Port Environment Committee

Report on the Survey Results of Water Quality Issues in Ports

International Association of Ports and Harbors (IAPH)

January 2011

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FOREWORD BY COMMITTEE CHAIR ON PORT ENVIRONMENT

"REPORT ON THE SURVEY RESULTS OF WATER QUALITY ISSUES IN PORTS"

Dear Members,

As Chairperson of the IAPH Port Environment Committee, it is indeed an honour for me to be involved in the collating of information prior publishing of this report on the Survey Result of Water Quality Issues in Ports.

This 63 page comprehensive report is the outcome of one of the discussions held during the committee meeting held in Genoa, Italy in 2009. As a result this item was included into our committee's work plan for the year 2009 – 2011.

Out of the total IAPH members, 65 member ports participated in this survey. Areas covered in the survey include estuary water quality, studies of spawning, oil and chemical spillage, the promotion of cleaning surface water in ports, monitoring of sea grass and mussels and in some ports monitoring of air quality as well.

It is hoped that the above report will be beneficial to our members and will serve as a guide for those ports planning to undertake such similar projects in the future.

Best regards.

January 2011

Capt. David Padman
Chairperson
Port Environment Committee , IAPH

Table of Contents

List of Tables

List of Charts

Report of IAPH Survey Results on Water Quality Issues in Ports

Executive Summary

1. Introduction

In May 2009 at Genova, Italy, the issue of port water quality was proposed from a member of IAPH Port Environment Committee to be listed as one of its work items for 2009/2011 Work Plans. After adopted as a Committee Work Item, IAPH member ports' survey was conducted in summer 2010.

Total 65 member ports have responded with detailed relevant information of port initiatives implemented in their ports. While ports in Europe and Asia regions are main respondents, which accounts for 70 % of total responded ports, Oceania and North America regions show specifically high response ratio of more than 60% among registered regular members in respective regions. Obtained data on respondents was analyzed in detail, which can be found in Item I. "Analysis of Respondents" of this report.

2. Survey Questionnaires

Survey questionnaires comprise total 11 questions, which are categorized into the following six fields.

1) Port Water Quality Programs/ Action Plans (Q1~3)
2) Regulatory Requirements/Standards for Port Water Quality (Q4~6)
3) Monitoring Water Quality (Q7)
4) Dissemination of Water Quality Data/Information (Q8)
5) Water Quality Issues due to Water Circulation/Flow Regimes (Q9&10)
6) Port Basin as a Water Intake Source (Q11)

A form of survey questionnaires is attached in the Appendix of the report.

3. Results of Survey

Survey results of each field of questionnaires are summarized as below.

1) Port Water Quality Programs/ Action Plans (Q1~3)

- While 57% of the total ports have implemented their Port Water Quality Programs, Oceania and North America regions show especially high ratio of implementation of Port Programs.
- On the other hands, it can be found that such implementation ratios are influenced by geographical elements of ports, namely Island port/Sea port/River or Channel port.

- As for issues covered by such programs, Water Quality is the most popular issue, which accounts for 81% in total programs followed by Sediment Quality issue (53%).
- Almost a half of No-Program ports intend to establish their port programs in future. (Ports in Asia and Europe regions show low ratios of future implementation)
- Port websites on Water Quality Programs are constructed in almost a half of ports that implemented programs.

2) Regulatory Requirements/Standards for Port Water Quality (Q4~6)

- Regulatory requirements on Port Water Quality are placed with a high ratio (82%) in total, except Africa and South America regions.
- The survey shows that such requirements are based on public laws of State, Federal or City rules (77% of total respondents).
- There are strong possibilities that ports having port water programs are under regulatory enforcement on water quality by public rules. (Please see the table 8 and chart 12)

3) Monitoring Water Quality (Q7)

- Port water quality monitoring is conducted mainly by Environment agencies of State or City in more than 2/3 of all responded ports. Port authorities are the following main parties of such monitoring with nearly a half of total respondents. Especially in North America and Oceania region, Port authorities act as main monitoring parties.
- As for items of monitoring, Water Quality is the most popular item to be monitored in all regions (88% of all respondents). Sediment Quality is the following major item to be monitored (65% of responded ports).
- As for monitoring area, “Port Basin & Outer Area” is the most frequently observed area (58% of all respondents). “Port Basin-only” is the following area of frequently monitored (28% of all responded ports).
- As for frequency of monitoring, Monthly Monitoring is the most popular frequency of monitoring (38% of total respondents). 28% of ports responded as Less Frequent than Monthly Monitoring.

4) Dissemination of Water Quality Data/Information (Q8)

- Environment agencies of State or City are the main parties of publication of port water quality information (60 % of all respondents). Port Authority, while low ratio (22%) in total, is the main party of publication in Oceania region (about 50%).

5) Water Quality Issues due to Water Circulation/Flow Regimes (Q9&10)

- 38% of all respondents experience water quality issues caused by semi-closed water flow regime in their ports. Especially ports in Africa and South America regions show strong concerns about such issues in

- Only 8% of all respondents, and 20% of ports which currently hold water circulation problems have technological solution being applied to their ports.

6) Port Basin as a Water Intake Source (Q11)

- 45% of all respondents answered that water in port basin is a source of intake for plants and other facilities. Such ratio is found high in Africa, Europe and Asia regions and low (less than 30%) in North America and Oceania regions.

4. Best Practices in member ports

- For useful knowledge to establish Port Water Quality Programs in industrial ports, good practices of Port Programs implemented in IAPH member ports are listed in the Appendix of this report with their relevant websites.

I. Analysis of Respondents

Total 65 ports from 29 countries have responded to the survey.

(Table 1: Summary of Survey Respondents by Country & Region)

	Registered Members		Responded Members		Number of Respondents by Country			
Region	Countries (a)	Registered members (b)	Countries (c) (Response Ratio) , (c)/(a)	Respondents (d) (Response Ratio) ,(d)/(b)	Country of Responded Members	Registered members in the responded Countries	Respondents in the Countries	(Response Ratio)
Africa Region	20	22	3	3	Mauritius	2	1	50%
			15%	14%	Senegal	1	1	100%
					Nigeria	1	1	100%
					S.Total	4	3	75%
Europe Region	24	55	13	20	Spain	12	4	33%
			54%	36%	France	8	3	38%
					Netherlands	4	2	50%
					Russia	2	2	100%
					Croatia	1	1	100%
					Cyprus	1	1	100%
					Denmark	2	1	50%
					Finland	1	1	100%
					Israel	3	1	33%
					Latvia	1	1	100%
					Malta	1	1	100%
					Romania	1	1	100%
					Sweden	2	1	50%
					S.Total	39	20	51%
North America	2	11	1	7	USA	10	7	70%
			50%	64%	S.Total	10	7	
South America	8	9	3	3	Panama	1	1	100%
			38%	33%	Peru	1	1	100%
					T&Tobago	2	1	50%
					S.Total	4	3	75%
America Total	10	20	4	10	America Total	14	10	71%
			40%	50%				
Eastern & Southern Asia	11	73	5	23	Japan	27	16	59%
			45%	32%	Malaysia	12	4	33%

					China	15	1	7%
					Philipine	2	1	50%
					Myanmar	1	1	100%
					S.Total	57	23	40%
Western & Central Asia	9	22	2	2	Bangladesh	2	1	50%
			22%	9%	Maldives	1	1	100%
					S.Total	3	2	67%
Asia Total	20	95	7	25	Asia Total	60	25	42%
			35%	26%				
Oceania	4	9	2	7	Australia	3	3	100%
			50%	78%	New Zealand	4	4	100%
					S.Total	7	7	100%
Grand Total	78	201	29	65	Total	124	65	52%
			37%	32%				

1. Numbers of Respondents and their Regional Share among Total Respondents

Asia Region: 25 ports (38%) from 7 countries

Europe Region: 20 ports (31%) from 13 countries

America Region: 10 ports (15%) from 4 countries

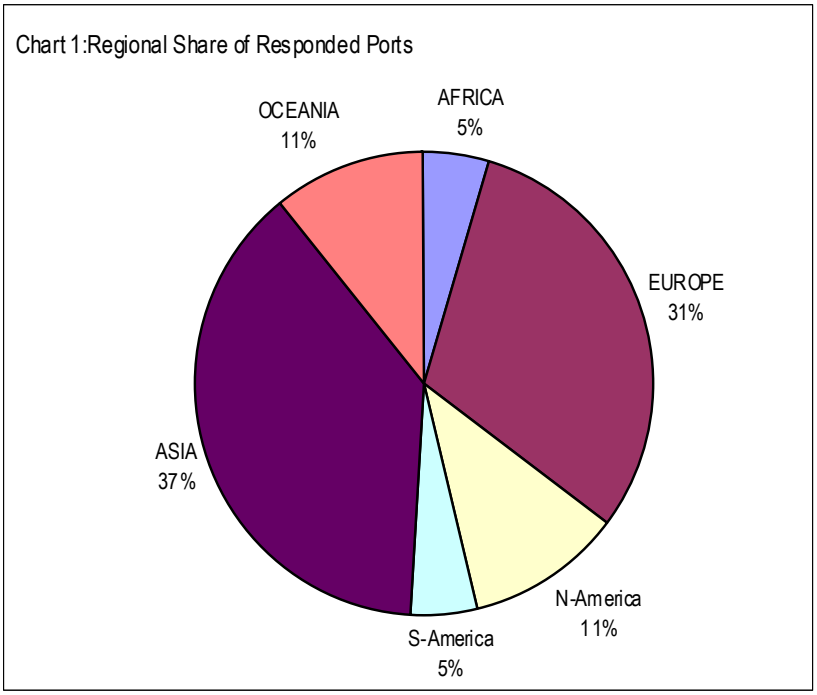
<North America: 7 ports (11%)>

<South America: 3 ports (5%)>

Oceania Region: 7 ports (11%) from 2 countries

Africa Region: 3 ports (5%) from 3 countries

Total: 65 ports from 29 countries

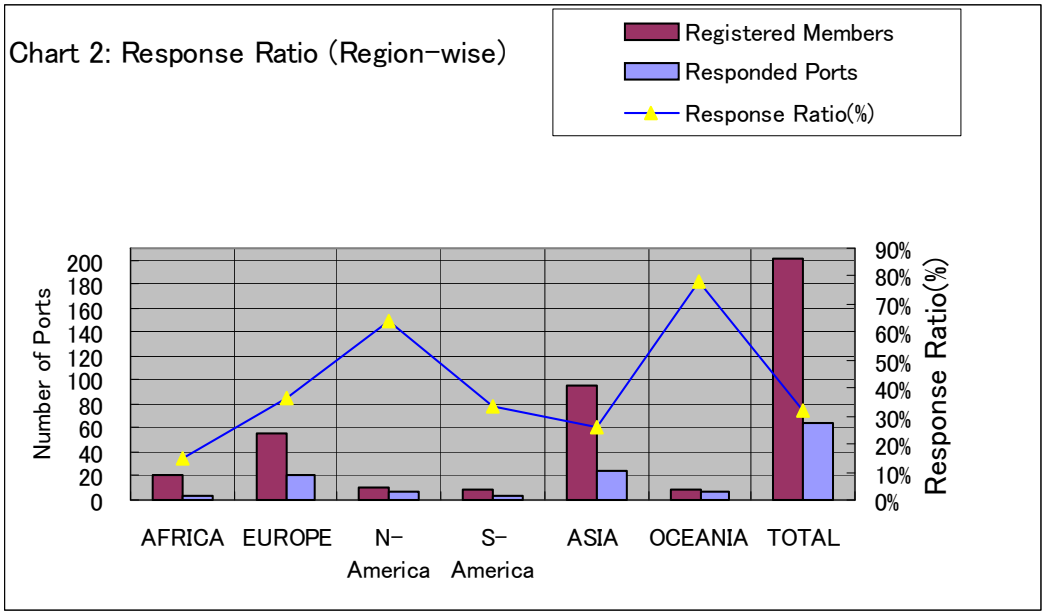


- ***Ports in Asia and Europe regions are major respondents with sharing total 70% among all respondents.***
- ***On the other hand, respondents from Africa and South America regions account for small share in total respondents.***

2. Response Ratio against Registered IAPH Regular Members

1) Response ratio among registered member ports by Region (as of 2010-Jul-20)

Oceania Region:	78% (7 ports / 9 regular members)
America Region:	50% (10 ports / 20 regular members)
	<North America: 64% (7 ports / 11 regular members) >
	<South America: 33% (3 ports / 9 regular members) >
Europe Region:	36% (20 ports / 55 regular members)
Asia Region:	26% (25 ports / 95 regular members)
	<Eastern &Southern Asia: 32% (23 ports / 73 regular members)>
	<Western &Central Asia: 9% (2 ports / 22 regular members)>
Africa Region:	15% (3 ports / 22 regular members)
Total:	32% (65 ports / 201 regular members)

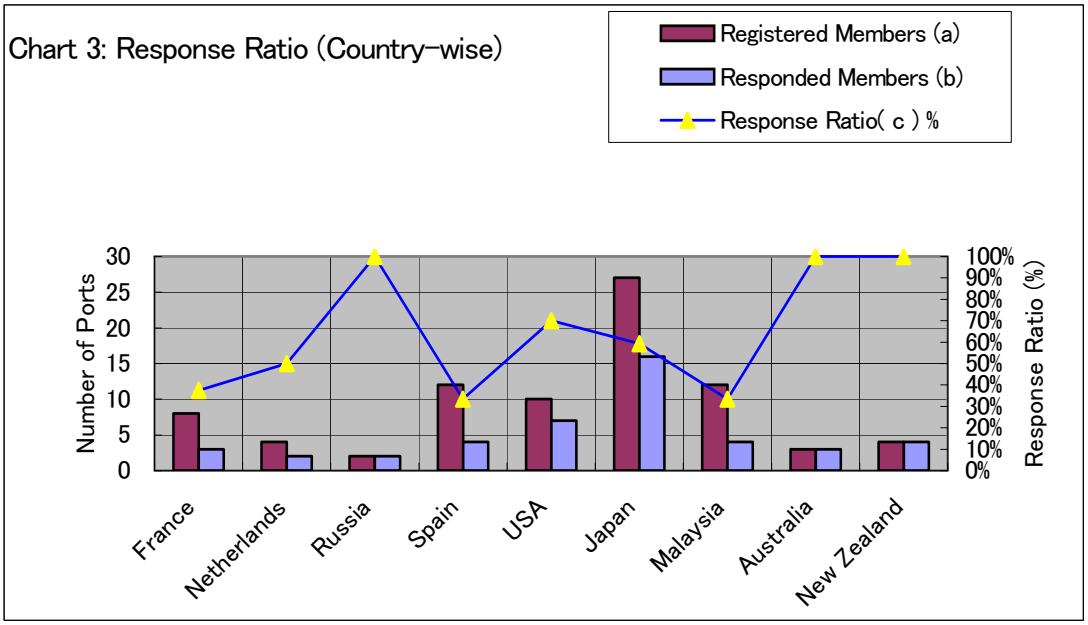


- ***Oceania and North America regions show high responding rate (more than 60% each) among registered IAPH regular members in respective region.***
- ***On the other hand, Africa region and Western & Central Asia Region show low responding rate (no more than 15%) among each registered regular members.***
- ***This result might indicate a presumption that "water quality issues in ports" are regarded and addressed with higher concerns in North America and Oceania region, rather than in other regions.***

2) Response Ratio among Registered Member Ports by Country

Response ratios among registered regular members in major responding countries are as below.(only listed following countries where no less than two ports responded)

Oceania Region:	Australia	100% (3 respondents/ 3 members)
	New Zealand	100% (4 respondents/ 4 members)
America Region:	USA	70% (7 respondents/ 10 members)
Europe Region:	Russia	100% (2 respondents/ 2 members)
	Netherlands	50% (2 respondents/ 4 members)
	France	38% (3 respondents/ 8 members)
	Spain	33% (4 respondents/ 12 members)
Asia Region:	Japan	59% (16 respondents / 27 members)
	Malaysia	33% (4 respondents / 12 members)



- ***Countries in Oceania region, i.e. Australia and New Zealand show 100% responses of their registered regular members. Russia also shows 100% response of its members (though it has only two registered members). Following above countries, USA recorded high ratio of 70% response.***

II. Analysis of Survey Answers on Water Quality Issues in Ports

1. "Water Quality Programs" in Ports (Q1~3)

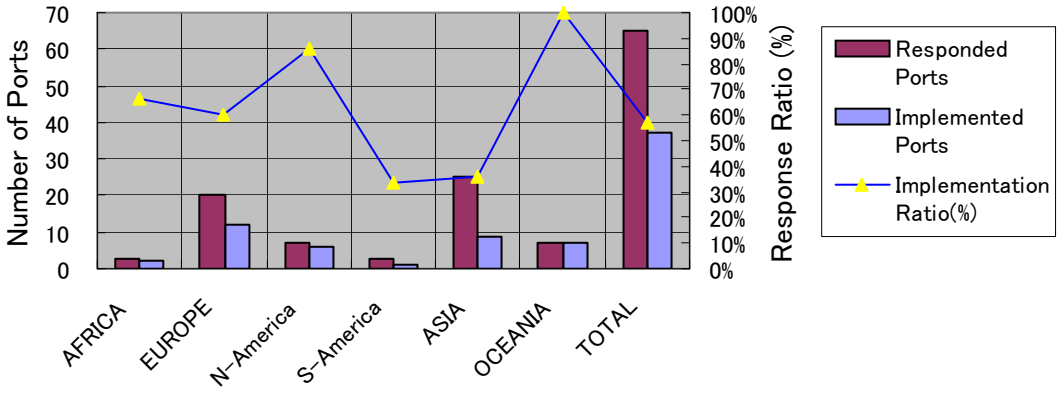
1) Number of ports implementing Water Quality Programs (Q1)

- Total 37 ports (57%) among 65 responded ports have implemented 53 programs in their ports.

a) Program-Implementation Ratio of ports among responded ports (Region-wise)

Africa region:	67 % (2 ports/ 3 respondents)
Oceania region:	100 % (7 ports/ 7 respondents)
North America region:	86 % (6 ports/ 7 respondents)
Europe region:	60 % (12 ports/20 respondents)
Asia region:	36% (9 ports/ 25 respondents)
South America region:	33% (1 port/ 3 respondents)
Total:	57% (37 ports / 65 respondents)

Chart 4:Implementation Ratio of Programs (Region-wise)



- ***In total, more than half of responded ports have introduced Water Quality programs in their ports.***
- ***High implementation ratio is shown in Oceania (100%) and North America region (86%). On the other hand, low ratio of program implementation is seen in Asia (36%) and South America region (33%).***

b) Implementation Ratio of Programs among responded ports (Country-wise)

(We have only listed following countries where no less than two ports responded)

-Europe Region

(Netherlands)	100% (2 ports / 2 respondents)
(France)	100% (3 ports / 3 respondents)

(Spain) 75% (3 ports / 4 respondents)

(Russia) 50% (1 port / 2 respondents)

-N-America Region

(USA) 86% (6 ports / 7 respondents)

(For US west-coast ports; 100% of responded ports)

-Asia Region

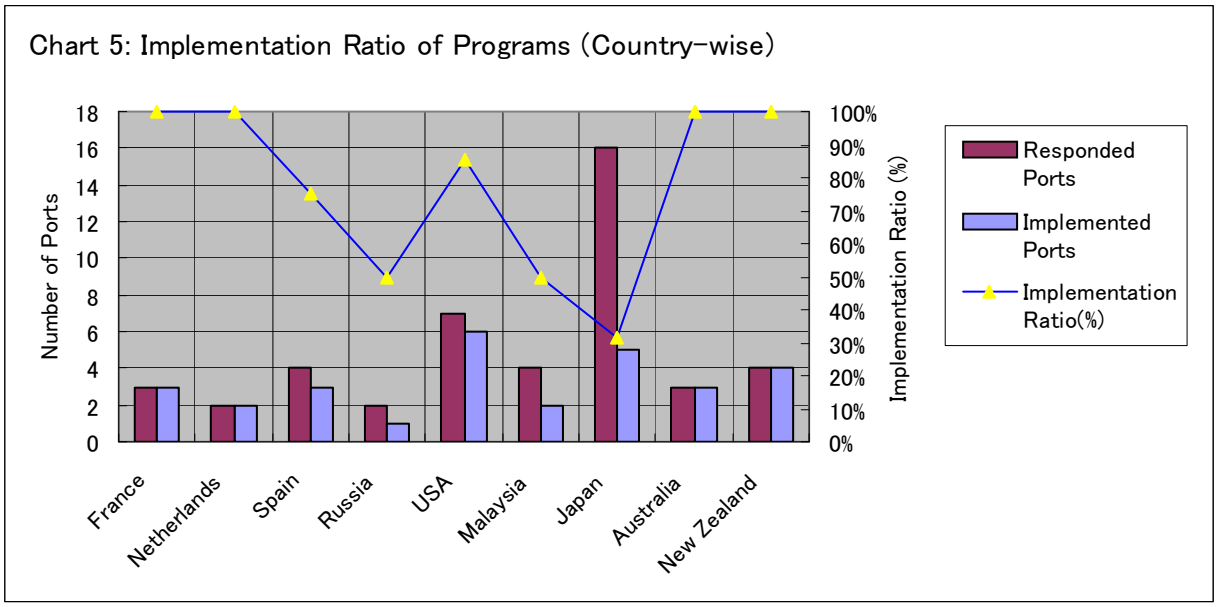
(Malaysia) 50% (2 ports / 4 respondents)

(Japan) 31% (5 ports / 16 respondents)

-Oceania Region

(Australia and) 100% (3 ports / 3 respondents)

(New Zealand) 100% (4 ports / 4 respondents)



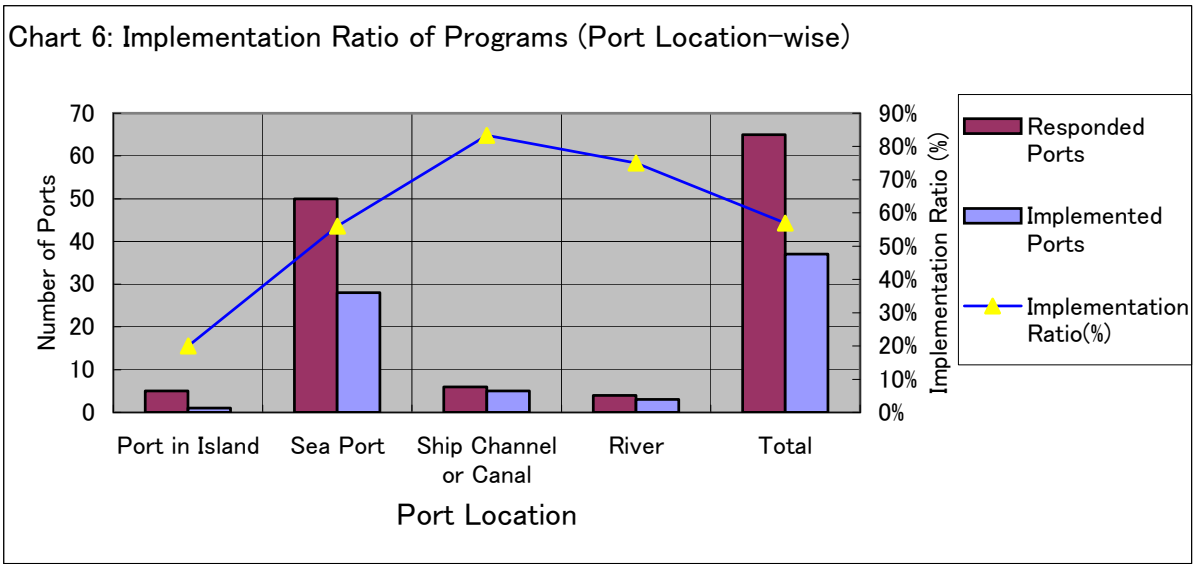
- ***Countries in Oceania region, i.e. Australia and New Zealand show 100% implementation of Water Quality Programs in their responded ports.***
- ***Both Netherlands and France in Europe region also show 100% implementation in their countries.***
- ***USA recorded high ratio of 86% implementation, especially showing 100% ratio in its west-coast ports.***
- ***In the other hand, ports in Japan show low ratio (31%) of implementation of such programs.***

c) Analysis of implementation ratio of programs by geographical location of port

Categorizing responded ports by their geographical location as River Ports(or Channel Ports)/ Sea ports/ Island Ports, implementation ratio of water quality programs among responded ports is shown as below.

(Table 2: Implementation Ratio of Programs among Responded Ports Categorized by Port Location)

		Port in Island	Sea Port	Ship Channel or Canal	River	Total
Africa Region	Responded Ports	1	2			3
	Implemented Ports	1	1			2
Europe Region	Responded Ports	2	13	4	1	20
	Implemented Ports	0	8	3	1	12
N-America	Responded Ports	0	4	2	1	7
	Implemented Ports	0	3	2	1	6
S-America	Responded Ports	1	2			3
	Implemented Ports	0	1			1
Asia Region	Responded Ports	1	22		2	25
	Implemented Ports	0	8		1	9
Oceania Region	Responded Ports		7			7
	Implemented Ports		7			7
Total	Responded Ports	5	50	6	4	65
	Implemented Ports	1	28	5	3	37
	Implementation Ratio(%)	20%	56%	83%	75%	57%



- ***As general tendency of program implementation ratio among world ports from geographical point of view, high ratio of program implementation is seen in River Ports (75%) and Channel Ports (83%) rather than Sea Ports (56%) or Island Ports (20%).***

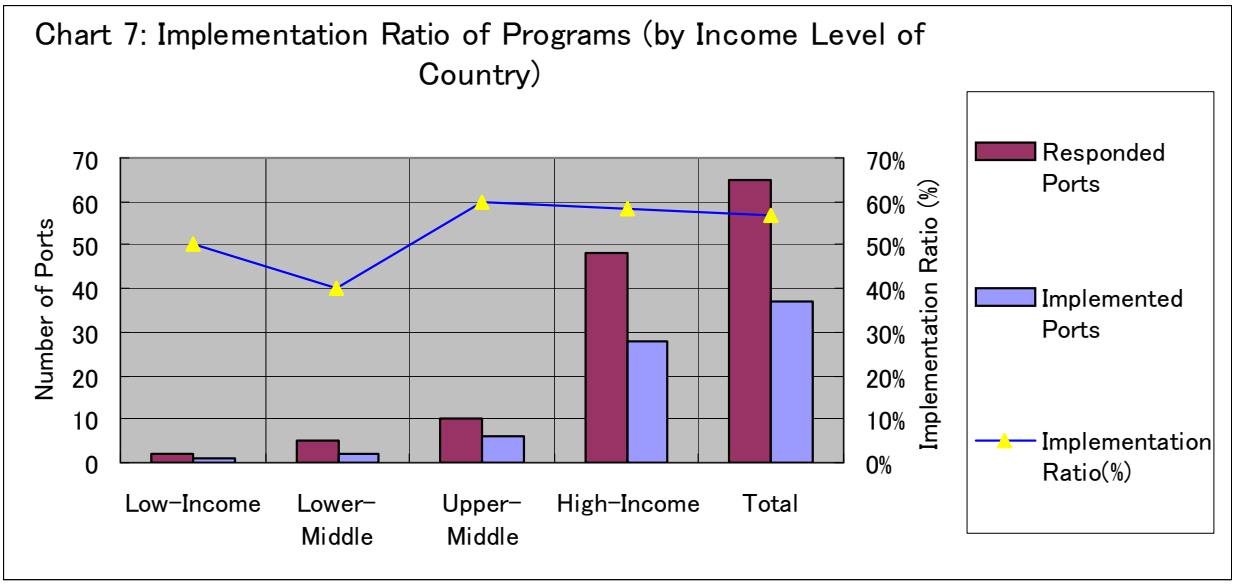
d) Analysis of implementation ratio of programs among responded ports by income level of country where port belongs to (Using World Bank's classification of country by income level)

Categorizing responded ports by income level of countries according to World Bank's classification as Low-Income/Lower-Middle-Income/ Upper-Middle-Income/ High-Income, implementation ratio of programs in responded ports are shown as below.

(Table 3: Implementation Ratio of Programs among Responded Ports Categorized by Income Level of Country)

		Low-Income	Lower-Middle	Upper-Middle	High-Income	Total
Africa Region	Responded Ports		2	1		3
	Implemented Ports		1	1		2
Europe Region	Responded Ports			3	17	20
	Implemented Ports			2	10	12
N-America	Responded Ports				7	7
	Implemented Ports				6	6
S-America	Responded Ports			2	1	3
	Implemented Ports			1	0	1
Asia Region	Responded Ports	2	3	4	16	25
	Implemented Ports	1	1	2	5	9
Oceania Region	Responded Ports				7	7
	Implemented Ports				7	7
Total	Responded Ports	2	5	10	48	65
	Implemented Ports	1	2	6	28	37
	Implementation Ratio(%)	50%	40%	60%	58%	57%

(According to World Bank's classification of Income Level of Country)



- ***While we can see that higher ratio of implementation is seen in the ports of higher income-level countries (58~60%) rather than in lower-income -level countries (40~50%), the gap between two groups is small.***

２） Number of programs implemented in ports (Q2)

a) Average number of programs among Responded Ports (Region-wise)

Africa Region:	1.0 programs/port (3 programs / 3 responded ports)
Europe Region:	0.9 programs/port (17 programs / 20 responded ports)
North America:	1.1 programs/port (8 programs / 7 responded ports)
South America:	0.3 program /port (1 program /3 responded ports)
Asia Region:	0.5 programs/port (12 programs/ 25 responded ports)
Oceania Region:	1.7 programs/port (12 programs / 7 responded ports)
Total Average:	0.8 programs/port (53 programs / 65 responded ports)

- ***Oceania region recorded the highest average number of programs per responded port(1.7 program/ responded port), which is more than double of average number of programs in all regions(Average 0.8 programs/port).***
- ***On the other hand, South America and Asia region recorded low average number of programs per port.***

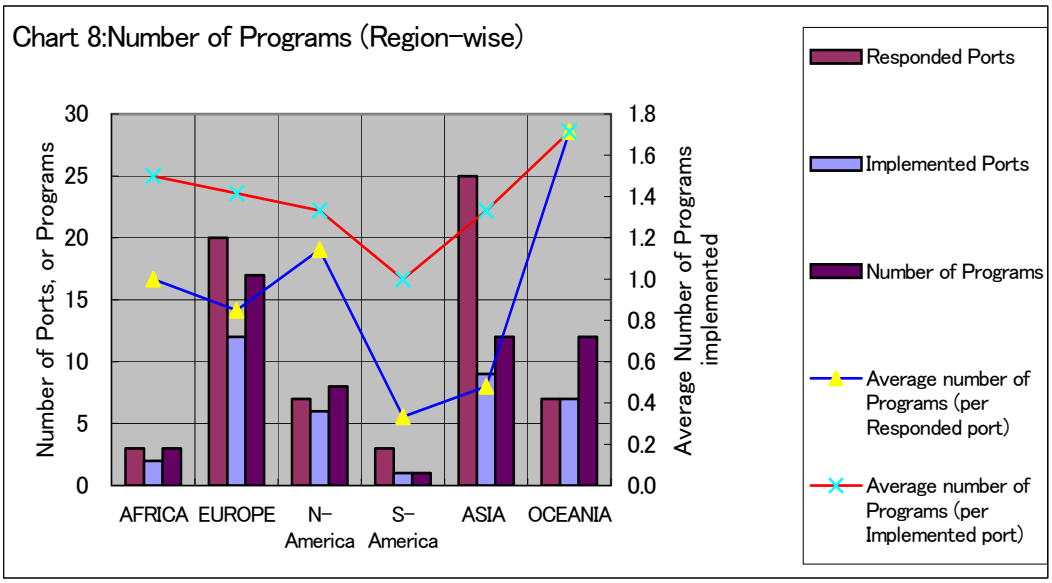
b) Average number of programs among Implemented Ports in each region

Africa Region:	1.5 programs/port (3 programs / 2 implemented ports)
Europe Region:	1.4 programs/port (17 programs / 12 implemented ports)
North America:	1.3 programs/port (8 programs / 6 implemented ports)
South America:	1.0 program /port (1 program / 1 implemented port)
Asia Region:	1.3 programs/port (12 programs / 9 implemented ports)
Oceania Region:	1.7 programs/port (12 programs / 7 implemented ports)
Total average:	1.4 programs/port (53 programs / 37 implemented ports)

(Table 4: Number of Water Quality Programs Implemented in Ports by Region)

	AFRICA	EUROPE	N-America	S-America	ASIA	OCEANIA	TOTAL
Responded Ports (a)	3	20	7	3	25	7	65
Implemented Ports (b)	2	12	6	1	9	7	37
Number of Programs (c)	3	17	8	1	12	12	53
Average number of Programs (per Responded port) (c)/ (a)	1.0	0.9	1.1	0.3	0.5	1.7	0.8

Average number of Programs (per Implemented port) (c) / (b)	1.5	1.4	1.3	1.0	1.3	1.7	1.4



- ***Average number of programs per implemented port in all regions is 1.4 programs. It indicates that about 40% of implemented ports in all regions have established plural programs in their ports.***
- ***The above data also shows high average number of programs per port introduced in Oceania region (1.7 programs).***

c) Ratio of ports having Plural-Programs among Implemented Ports in each region

Africa Region:	50 % (1 port of plural-program / 2 implemented ports)
Europe Region:	42 % (5 ports of plural-program / 12 implemented ports)
North America:	33 % (2 ports of plural-program / 6 implemented ports)
South America:	0 % (No ports of plural-program / 1 implemented port)
Asia Region:	33 % (3 ports of plural-program / 9 implemented ports)
Oceania Region:	71% (5 ports of plural-program / 7 implemented ports)
Total:	43% (16 ports having plural-program among 37 implemented ports)

- ***Almost half of program-ports (43% of 37 implemented ports) have plural programs. Oceania region recorded high ratio, especially in New Zealand, all responded ports have two programs.***

3) Covering issues or areas of such port programs (Q2)

a) Ratio of covering issues among all implemented programs

i) Port Basin Water quality:	81% (43 programs among total 53 programs)
ii) Sediment quality:	53% (28 programs among total 53 programs).

iii) Other issues: 32% (17 programs among total 53 programs)

- ***Port Basin Water quality issue is the most major item of port programs with sharing more than 80 % of all implemented programs.***
- ***Sediment quality is covered in more than half of all implemented programs.***

b) Ratio of covering issues of programs in each region

<Africa Region>

i) Port Basin Water quality: 100% (3 programs among total 3 programs)
ii) Sediment quality: Nil
iii) Other issues: Nil

<Europe Region>

i) Port Basin Water quality; 65% (11 programs among total 17 programs)
ii) Sediment quality: 53% (9 programs among total 17 programs)
iii) Other issues: 35% (6 programs among total 17 programs)

<North America>

i) Port Basin Water quality: 75% (6 programs among total 8 programs)
ii) Sediment quality: 50% (4 programs among total 8 programs).
iii) Other issues: 13% (1 program among total 8 programs)

<South America>

i) Port Basin Water quality: 100% (1 program among total 1 program)
ii) Sediment quality: 100% (1 programs among total 1 program).
iii) Other issues: Nil

<Asia Region>

i) Port Basin Water quality: 92% (11 programs among total 12 programs)
ii) Sediment quality: 33% (4 programs among total 12 programs).
iii) Other issues: 42% (5 programs among total 12 programs)

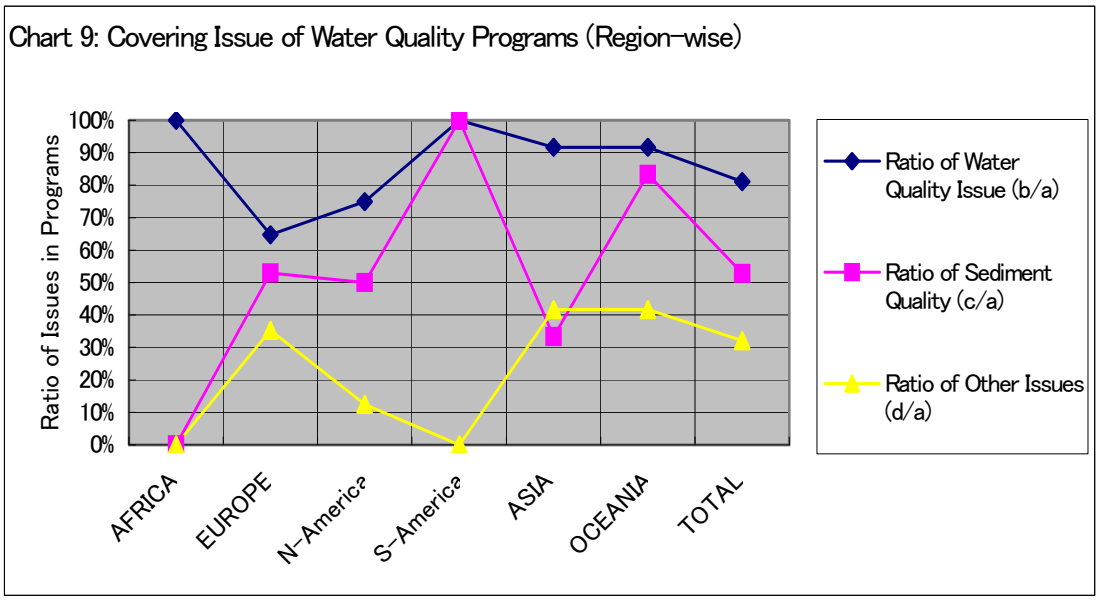
<Oceania Region>

i) Port Basin Water quality: 92% (11 programs among total 12 programs)
ii) Sediment quality: 83% (10 programs among total 12 programs).
iii) Other issues: 42% (5 programs among total 12 programs)

(Table 5: Covering Issues of Water Quality Programs in Ports (Region-wise))

	AFRICA	EUROPE	N-America	S-America	ASIA	OCEANIA	TOTAL
Number of Programs (a)	3	17	8	1	12	12	53
Port Basin Water Quality Issue (b)	3	11	6	1	11	11	43
Sediment Quality Issue (c)	0	9	4	1	4	10	28
Other Issues (d)	0	6	1	0	5	5	17
Ratio of Water Quality Issue (b/a)	100%	65%	75%	100%	92%	92%	81%
Ratio of Sediment Quality (c/a)	0%	53%	50%	100%	33%	83%	53%
Ratio of Other Issues (d/a)	0%	35%	13%	0%	42%	42%	32%

(Ratios of covering issues are figures among implemented programs)



- ***While Port-Basin-Water-Quality issue is taken up with high ratio (81%) in all regions, the issue is recorded with comparative mid-range ratio in Europe (65%) and North America region (75%).***
- ***While Sediment Quality issue is taken up by almost half (53%) of implemented programs, South America (100%) and Oceania regions (83%) recorded specifically high ratio in their ports.***
- ***Other issues rather than Water Quality or Sediment Quality, which are recorded low ratio of average 32% in total, are taken up comparatively high in Asia(42%) and Oceania regions(42%).***

- ***Examples of items taken up as other issues in the programs are as below.***

<Europe Region>

- Loire estuary water quality (France)
- Periodic studies of spawning of the Baltic herring (Finland)
- Water quality legally defined as the port service area (Spain)

<Asia Region>

- Oil & Chemical spillage in port area (Malaysia)
- Promotion of cleaning surface water (Japan)

<Oceania Region>

- Mussels, Mangroves, Sea-grass, Inter-tidal habitat, etc. (Australia)
- Air quality, All environmental aspects from port operation (New Zealand)

- ***If we count "Water quality outside of port basin" now categorized in other issues into "Water Quality Issue" category, the ratio of Water quality will be higher than current 81%.***

4) Future plan to implement water quality programs in port(Q3)

a) Ratio of ports having future plan to implement port program among no-program ports in all regions

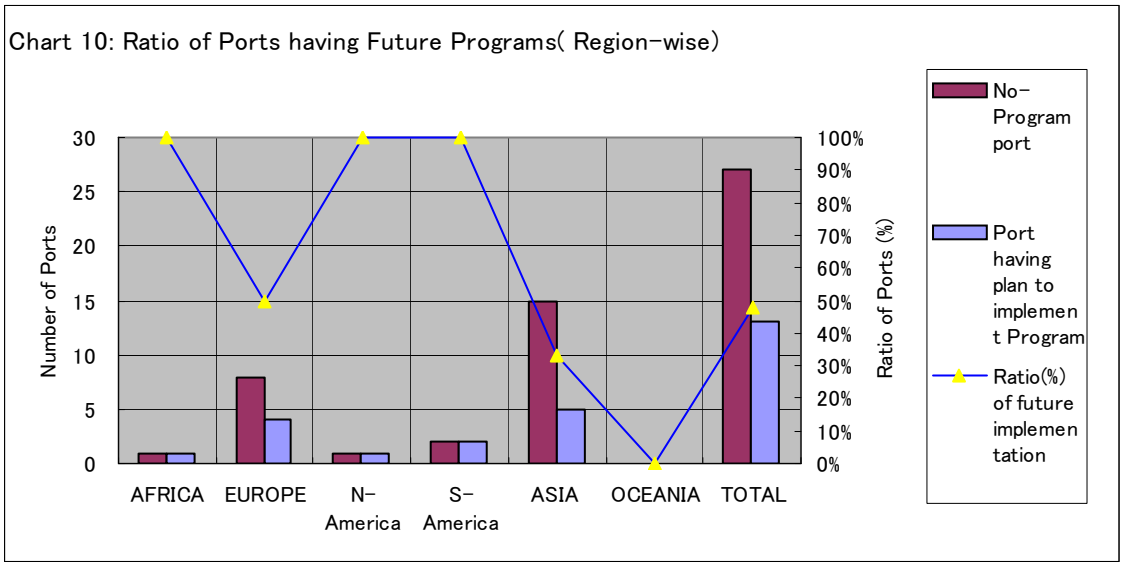
- ***In total, 13 ports (48%) of 27 no-program ports have intention to implement water quality program in future.***

b) Ratio of ports having future plan among no-program ports in each region

Africa Region: 100% (1 port/ 1 no-program port)
Europe Region: 50% (4 ports/ 8 no-program ports)
North America: 100% (1 port/ 1 no-program port)
South America: 100% (2 ports/2 no-program ports)
Asia Region: 33% (5 ports /15 no-program ports)
Oceania Region: (all respondents have programs)
Total: 48% (13 ports / 27 no-program ports)

(Table 6: Ratio of Ports having Future Plan of Water Quality Programs (Region-wise)

	AFRICA	EUROPE	N-America	S-America	ASIA	OCEANIA	TOTAL
No-Program port	1	8	1	2	15	0	27
Port having plan to implement Program	1	4	1	2	5	0	13
Ratio(%) of future implementation	100%	50%	100%	100%	33%	n/a	48%



- ***While 100% of no-program ports in North and South America show their intention to implement programs in future, ports in Europe and Asia region show low ratio. Especially in Asia region, only 33% of no-program ports have intention to have such programs in future.***

c) Major reasons of no future plan to establish water quality programs in ports

<Europe Region>

- Water quality programs are already developed by State environment agency. (Denmark, Latvia)

<Asia Region>

- Specific water quality problems do not exist in their ports (Japan, Myanmar)
- No water quality problems exist due to their ports' location (being open to sea) (Maldives, Malaysia)

We can summarize main reasons of their no-intention of future plan as below.

- ***No water quality problems exist in their ports***
- ***Other governmental agencies have already established such programs.***

5) Port Website concerning such Water Quality Programs (Q2)

a) Implementation ratio of website

Total 20 relevant websites have been established in 16 ports.

- 25% of total responded ports (16 ports/65 respondents)
- 43% of program-implemented ports (16 ports/37 program-ports)

- ***While implementation ratio of website among all responded ports is low (25%), almost half (43%) of program-ports have their own website of port water quality programs.***

b) Analysis of establishment ratio of website by Region

Africa Region

-No websites.

Europe Region

25% of total responded ports (5 ports/20 respondents)

42% of program-ports (5 ports/12 program-ports)

N. America Region

43% of total responded ports (3 ports/7 respondents)

50% of program-ports (3 ports/6 program-ports)

S. America Region

33% of total responded ports (1 port/3 respondents)

100% of program-ports (1 port/1 program-port)

Asia Region

16% of total responded ports (4 ports/25 respondents)

44% of program-ports (4 ports/9 program-ports)

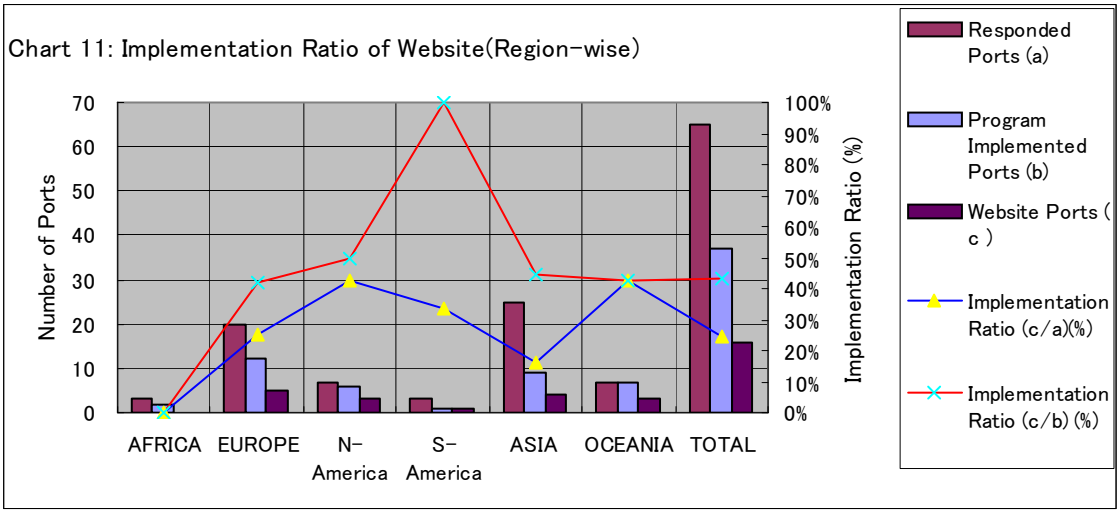
Oceania Region

43% of total responded ports (3 ports/7 respondents)

43% of program-ports (3 ports/7 program-ports)

(Table 7: Implementation Ratio of Website of Water Quality Program by region)

	AFRICA	EUROPE	N-America	S-America	ASIA	OCEANIA	TOTAL
Responded Ports (a)	3	20	7	3	25	7	65
Program Implemented Ports (b)	2	12	6	1	9	7	37
Website Ports (c)	0	5	3	1	4	3	16
Implementation Ratio over responded ports (c/a)(%)	0%	25%	43%	33%	16%	43%	25%
Implementation Ratio over implemented ports (c/b) (%)	0%	42%	50%	100%	44%	43%	43%



- ***Though implementation ratio of web-programs among responded ports vary rather widely (from 16% of Asia region to 43% of North America and Oceania regions), the ratio among program-implemented ports shows comparatively smaller variances centering around 40%.(The data of Africa region and South America regions are ought to be treated exceptionally due to their few case examples of respondents)***

2. Regulatory Requirements or Standards on Port Water Quality (Q4~6)

1) Number of ports subject to regulatory requirements on port water quality issues (Q4)

Africa Region:	33% (1 port / 3 responded ports)
Europe Region:	85% (17 ports/20 responded ports)
North America:	100% (7 ports/ 7 responded ports)
South America:	33% (1 port/ 3 responded ports)
Asia Region:	84% (21 ports /25 responded ports)
Oceania Region:	86% (6 ports / 7 responded ports)
Total:	82% (53 ports / 65 responded ports)

- ***Total 53 ports (82% of responded ports) are under regulatory requirements or standards regarding water quality or sediment quality issues in ports.***
- ***Ports in Europe, North America, Asia and Oceania regions show high ratio of being under regulatory requirements on port water quality.***
- ***On the other hand, ports in South America and Africa show low rate (33%) of such regulatory requirements in ports.***

2) Regulatory differences of quality requirements between port area and other area (Q5-2)

Following ports replied that there exist differences of regulatory requirements between port area and other areas.

Africa Region:	(No answer)
Europe Region:	15% (3 ports of 20 respondents)
North America:	43% (3 ports of 7 respondents)
South America:	33% (1 port of 3 respondents)
Asia Region:	8% (2 ports of 25 respondents)
Oceania Region:	29% (2 ports of 7 respondents)
Total:	17% (11 ports of total 65 responded ports)

- ***Total 42 ports (65% of responded ports) replied that no different regulatory requirements exist between port area and other area.***
- ***On the other hand, 11 ports (17% of total respondents) answered that different regulatory requirements exist in port area from other area. Especially in North America region, considerably high ratio (43%) of ports responded that they are subject to different regulative requirements in port area.***

3) Water quality requirements or standards based on law or regulation (Q5-3)

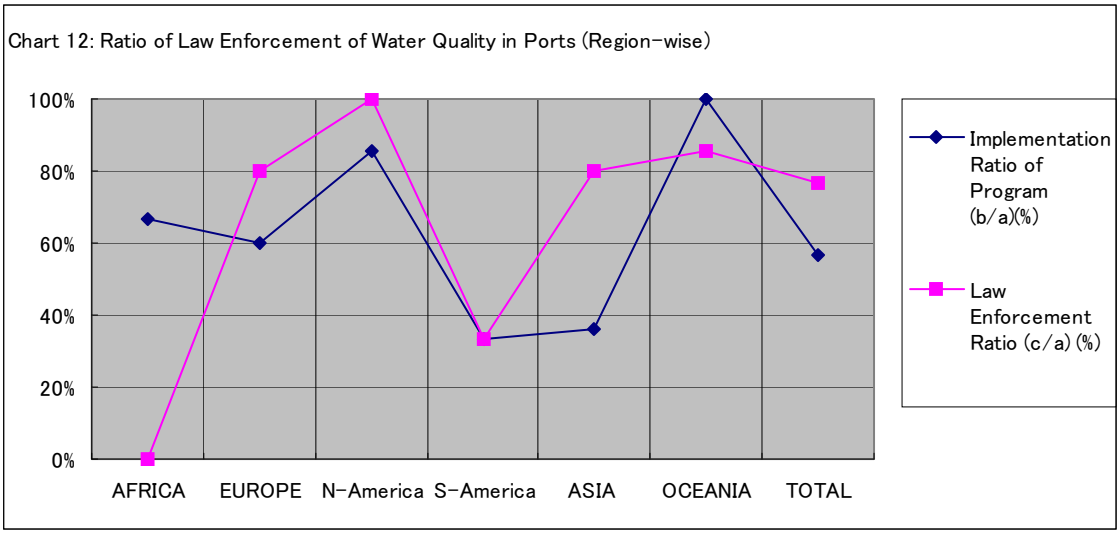
Following ports replied that regulatory requirements for port water quality are based on Federal, State or

City Law.

Africa Region:	(No answer)
Europe Region:	80% (16 ports of 20 respondents)
North America:	100% (7 ports of 7 respondents)
South America:	33% (1 port of 3 respondents)
Asia Region:	80% (20 ports of 25 respondents)
Oceania Region:	86% (6 ports of 7 respondents)
Total:	77% (50 ports of total 65 responded ports)

(Table 8: Ratio of Law Enforcement on Water Quality Standards in Ports by Region)

	AFRICA	EUROPE	N-America	S-America	ASIA	OCEANIA	TOTAL
Responded Ports (a)	3	20	7	3	25	7	65
Program Implemented Ports (b)	2	12	6	1	9	7	37
Law Enforcement (c)	n/a	16	7	1	20	6	50
Implementation Ratio of Program (b/a) (%)	67%	60%	86%	33%	36%	100%	57%
Law Enforcement Ratio (c/a) (%)	n/a	80%	100%	33%	80%	86%	77%



- ***In general, total 50 ports (77% of total responded ports) replied that relevant water quality standards or requirements in their ports are based on State, Federal or City law.***
- ***Ports in Europe, North America, Asia and Oceania regions show high ratio (more than 80% of responded ports in the regions) of having requirements or standards based on such public law.***
- ***On the other hand, ports in Africa and South America (33%) show comparatively low rate of regulatory requirements of port water quality based on such public law.***

- ***As shown in above Chart 12, there are correlation between ratios of implementation of Water Quality Programs and Law Enforcement on Port Water Quality. (Africa and Asia regions show some gaps between both ratios.)***

4) Issues or areas regulated by relevant public laws (Q6)

a) Ratio of regulated issues by public laws (For ports responded "YES" to Q5-3)

i) Port basin water quality: 76% (38 ports/50 ports responded "YES")

ii) Sediment quality: 56% (28 ports/50 ports responded "YES")

iii) Other issues: 32% (16 ports/50 ports responded "YES")

b) Ratio of regulated issues by public laws in each region

(For ports responded "YES "to Q5-3)

<Africa Region>

i) Water quality: (No answer)

ii) Sediment quality: (No answer)

iii) Other issues: (No answer)

<Europe Region>

i) Water quality: 69% (11 ports among 16 ports responded "YES")

ii) Sediment quality: 56% (9 ports among 16 ports responded "YES")

iii) Other issues: 31% (5 ports among 16 ports responded "YES")

<North America>

i) Water quality: 71% (5 ports among 7 ports responded "YES")

ii) Sediment quality: 57% (4 ports among 7 ports responded "YES")

iii) Other issues: 14% (1 port among 7 ports responded "YES")

<South America>

i) Water quality: 100% (1 ports among 1port responded "YES")

ii) Sediment quality: 100% (1 ports among 1port responded "YES")

iii) Other issues: (No answer)

<Asia Region>

i) Water quality: 80% (16 ports among 20 ports responded "YES")

ii) Sediment quality: 45% (9 ports among 20 ports responded "YES")

iii) Other issues: 40% (8 ports among 20 ports responded "YES")

<Oceania Region>

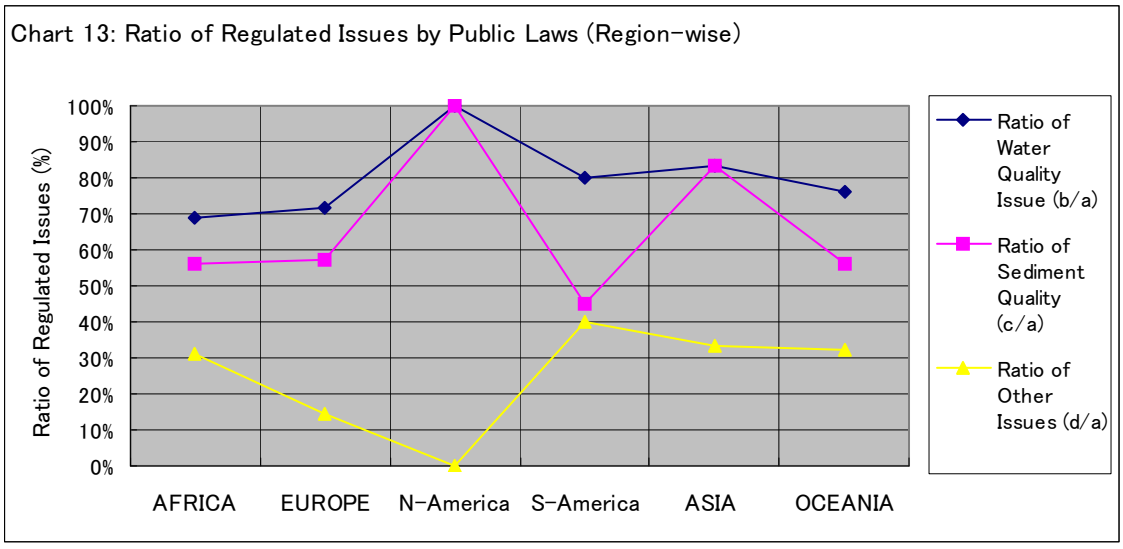
i) Water quality: 83% (5 ports among 6 ports responded “YES”)

ii) Sediment quality: 83% (5 ports among 6 ports responded “YES”)

iii) Other issues: 33% (2 ports among 6 ports responded “YES”)

(Table 9: Ratio of Regulated Issues by Public Laws by Region)

	AFRICA	EUROPE	N-America	S-America	ASIA	OCEANIA	TOTAL
Responded Ports as based on Law (a)	n/a	16	7	1	20	6	50
Water Quality Issue (b)	n/a	11	5	1	16	5	38
Sediment Quality Issue (c)	n/a	9	4	1	9	5	28
Other Issues (d)	n/a	5	1	0	8	2	16
Ratio of Water Quality Issue (b/a)	n/a	69%	71%	100%	80%	83%	76%
Ratio of Sediment Quality (c/a)	n/a	56%	57%	100%	45%	83%	56%
Ratio of Other Issues (d/a)	n/a	31%	14%	0%	40%	33%	32%



- ***Port basin water quality issue is the most regulated item by public laws in all regions (76% of total 50 ports responded “YES” to Q5-3).***
- ***Sediment quality issue in port is reported as regulated by public laws in a little more than half (56%) of 50 ports responded “YES”. Oceania region shows specifically high ratio (more than 80%) of regulating sediment issue by public laws.***
- ***On the other hand, the issue is reported as less regulated (45%) in Asia region.***
- ***While other issues rather than water quality or sediment quality regulated by public laws share about 32% in total, they show comparatively higher ratio (40%) in Asia region and lower share (14%) in North America region.***

c) Examples of other issues regulated by public laws

Major other issues regulated by such public laws;

- Europe Region: Impacts on water
  Sea beaches
  The Noordzee Kanaal
  Sea water in general
  All surface waters including sea water
- Asia Region: Other marine waters
  Public waters both in river/ lake /sea
  Discharge water
- Oceania Region: ANZECC & EPBC Act 1999 in Australia
  Ambient water monitoring programs in NZ

3. Monitoring Water Quality (Q7)

1) Who monitors quality of water or sediments? (Q 7-1)

a) For all responded ports

- Environment agencies of State or city: 68% of respondents (44 ports/65 ports)
- Port authority: 48% of respondents (31 ports/65 ports)
- Other parties: 35% of respondents (23 ports/65 ports)

b) Ratio of monitoring parties by region

<Africa Region>

- Environment agencies of State or city: 33% of respondents (1 port/3 ports)
- Port authority: 67% of respondents (2 port/3 ports)
- Other parties: 33% of respondents (1 port/2 ports)

<Europe Region>

- Environment agencies of State or city: 60% of respondents (12 ports/20 ports)
- Port authority: 40% of respondents (8 ports/20 ports)
- Other parties: 45% of respondents (9 ports/20 ports)

<North America Region>

- Environment agencies of State or city: 57% of respondents (4 ports/7 ports)
- Port authority: 71% of respondents (5 ports/7 ports)
- Other parties: 71% of respondents (5 ports/7 ports)

<South America Region>

- Environment agencies of State or city: 67% of respondents (2 ports/3 ports)
- Port authority: 33% of respondents (1 port/3 ports)
- Other parties: 67% of respondents (2 ports/3ports)

<Asia Region>

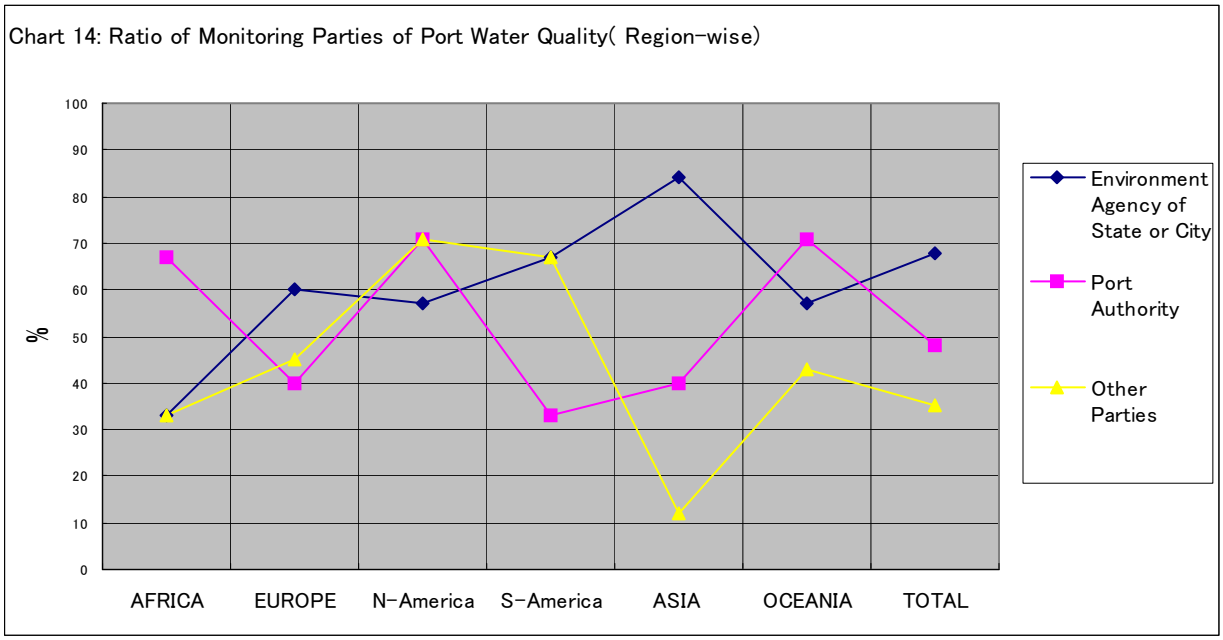
- Environment agencies of State or city: 84% of respondents (21 ports/25 ports)
- Port authority: 40% of respondents (10 ports/25 ports)
- Other parties: 12% of respondents (3 ports/25 ports)

<Oceania Region>

- Environment agencies of State or city: 57% of respondents (4 ports/7 ports)
- Port authority: 71% of respondents (5 ports/7 ports)
- Other parties: 43% of respondents (3 ports/7 ports)

(Table 10: Ratio of Monitoring Parties of Port Water Quality (Region-wise))

	AFRICA	EUROPE	N-America	S-America	ASIA	OCEANIA	TOTAL
Environment Agency of State or City	33	60	57	67	84	57	68
Port Authority	67	40	71	33	40	71	48
Other Parties	33	45	71	67	12	43	35



The above ratios will indicate following regional characteristics of monitoring parties.

<u>Environment agencies of State or city</u>

- ***While 68% of all responded ports answered that environmental agencies of State or city practice monitoring, Asia region shows its high ratio (84%) and North America and Oceania regions show comparative lower ratio (57%) of monitoring made by environment agencies of State or city.***

<u>Port authority as monitoring parties</u>

- ***While port authorities make monitoring in 48% of all responded ports, considerable number (71%) of port authorities in North America and Oceania region perform port water quality monitoring by them. In these regions, port authorities are major monitoring parties than environment agencies of State or city (57%).***

<u>Other parties as monitoring parties</u>

- ***While average ratio of monitoring by other parties among total respondents is low (35%), North America and South America Regions show specific high ratio (71% and 67%) of monitoring by other parties. Details of other monitoring parties by region are shown in the next column c).***

c) Examples of other monitoring parties

Africa Region

- Government or municipal agencies other than Environment agency

  (Ministry of Agro industry, Food Production and Security<Fishery Div.>/ Mauritius)

Europe Region

- Other government or municipal agencies

  Waters Administration, National Marine Research Institute (Romania)

  Ministry of transport, public works and water management (Netherlands)

  The Dutch Ministry of Public Works and Transport (Netherlands)

  Institute for public health (Croatia)

  The Country administrative board (Sweden)

  Dept. of Fisheries and Marine Research, Dept. of medical and public health services (Cyprus)

- Consultants or private companies

  Water environment monitoring consultants (Finland)

  Private monitoring company (Spain)

North America Region/USA

- Other government or municipal agencies

  (Federal Government Agency, US EPA, US Army Corps of Engineers)

- Tenants of Port Facilities

  (Tenants are required to monitor under The Industrial General Permit)

South America Region

- Other government or municipal agencies

  Supervisor Agency of Infrastructure Public Transport (Peru)

Asia Region

- Other government or municipal agencies

  Coast Guard, Dept. of Agriculture, River Commissioner (Philippine)

  Coast Guard (Japan)

- Port Operator

  Port Operator (Malaysia)

Oceania Region

- Other government or municipal agencies

  Dept. of Water (Australia)

- Port Operator or company

  Port Company (New Zealand)

From the survey results of this questionnaire (Q7-1), we can summarize as below.

- ***In general, port water quality monitoring is made mainly by Environment agencies of State or city***

- ***Port authorities are the next main parties of such monitoring with nearly half of total respondents. Especially in North America and Oceania region, Port authorities act as main monitoring parties rather than Environment agencies of State or city. (Port Authorities share 71% of total respondents while State or city environment agencies share 57% of respondents in these regions)***
- ***Other monitoring parties rather than environment agencies of State, City or Port Authorities comprise mainly other agencies of Government and City such as Coast Guard, Dept. of Fishery or Public Health etc. The ratios of other monitoring parties are recorded high (around 70% of respondents) in North & South America Region.***
- ***If we add the figure of other governmental agencies to that of environment agencies of State and city, we may conclude that the monitoring of water quality in ports are made mainly by governmental or municipal agencies comprising not only their environmental agencies but other agencies such as Coast Guard, Public Health, Fishery and Transportation Dept etc.***

2) What do they monitor? (Q 7-2)

a) For all responded ports

i) Water Quality: 88% of respondents (57 ports/65 respondents)
ii) Sediment Quality: 65% of respondents (42 ports/ 65 respondents)
iii) Other items: 9% of respondents (6 ports/ 65 respondents)

b) Ratio of monitoring items by region

<Africa Region>

- Water Quality: 100% of respondents (3 ports/3 respondents)
- Sediment Quality; Nil
- Other items: Nil

<Europe Region>

- Water Quality: 80% of respondents (16 ports/20 respondents)
- Sediment Quality: 65% of respondents (13 ports/ 20 respondents)
- Other items: 10% of respondents (2 ports/ 20 respondents)

<North America Region>

- Water Quality: 86% of respondents (6 ports/7 respondents)
- Sediment Quality: 71% of respondents (5 ports/ 7 respondents)
- Other items: 14% of respondents (1 port/ 7 respondents)

<South America Region>

- Water Quality: 67% of respondents (2 ports/3 respondents)
- Sediment Quality: 67% of respondents (2 ports/ 3 respondents)
- Other items: Nil

<Asia Region>

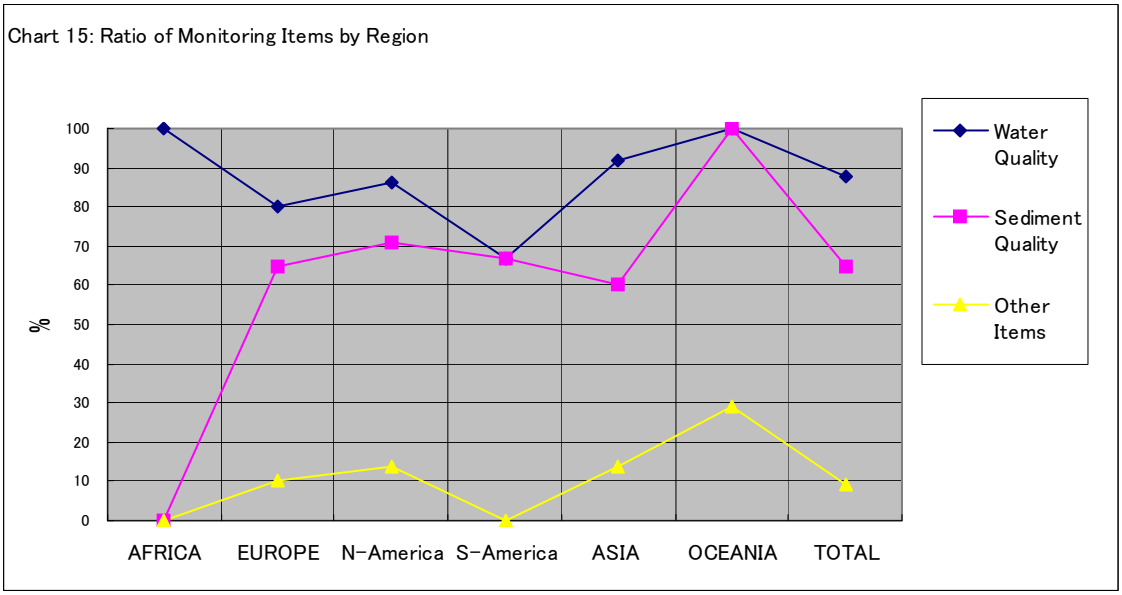
- Water Quality: 92% of respondents (23 ports/25 respondents)
- Sediment Quality: 60% of respondents (15 ports/ 25 respondents)
- Other items: 14% of respondents (1 port/ 25 respondents)

<Oceania Region>

- Water Quality: 100% of respondents (7 ports/7 respondents)
- Sediment Quality: 100% of respondents (7 ports/ 7 respondents)
- Other items: 29% of respondents (2 ports/ 7 respondents)

(Table 11: Ratio of Monitoring Items by Region, %)

	AFRICA	EUROPE	N-America	S-America	ASIA	OCEANIA	TOTAL
Water Quality	100	80	86	67	92	100	88
Sediment Quality	0	65	71	67	60	100	65
Other Items	0	10	14	0	14	29	9



c) Examples of other monitoring items:

Africa Region

- no examples

Europe Region

- Fish and vegetation studies/ Finland
- Ionizing Radiation Level/ When nuclear-powered vessel entered/ Cyprus

North America Region

- Fish Tissue/ USA

South America Region

- no examples

Asia Region

- case by case

Oceania Region

- Mussels/ Australia
- Shell fish trace metal/ New Zealand

From the above survey results of this questionnaire (Q7-2), we may conclude as below.

- ***Water Quality is the most popular item to be monitored among all regions with sharing 88% of all respondents.***
- ***Sediment Quality is the next major item to be monitored with sharing 65% of responded ports, which indicates more than half of total respondents monitor both Sediment Quality and Water Quality.***
- ***-Oceania region shows 100% monitoring of both Water Quality and Sediment quality in their all responded ports.***
- ***Other monitoring items rather than Water Quality or Sediment Quality are reported very few with sharing only 9% of all respondents. Such items as Fish-tissue, Shell-fish trace metal, Ionizing radiation level are reported as examples of other items.***

3) Where do they monitor? (Q7-3)

a) For all responded ports

-	Port basin only:	28% of respondents	(18 ports/ 65 respondents)
-	Port basin & outer area:	58% of total respondents	(38 ports/ 65 respondents)
-	River estuary:	23% of respondents	(15 ports/ 65 respondents)
-	Other areas:	15% of respondents	(10 ports/65 respondents)

b) Ratio of monitoring areas by region

<Africa Region>

-	Port basin only:	Nil	
-	Port basin& outer area:	67% of respondents	(2 ports/ 3 respondents)
-	River estuary:	33% of respondents	(1 port / 3 respondents)
-	Other areas:	Nil	

<Europe Region>

-	Port basin only:	20% of total respondents	(4 ports / 20 respondents)
-	Port basin& outer area:	55% of respondents	(11ports/ 20 respondents)
-	River estuary:	25% of respondents	(5 ports/ 20 respondents)
-	Other areas:	15% of respondents	(3 ports/20 respondents)

<North America Region>

- Port basin only: 57% of total respondents (4 ports / 7 respondents)
- Port basin & outer area: 29% of respondents (2 ports/ 7 respondents)
- River estuary: 29% of respondents (2 ports/ 7 respondents)
- Other areas: Nil

<South America Region>

- Port basin only: 33% of total respondents (1 port / 3 respondents)
- Port basin & outer area: 33% of total respondents (1 port / 3 respondents)
- River estuary: 33% of total respondents (1 port / 3 respondents)
- Other areas: 33% of total respondents (1 port / 3 respondents)

<Asia Region>

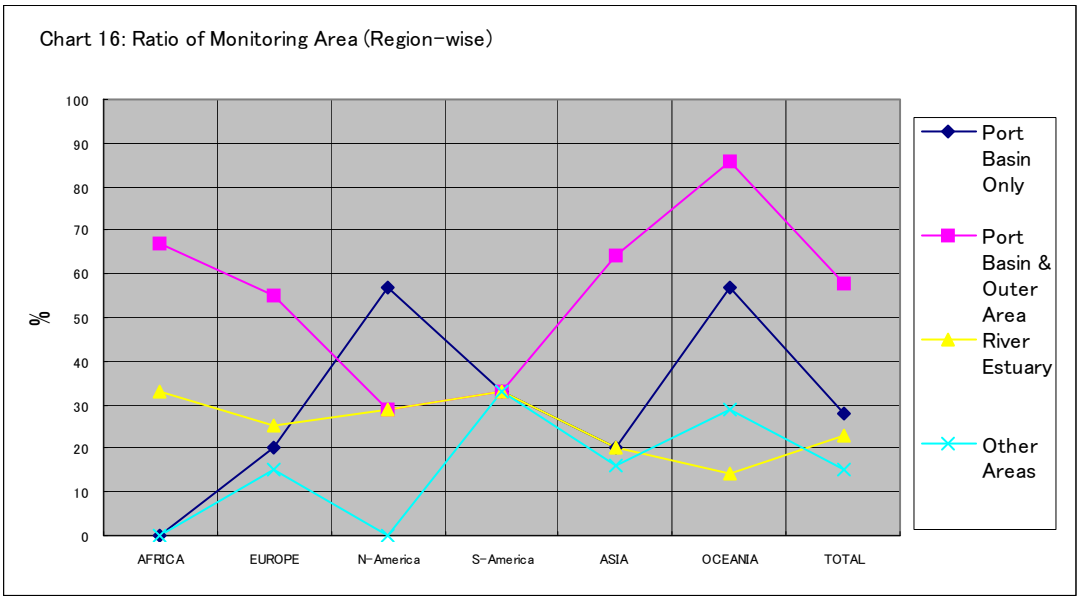
- Port basin only: 20% of total respondents (5 ports / 25 respondents)
- Port basin & outer area: 64% of respondents (16 ports/ 25 respondents)
- River estuary: 20% of respondents (5 ports/ 25 respondents)
- Other areas: 16% of respondents (4 ports/25 respondents)

<Oceania Region>

- Port basin only: 57% of total respondents (4 ports / 7 respondents)
- Port basin & outer area: 86% of respondents (6 ports/ 7 respondents)
- River estuary: 14% of respondents (1 port/ 7 respondents)
- Other areas: 29% of respondents (2 ports/ 7 respondents)

(Table 12: Ratio of Monitoring Area by Region, %)

	AFRICA	EUROPE	N-America	S-America	ASIA	OCEANIA	TOTAL
Port Basin Only	0	20	57	33	20	57	28
Port Basin & Outer Area	67	55	29	33	64	86	58
River Estuary	33	25	29	33	20	14	23
Other Areas	0	15	0	33	16	29	15



c) Examples of other monitoring areas

Africa Region

- no examples

Europe Region

- Canal (The Netherlands)
- Sea water samples at beach (Croatia)
- Coastal and Maritime Romanian Waters (Romania)

North America Region

- no examples

South America Region

- no examples

Asia Region

- Public waters both river & sea (Japan)
- Specific area designated by City Environment Dept. (Japan)

Oceania Region

- All beaches in Sydney, Hunter and Illawara region (Australia)
- Public beach in port basin (New Zealand)

As a summary of this questionnaire, we can conclude as below.

- ***"Port Basin & Outer Area" is the most monitored area with sharing 58% of all respondents. Africa Region and Oceania Region responded with specific high ratio (100% and86%)of monitoring such area. In the other hand, North and South America regions recorded specific low ratio (about 30%) of monitoring such area.***
- ***"Port Basin-only" is the next popular area of monitoring with sharing 28% of all responded ports.***

- ***North America region is the only region where more than half of its respondents practice monitoring in Port Basin only.***
- ***"River estuary" is the area monitored by 23% of all respondents. While the ratio is comparatively low in total, more than half of River ports or located in ship channels responded "River estuary" as their monitoring area.***
- ***Only ten ports (15% among all respondents) responded as they practice monitoring in "Other Monitoring Areas". From above c) data of examples, we can see that public beach near port area is the most popular "other area" for monitoring water quality.***

4) How often do they monitor? (Q7-4)

a) For all responded ports

i) Continuous Monitoring:	12 ports (18% of respondents)
ii) Monthly Monitoring:	25 ports (38% of respondents)
iii) Less frequent than Monthly Monitoring:	18 ports (28% of respondents)
iv) Yearly Monitoring:	22 ports (34% of respondents)

b) Ratio of monitoring frequencies by region

<Africa Region>

- Continuous Monitoring:	Nil
- Monthly Monitoring:	Nil
- Less frequent than Monthly Monitoring:	2 ports (67% of respondents)
- Yearly Monitoring:	Nil

<Europe Region>

- Continuous Monitoring:	3 ports (15% of respondents)
- Monthly Monitoring:	7 ports (35% of respondents)
- Less frequent than Monthly Monitoring:	4 ports (20% of respondents)
- Yearly Monitoring:	5 ports (25% of respondents)

<North America Region>

- Continuous Monitoring:	4 ports (57% of respondents)
- Monthly Monitoring:	2 ports (29% of respondents)
- Less frequent than Monthly Monitoring:	2 ports (29% of respondents)
- Yearly Monitoring:	1 port (14% of respondents)

<South America Region>

- Continuous Monitoring:	1 port (33% of respondents)
- Monthly Monitoring:	Nil
- Less frequent than Monthly Monitoring:	1 port (33% of respondents)
- Yearly Monitoring:	1 port (33% of respondents)

<Asia Region>

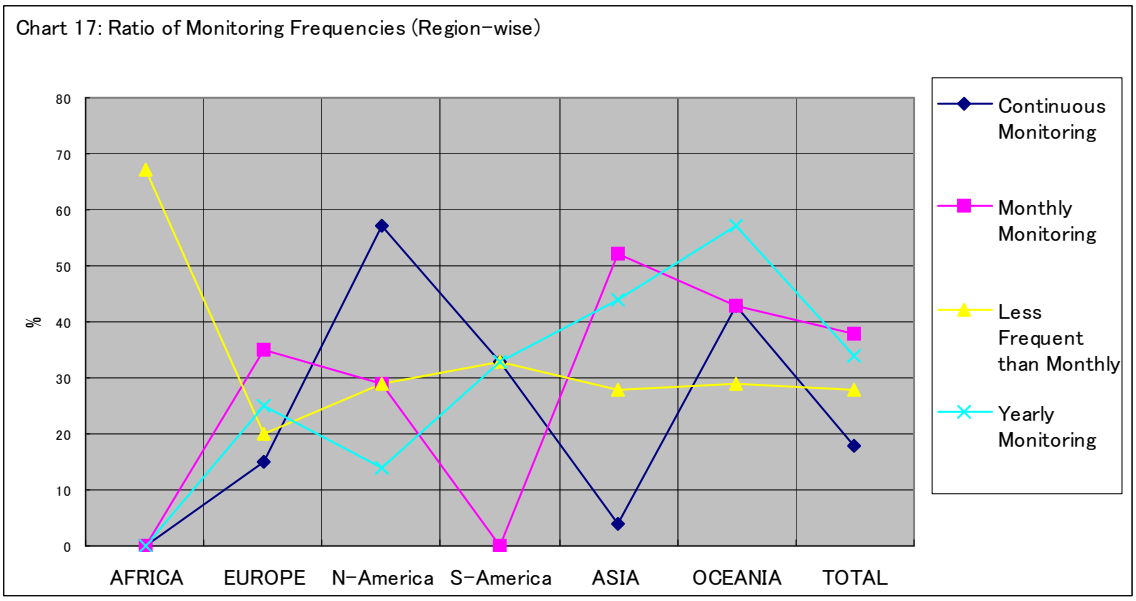
- Continuous Monitoring: 1 port (4% of respondents)
- Monthly Monitoring: 13 ports (52% of respondents)
- Less frequent than Monthly Monitoring: 7 ports (28% of respondents)
- Yearly Monitoring: 11 ports (44% of respondents)

<Oceania Region>

- Continuous Monitoring: 3 ports (43% of respondents)
- Monthly Monitoring: 3 ports (43% of respondents)
- Less frequent than Monthly Monitoring: 2 ports (29% of respondents)
- Yearly Monitoring: 4 ports (57% of respondents)

(Table 13: Ratio of Monitoring Frequencies (Region-wise) %)

	AFRICA	EUROPE	N-America	S-America	ASIA	OCEANIA	TOTAL
Continuous Monitoring	0	15	57	33	4	43	18
Monthly Monitoring	0	35	29	0	52	43	38
Less Frequent than Monthly	67	20	29	33	28	29	28
Yearly Monitoring	0	25	14	33	44	57	34



As a summary of this questionnaire, we can conclude as below.

- ***While only 18% of total responded ports practice Continuous Monitoring in their ports, considerable share of responded ports in North America and Oceania regions make Continuous Monitoring.< America 57%, Oceania 43%>***
- ***Monthly Monitoring is the most popular frequency of monitoring with 38% of total respondents. Especially in Asia and Oceania regions, Monthly Monitoring recorded higher ratio of monitoring***

- ***Less Frequent than Monthly Monitoring recorded 28% ratio of all respondents. Ports in Africa region only shows 67% ratio of such monitoring among their respondents.***
- ***Yearly Monitoring is the second popular monitoring frequency with 34% of total respondents with recording specific higher ratio (around 50%) in both Asia and Oceania regions.***

4. Publication of information and Data on Water & Sediment Quality (Q8)

1) Ratio of ports making publication the water quality data (Q8-1)

Africa region:	33% of respondents in the region
Europe region:	63% of respondents in the region
North America region:	86% of respondents in the region
South America region:	33% of respondents in the region
Asia region:	76% of respondents in the region
Oceania region:	71% of respondents in the region
All regions:	68% of all respondents

- ***For all regions, 68% (44 ports) of all respondents make some publication of information regarding port water quality of their ports.***
- ***Ports in North America (86%), Asia (76%) and Oceania(71%) show high ratio of such publication. In the other hand, ports in Africa and South America regions responded with lower ratio (33%) of release of such information.***

2) Who does make such publication of information (Q8-2)

a) Ratio of publication parties for all regions

Environment agencies of State or City:	60% of all respondents
Port Authority:	22%
Other Parties:	15%

- ***State or City agencies of environment are the main publication parties of water quality information.***

b) Ratio of publication parties by region

<Africa region>

- Environment agencies of State or City: 33% of respondents in the region
- Port Authority: 33%
- Other Parties: Nil

<Europe region>

- Environment agencies of State or City: 55% of respondents in the region
- Port Authority: 25%
- Other Parties: 15%

<North America region>

- Environment agencies of State or City: 43% of respondents in the region

- Port Authority: 29%
- Other Parties: 43%

<South America region>
- Environment agencies of State or City: Nil
- Port Authority: Nil
- Other Parties: 33% of respondents in the region

<Asia region>
- Environment agencies of State or City: 76% of respondents in the region
- Port Authority: 12%
- Other Parties: 8%

<Oceania region>
- Environment agencies of State or City: 71% of respondents in the region
- Port Authority: 43%
- Other Parties: 14%

① Examples of other parties

Africa Region
- No examples

Europe Region
- Ministry of Public Works & Transport/Netherlands
- Statutory Zoning Board/ Israel

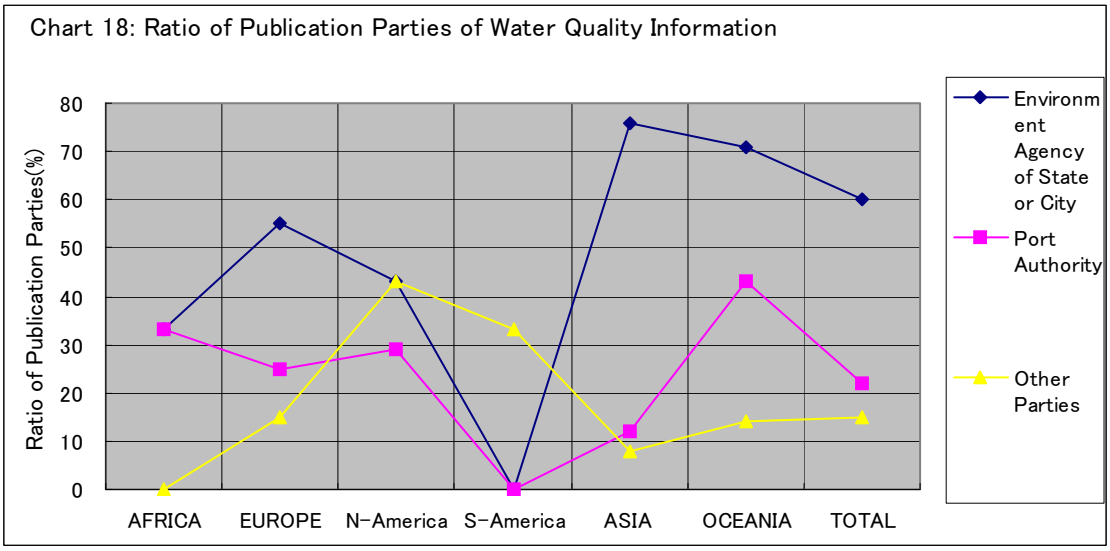
North America Region
- Federal Government/USA
- Available upon request/USA

South America Region
- Available upon request/Peru
- Asia Region
- Other government agencies/Philippine
- Coast Guard/ Japan

Oceania Region
- Port Curtis Integrated Monitoring Program (PCIMP)group/Australia

(Table 14: Ratio of Publication Parties of Water Quality Information by Region (%)

	AFRICA	EUROPE	N-America	S-America	ASIA	OCEANIA	TOTAL
Environment Agency of State or City	33	55	43	0	76	71	60
Port Authority	33	25	29	0	12	43	22
Other Parties	0	15	43	33	8	14	15



- ***In every region except South America, environment agencies of State or City are the main parties of publication of port water quality information. Especially in Asia and Oceania regions, more than 70% of responding ports replied such agencies make release of port water quality information.***
- ***While low ratio (22% of respondents) is recorded on port authority as publication party in all regions, Oceania region shows higher share of port authority (around 50%).***
- ***Only 15% of all respondents replied that other parties rather than environment agencies of State or City and port authority make publication of such information. Only North America region shows higher (43%) ratio of publication by other parties.***
- ***Main examples of other publication parties are government agencies other than environment agency.***

5. Water Circulations / Flow Regimes Issues (Q9 &10)

1) Water quality issues in semi-closed water flow regime (Q9)

(Ratio of ports having water quality problems in semi-closed water flow regime)

Africa region: 67% of respondents (2ports/ 3 respondents)

Europe Region: 30% (6 ports/ 20 respondents)

North America Region: 57% (4 ports/ 7 respondents)

South America Region: 67% (2 ports/ 3 respondents)

Asia Region: 40% (10ports/ 25 respondents)

Oceania Region: 14% (1 port/ 7 respondents)

All Regions: 38% (25 ports/ 65 respondents)

2) Solution technologies to improve water circulation (Q10)

(Ratio of ports having applied solution technologies for above issue)

Africa region: Nil (No ports/ 3 respondents)

Europe Region: 10% (2 ports/ 20 respondents)

North America Region: 29% (2 ports/ 7 respondents)

South America Region: Nil (No ports/ 3 respondents)

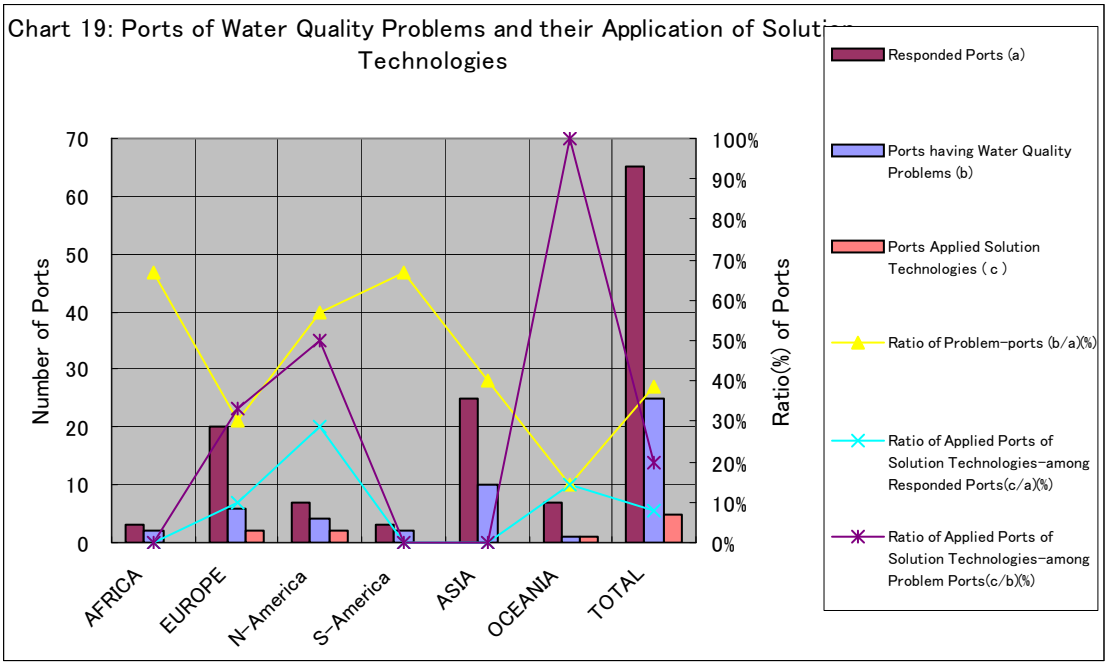
Asia Region: Nil (No ports/ 25 respondents)

Oceania Region: 14% (1 port/ 7 respondents)

All Regions: 8% (5 ports/ 65 respondents)

(Table 15: Ratio of Ports having Water Quality Issues in Semi-Closed Bay, and having Application of Solution Technologies)

	AFRICA	EUROPE	N-America	S-America	ASIA	OCEANIA	TOTAL
Responded Ports (a)	3	20	7	3	25	7	65
Ports having Water Quality Problems (b)	2	6	4	2	10	1	25
Ports Applied Solution Technologies (c)	0	2	2	0	0	1	5
Ratio of Problem-ports (b/a)(%)	67%	30%	57%	67%	40%	14%	38%
Ratio of Applied Ports of Solution Technologies-among Responded Ports(c/a)(%)	0%	10%	29%	0%	0%	14%	8%
Ratio of Applied Ports of Solution Technologies-among Problem Ports(c/b)(%)	0%	33%	50%	0%	0%	100%	20%



- ***Total 25 ports (38% of respondents) have such issues in semi-closed water flow regime in their ports. Especially ports in Africa and South America regions recorded high rate of existence of such issues in their ports.(Africa 100%, South America 67%)***
- ***On the other hand, ports in Oceania region show specially low ratio(14%) of having such problems in their ports.***
- ***Only 5 ports (8% of respondents, and also 20% of ports having water circulation problems)*** **have applied technological solution, such as,**
    - **Cooling water circulation to keep ice away/ Finland**
    - **Grease and Oil intercept tanks/ France**
    - **US Army Corps of Engineers (UACE) makes release of dam waters timely/USA**
    - **Aerator Facilities / USA**
    - **Have designed flushing channel to ensure an estuary adequately flushed for maintaining shore bird habitat/ Australia**

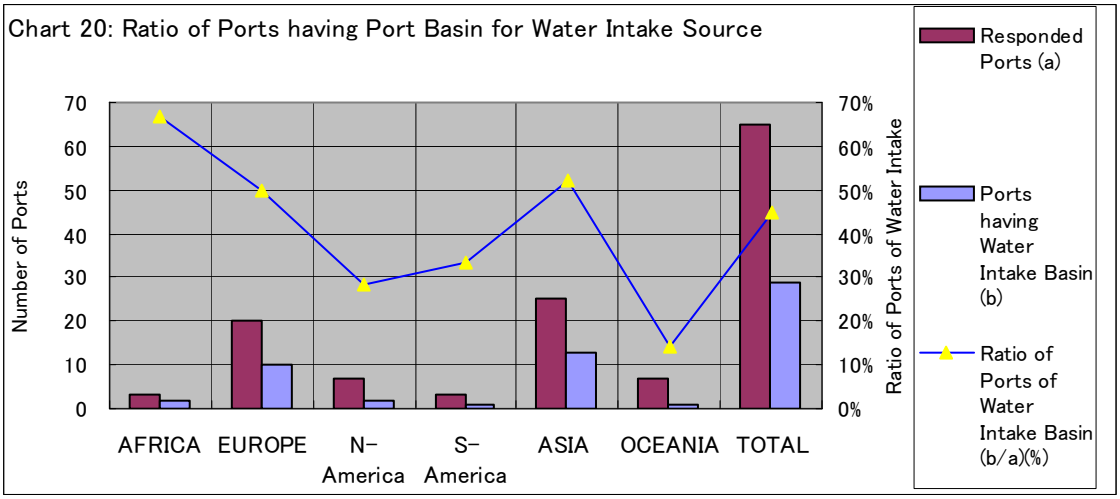
6. Water Intake in Port Basin (Q11)

(Ratio of ports having port basin as a water intake source)

Africa region:	67% (2 ports/ 3 respondents)
Europe Region:	50% (10 ports/ 20 respondents)
North America Region:	29% (2 ports/ 7 respondents)
South America Region:	33% (1 port/ 3 respondents)
Asia Region:	52% (13 ports/ 25 respondents)
Oceania Region:	14% (1 port/ 7 respondents)
All Regions:	45% (29 ports/ 65 respondents)

(Table 16: Ratio of Ports having Port Basin for Water Intake Source)

	AFRICA	EUROPE	N-America	S-America	ASIA	OCEANIA	TOTAL
Responded Ports (a)	3	20	7	3	25	7	65
Ports having Water Intake Basin (b)	2	10	2	1	13	1	29
Ratio of Ports of Water Intake Basin (b/a)(%)	67%	50%	29%	33%	52%	14%	45%



- ***In total 29 ports (45% of respondents), water in port basin is a source of intake for plants and facilities of shore such as,***
  - ***Fire fighting facility/Africa, Asia***
  - ***Power plant/ Africa, Europe, America, Asia, Oceania***
  - ***Manufacturing plant, chemical plant/ Africa, Europe, Asia***
  - ***For cooling building, and toilet flushing/ Asia***
  - ***Natural gas liquidizing plant/ Asia***
  - ***Regional gas supply, heat supply/ Asia***

- ***Especially ports in Africa, Europe and Asia Region show high ratio (more than 50%) of water intake from port basin. In the other hand, North America and Oceania region show lower ratio (less than 30%) of taking water for shore facilities from port basin.***

III. Appendix

1. Summary Table of Survey Results-All Regions

(Table 17: Summary Table of Survey Results-All Region)

			AFRICA		EUROPE		N-America		S-America		ASIA (inc. Japan)		OCEANIA		TOTAL	
			Sub-Total	Share	Sub-Total	Share	Sub-Total	Share	Sub-Total	Share	Sub-Total	Share	Sub-Total	Share	Total	Share
Port			3		20		7		3		25		7		65	
Country			3		13		1		3		7		2		29	
Q 1	Water Quality program	YES	2	67%	12	60%	6	86%	1	33%	9	36%	7	100%	37	57%
		NO	1	33%	8	40%	1	14%	2	67%	15	60%	0	0%	27	42%
Q 2	Program Name(Number of Program)		3	100%	17	89%	8	114%	1	33%	12	48%	12	171%	53	82%
	Website(Number of Web)		0	0%	6	32%	3	43%	1	33%	6	24%	4	57%	20	31%
	Covering Area	Water Quality	3	100%	11	58%	6	86%	1	33%	11	44%	11	157%	43	66%
		Sediment Quality		0%	9	47%	4	57%	1	33%	4	16%	10	143%	28	43%
		Other		0%	6	32%	1	14%			5	20%	5	71%	17	26%
Q 3	Future plan	YES	1	100%	4	50%	1	100%	2	100%	5	33%	0		13	48%
		NO			3	38%			0		10	67%	0		13	48%
Q 4	Regulatory Requirements	YES	1	33%	17	85%	7	100%	1	33%	21	84%	6	86%	53	82%
		NO	2	67%	2	10%			2	67%	4	16%	1	14%	11	17%
Q 5-1)	Summary of Requirements			0%												
Q 5-2)	Regulatory differences from ouside area	YES		0%	3	15%	3	43%	1	33%	2	8%	2	29%	11	17%
		NO(same)	1	33%	15	75%	4	57%		0%	19	76%	3	43%	42	65%
Q 5-3)	Based on State/Federal Law	YES		0%	16	80%	7	100%	1	33%	20	80%	6	86%	50	77%
		NO	1	33%	1	5%					0	0%		0%	2	3%
Q 6	Name of Law			0%										0%	0	
	Regulating Area	Water Quality		0%	11	69%	5	71%	1	100%	16	80%	5	83%	38	76%
		Sediment Quality		0%	9	56%	4	57%	1	100%	9	45%	5	83%	28	56%

		Other		0%	5	31%	1	14%		0%	8	40%	2	33%	16	32%
Q 7-1)	Who monitors	State or City Agency	1	33%	12	60%	4	57%	2	67%	21	84%	4	57%	44	68%
		Port Authority	2	67%	8	40%	5	71%	1	33%	10	40%	5	71%	31	48%
		Others	1	33%	9	45%	5	71%	2	67%	3	12%	3	43%	23	35%
Q 7-2)	What do they monitor	Water Quality	3	100%	16	80%	6	86%	2	67%	23	92%	7	100%	57	88%
		Sediment Quality		0%	13	65%	5	71%	2	67%	15	60%	7	100%	42	65%
		Other		0%	2	10%	1	14%			1	14%	2	29%	6	9%
Q 7-3)	Where monitor	Port basin		0%	4	20%	4	57%	1	33%	5	20%	4	57%	18	28%
		Port basin& outer area	2	67%	11	55%	2	29%	1	33%	16	64%	6	86%	38	58%
		River estuary	1	33%	5	25%	2	29%	1	33%	5	20%	1	14%	15	23%
		Other		0%	3	15%		0%	1	33%	4	16%	2	29%	10	15%
Q 7-4)	How often monitor	Continuous		0%	3	15%	4	57%	1	33%	1	4%	3	43%	12	18%
		Monthly		0%	7	35%	2	29%			13	52%	3	43%	25	38%
		Less than monthly	2	67%	4	20%	2	29%	1	33%	7	28%	2	29%	18	28%
		Yearly		0%	5	25%	1	14%	1	33%	11	44%	4	57%	22	34%
Q 8-1)	Publication, Dissemination	Yes	1	33%	12	63%	6	86%	1	33%	19	76%	5	71%	44	68%
		No	2	67%	6	32%			2	67%	7	28%	2	29%	19	32%
Q 8-2)	How publicized	State or City Agency	1	33%	11	55%	3	43%			19	76%	5	71%	39	60%
		Port Authority	1	33%	5	25%	2	29%			3	12%	3	43%	14	22%
		Other party		0%	3	15%	3	43%	1	33%	2	8%	1	14%	10	15%
Q 9	Water Circulation	Yes	2	67%	6	30%	4	57%	2	67%	10	40%	1	14%	25	38%
		No	1	33%	13	65%	2	29%	1	33%	18	72%	6	86%	41	63%
Q	Technological	Yes		0%	2	10%	2	29%					1	14%	5	8%

10	Solution	No	2	67%	9	45%	2	29%	3	100%	18	72%	2	29%	36	55%
Q 11	Water intake	Yes	2	67%	10	50%	2	29%	1	33%	13	52%	1	14%	29	45%
		No	1	33%	9	45%	4	57%	2	67%	0	36%	6	86%	31	48%

2. Respondents List of IAPH Members' Survey on Port Water Quality

(Table 18: Respondents List of IAPH Members' Survey on Port Water Quality)

	Region	Country	Organization
1	Africa	Mauritius	Mauritius Ports Authority (Port Louis)
2	Africa	Nigeria	Nigerian Ports Authority (Lagos)
3	Africa	Senegal	Dakar Port Authority
4	Europe	Croatia	Port of Rijeka Authority
5	Europe	Cyprus	Cyprus Ports Authority(Limassol)
6	Europe	Denmark	Port of Aarhus
7	Europe	Finland	Port of Helsinki
8	Europe	France	Grand Port Maritime de Marseille-GPMM
9	Europe	France	Grand Port Maritime du Havre
10	Europe	France	Grand Port Maritime de Nantes Saint-Nazaire
11	Europe	Israel	Haifa Port Comapany Ltd. Ashdod Port Company Ltd.
12	Europe	Latvia	Freeport of Riga Authority
13	Europe	Malta	Authority for Transport in Malta
14	Europe	Netherlands	Port of Amsterdam(Noordzeekanaal)
15	Europe	Netherlands	Port of Rotterdam Authority
16	Europe	Romania	N.C. "Maritime Ports Administration" S.A. Constantza
17	Europe	Russia	Commercial Port of Vladivostok
18	Europe	Russia	Joint Stock Company Passenger Port of Saint Petersburg "Marine Façade"
19	Europe	Spain	Autoridad Portuaria de la Bahìa de Algeciras
20	Europe	Spain	Autoridad Portuaria de Santander
21	Europe	Spain	Autoritat Portuaria de Tarragona (Port Authority of Tarragona)
22	Europe	Spain	Vilagarcía de Arousa Port Authority
23	Europe	Sweden	Stockholms Hamnar (Ports of Stockholm)
24	N.America	U.S.A	Port of Seattle
25	N.America	U.S.A	The Port of Stockton, California
26	N.America	U.S.A	Port of Long Beach
27	N.America	U.S.A	Port of Los Angeles
28	N.America	U.S.A	Georgia Ports Authority
29	N.America	U.S.A	Port of Houston Authority
30	N.America	U.S.A	Port of Miami
31	S.America	Panama	Autoridad Marítima de Panamá (Panama Maritime Authority)
32	S.America	Peru	Empresa Nacional de Puertos S.A.-ENAPU S.A.(Callao)
33	S.America	Trinidad and Tobago	Port of Port-of-Spain
34	E&S Asia	Japan	Ishikari Bay New Port Authority

35	E&S Asia	Japan	Tomakomai Port Authority
36	E&S Asia	Japan	Miyagi Prefecture (Ishino-maki)
37	E&S Asia	Japan	Miyagi Prefecture (Shiogama)
38	E&S Asia	Japan	Tokyo Metropolitan Government (Port of Tokyo)
39	E&S Asia	Japan	City of Yokohama
40	E&S Asia	Japan	City of Shizuoka (Shimizu)
41	E&S Asia	Japan	Nagoya Port Authority
42	E&S Asia	Japan	Yokkaichi Port Authority
43	E&S Asia	Japan	City of Osaka
44	E&S Asia	Japan	Port of Kobe (Port and Urban Projects Bureau, City of Kobe)
45	E&S Asia	Japan	Hiroshima Pref.Gov.,Air Port&Sea Port Dept.
46	E&S Asia	Japan	Port & Harbour Bureau, Shimonoseki City Government
47	E&S Asia	Japan	Port of Hakata
48	E&S Asia	Japan	Port of Kitakyushu (Seaport and Airport Bureau, City of Kitakyushu)
49	E&S Asia	Japan	Naha Port Authority
50	E&S Asia	China	Marine Department, HKSAR
51	E&S Asia	Malaysia	Bintulu Port Authority, Bintulu Port Sdn Bhd
52	E&S Asia	Malaysia	Kuantan Port Authority
53	E&S Asia	Malaysia	Port Klang Authority
54	E&S Asia	Malaysia	Sabah Ports Authority
55	E&S Asia	Myanmar	Myanma Port Authority
56	E&S Asia	Philippines	Philippine Ports Authority
57	W&C Asia	Bangladesh	The Chittagong Port Authority
58	W&C Asia	Maldives	Male' Commercial Harbour
59	Oceania	Australia	Fremantle Ports Authority
60	Oceania	Australia	Gladstone Ports Corporation Ltd.
61	Oceania	Australia	Sydney Ports Corporation
62	Oceania	New Zealand	Port Nelson Limited
63	Oceania	New Zealand	Port of Napier Ltd.
64	Oceania	New Zealand	Port Taranaki Ltd.
65	Oceania	New Zealand	Ports of Auckland Limited

3. List of Port Water Quality Programs and their Relevant Websites

1) Africa Region

Region		Africa		
Port		Dakar		Port Louis
Country		Senegal		Mauritius
Program Name		Survey campaign of Port Basin water quality and Identification of corrosives substances in the armament basin	Cleaning of solid floating waste and hydrocarbon present in Port Basin water	Water Analysis-Harbour,Baie du Tombeau and Lataniers
Website				
Covering Area	Water Quality	Y	Y	Y
	Sediment Quality			
	Other			

2) Europe Region

Port		Helsinki		Rotterdam	Nordseekanaal (Amsterdam)
Country		Finland		Netherlands	Netherlands
Program Name		Monitoring program of Helsinki Sea Area	Marine environment monitoring of the Vuosaari Harbour	Sampling Campaign port basis and waterways	MWTL - Monitoring Water Quality in the Netherlands (Water quality of of the Noordzee Canal.It includes monitoring sediment quality.)
Website		http://www.hel.fi/wps/portal/Ymparistokeskus_en/Artikkeli?WCM_GLOBAL_CONTEXT=/Ymk/en/Customer+Service/Publications/Publications/Publications+2010	http://www.portofhelsinki.fi/default.asp?docId=16651		http://live.waterbase.nl/waterbase_wns.cfm?taal=en
Covering Area	Water Quality	Y	Y		Y
	Sediment Quality	Y	Y		Y
	Other		periodical studies of spawning of the Baltic herring, fish fry and marine vegetation monitoring transects		

Port		Le Havre	Marseille-Fos	Nantes Sanit-Nazaire	
Country		France	France	France	
Program Name		Water Quality Monitoring through the Water Framework Directive (WFD)	"water and sediment monitoring"	Dredging sediment quality (Loire estuary, disposal site)	Water treatment on the Montoir agri-foodstuffs terminal
Website		www.eau-seine-normandie.fr			
Covering Area	Water Quality	Y	Y		
	Sediment Quality		Y	Y	
	Other				Loire estuary water quality

Port		Santander	Tarragona Port		Villagarcia de Arosa
Country		Spain	Spain		Spain
Program Name		ROM 5.1 Recommendation for Maritime Works "Quality of coastal waters in seaport areas"	ROM 5.1. Calidad de las Aguas Litorales en Áreas Portuarias	Identificación de elementos contaminantes según DMA (2000/60/CE) en los vertidos a mar desde el recinto portuario de Tarragona	Environmental Monitoring Report
Website			http:/www.puertos.es/es/programa_rom/index.html		
Covering Area	Water Quality		Y		Y
	Sediment Quality		Y		
	Other	The area legally defined as the Port Service Area		Sustancias contaminates en 13 puntos de la lámina interior del puerto	

Port		Rijeka		Constantza		Vladivostok
Country		Croatia		Romania		Russia
Program Name		Monitoring program of sea and sea sediment quality	Sea bathing water quality on beaches in the Republic of Croatia; Port of Rijeka Authority: Water Monitoring Plan.	"Protocol" between National Company Maritime Ports Administration SA Constnta and Waters Administration "Dobrogea-Litoral" concerning the monitoring of the water quality in port of Constanta	"Action plan for dredging related aspects" developed by Cadastrial Survey Department within our company's "Environment Management Program"	Environmental Action Plan at Commercial Port of Vladivostok (CPV), Annual Action Plan of Environmental Laboratory
Website			http://www.izor.hr/bathing/old.html			
Covering Area	Water Quality	Y	Y	Y		
	Sediment Quality	Y	Y		Y	
	Other		Y			

3) America Region

Region		North America			
Port		**POLA**	**POLB**	**Seattle**	**Stockton**
Country		USA-West Coast	USA-West Coast	USA-West Coast	USA-West Coast
Program Name		Port of Los Angeles and Port of Long Beach Water Resources Action Plan (WRAP)	Port of Los Angeles and Port of Long Beach Water Resources Action Plan (WRAP)	Stormwater Management Plan - Phase I Permit	Port of Stockton Municipal Storm Water Management Program
Website		www.portoflosangeles.org/environment/wrap.asp	http://www.polb.com/environment/water_quality/wrap.asp	http://www.portseattle.org/downloads/community/environment/seaportstormwaterplan3-10.pdf Over all site: http://www.dev.portseattle.org/community/environment-water/seaport/stormwater.shtml	
Covering Area	Water Quality	Y	Y	Y	Y
	Sediment Quality	Y	Y		
	Other		The WRAP incorporates all Water and Sediemnt Quality Programs for both the Port of Long Beach and Port of Los Angeles		

Region		North America				South America
Port		Savannah (GPA)		Houston		Callao
Country		USA-East Coast		USA-Gulf		Peru
Program Name		Stormwater Management Program	Dredge Material Management Plan	Water Quality Program	Sediment Management Program	Quality monitoring sea water and marine sediment Program
Website						www.enapu.com.pe
Covering Area	Water Quality	Y		Y		Y
	Sediment Quality		Y		Y	Y
	Other					

4) Asia Region

Port		Chittagong P.A.	Hong Kong		Bintulu P. A.	Bintulu Port Sdn,Bhd	Sabah
Country		Bangladesh	China(HK)		Malaysia	Malaysia	Malaysia
Program Name		Water Quality Measurment	Environmental Prptection Department's Marine Water Quality Monitoring Programme	Harbour Area Treatment Scheme	Environmental Monitoring & Auditing	Environmental Monitoring for second Inner Harbor as per EIA Requirement	Emergency Response Plan & Oil Contigency Plan
Website		www.cpa.gov.bd	http://www.epd.gov.hk/epd/english/environmentinhk/water/marine_quality/mwq_home.html	http://www.cleanharbour.gov.hk/english/g1_1.html			N/A
Covering Area	Water Quality	Y	Y	Y	Y	Y	Y
	Sediment Quality		Y		Y	Y	
	Other				Y		Oil/ Chemical Spillage at Port Area

Port		Nagoya	Naha Port	Osaka		Yokkaichi		Yokohama
Country		Japan	Japan	Japan		Japan		Japan
Program Name		Naka-River Water Quality Purification Facility	Naha Port Plan	Basic Environment Plan of Osaka-City(Port areas are included in the Plan)	Water Environment Plan of Osaka-City(Port Areas are included in the Plan)	Port of Yokkaichi Harbor Environmental Plan	Port of Yokkaichi Longterm Vision	Port Plan of Yokohama Port
Website				http://www.city.osaka.lg.jp/kankyo/page/0000010641.html	http://www.city.osaka.lg.jp/kankyo/page/0000010692.html		http://www.yokkaichi-port.or.jp/jp/port/plan/lt_vision/long_term_vision_top.html	
Covering Area	Water Quality	Y		Y	Y	Y	Y	Y
	Sediment Quality			Y	Y			
	Other		Overall of port area	Promotion of cleaning surface water	Promotion of cleaning surface water			

5) Oceania Region

Port		Sydney	Fremantle Ports	Gladstone Ports		Port Taranaki	
Country		Australia	Australia	Australia		New Zealand	
Program Name		Name of Program or Action Plan: Solely for activities related to the construction of the Port Botany Expansion Project – Port Botany Expansion Construction Framework Environmental Management Plan – Soil and Water Management Sub Plan, Dredging Environmenta	Marine Quality Monitoring Program	Port Curtis Integrated Monitoring Program	GPC Monitoring and Measurement Program (multiple near field monitoring programs	Port Environmental Management Plan	Oil Spill Response Plan
Website		http://www.sydneyports.com.au/port_development/port_botany_expansion_project/environmental_management		http://www.pcimp.com.au/	http://www.gpcl.com.au/pdf/AnnualReports/GPCL_Annual_Report_%202009-10.pdf		
Covering Area	Water Quality	Y	Y	Y	Y	Y	Y
	Sediment Quality	Y	Y	Y	Y	Y	
	Other		Y (Mussels)	Mangroves, Seagrass, Intertidal habitat, Macrobenthic communities	macrobenthos, hydrodynamics, plume modelling, physiochem, metals	Air Quality	

Port		Napier		Nelson		Auckland	
Country		New Zealand		New Zealand		New Zealand	
Program Name		6th Monthly Water Quality	Sea Water Quality Checks	Port Nelson ISO14001 Environmental Management Plan	Port Nelson Long-term monitoring programme	Stormwater Environmental Management Plansd	Water and sediment quality monitoring - dredging programmes
Website				www.portnelson.co.nz/Environment			
Covering Area	Water Quality	Y		Y	Y	Y	Y
	Sediment Quality		Y	Y	Y	Y	Y
	Other			Aims to manage all environmental aspects and impacts from port operations			

4. Form of Survey Questionnaire

Questionnaire on Water Quality Issues in Ports

IAPH Port Environment Committee / July 20, 2010

Dear IAPH members,

The Port Environment Committee (PEVC) is now carrying out a survey on "Water Quality Issues in Ports", which is aimed at collecting practices made by member ports for addressing water quality issues in ports.

Your cooperation is indispensable in order to complete our mission through collecting various measures currently introduced to address the issues in your port.

Questions;

Water Quality Programs/ Action Plans

1. Does your port have any "Water Quality Programs" or "Action Plans" introduced to address water quality issues in your port?

   ☐ Yes go to **Q2**
   ☐ No go to **Q3**

2. If answer to **Q.1.** is **Yes**, please specify such programs or action plans, with relevant website information when available. (If you have some different programs, please specify each program)

<Program A>

Name of Program or Action Plan:_____

Its covering area: ☐ Port basin water quality
☐ Sediment quality
☐ Others( )

Its Web-Site :_____

<Program B>

Name of Program or Action Plan:_____

Its covering area: ☐ Port basin water quality
☐ Sediment quality
☐ Others( )

Its Web-Site :_____

3. If answer to **Q.1.** is **No**, do you feel a necessity to have such initiatives in future?

☐ Yes (Reason:)
☐ No (Reason:)

Regulatory Requirements/ Standards

4. Is Port basin Water Quality or Sediment Quality in your port subject to any Regulatory Requirements/Standards/Guidelines?

☐ Yes go to **Q5**
☐ No go to **Q7**

5. If answer to **Q4** is **Yes,**

1) Please provide summary of the regulatory requirements/standards.

2) Are these regulatory standards/requirements different from those applicable to areas outside port basin?

☐ Yes (different)
☐ No (same)

3) Are these regulatory requirements/standards based on laws or regulations of your country/State/City?

☐ Yes go to **Q6**
☐ No go to **Q7**

6. If answer to **Q5-3)** is **Yes,**

1) Please specify the relevant laws or regulations applicable to standards /requirements of water quality and sediment quality in your port?

Title and relevant section of applicable Laws or Regulations: ( )

Regulating area: ☐Port basin Water Quality
☐Sediment Quality
☐Others ( )

Monitoring Water Quality

7. Regarding monitoring compliance with the relevant laws or regulations,

1) Who monitors?

☐Environment Agency of State/City

☐Port Authority

☐Others ( )

2) What do they monitor?

☐ Water quality (e.g. Dissolved oxygen, Microbial indicator, Organic compounds, Bulk commodities that spilled into the basin as a result of operations, rain or washing, etc)

-Please list monitoring parameters

( )

☐ Sediment quality (e.g. Metals, Organic compounds, Bulk commodities that spilled into the basin as a result of operations, rain or washing, etc)

-Please list monitoring parameters

( )

☐ Others( )

3) Where do they monitor?

☐ Port basin only

☐ Port basin and outer areas ( )

☐ River estuary

☐ Other ( )

4) How often do they monitor?

☐ Continuous (permanently placed monitoring instruments)

-Please specify parameters of continuous monitoring.

( )

☐ Monthly

☐ Less than monthly

☐ Yearly

Dissemination of Data & Information

8. Regarding dissemination of data and information on water and sediment quality issues in your port,

1) Is it available to the public?

☐ Yes go to **Q8-2)**

☐ No go to **Q9**

2) How is it publicized?

☐ By environment agency of state/city

☐ By port authority

☐ By other party ( )

Water circulations/ Flow regimes

9. Are there any water quality issues in your port basin due to Water Circulations/ Flow Regimes in the semi-closed environment?

☐ Yes go to **Q10**

☐ No go to **Q11**

10. Have you applied any technological solutions to improve water circulation /flow regimes for addressing the water quality issue?

☐ Yes

-Please specify applied technologies.

☐ No

11. Is your port basin a water intake source for a power plant or other facility?

☐ Yes

-Please specify type of facility that uses port basin water.

( )

☐ No

12. About Yourself, please specify <u>your port</u> and <u>yourself</u> below.

Your Name	
Your Title	
Your Port	
Your Country	
Your Fax Number	
Your e-mail Address	

<Contact info for inquiries>

Please send the **answer-saved MS Word file** to the following e-mail address. If you have any questions, please feel free to contact the same address.

e-mail: info@iaphworldports.org

Thank you for your cooperation!!