Water Quality Management in Asia

- Based on the experiences of
Water Environment Partnership in Asia (WEPA)

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Presentation Outline

1. Water Environment Partnership in Asia (WEPA)
   - A partnership program on water quality management improvement in Asian countries
2. Introduction to WEPA database
3. State of water quality in WEPA countries
4. The 2nd phase of WEPA
5. Water quality management in Asia

(photo: IGES)

Water Environment Partnership in Asia (WEPA)

- A partnership program to improve the management of **water environment** in Asian countries-

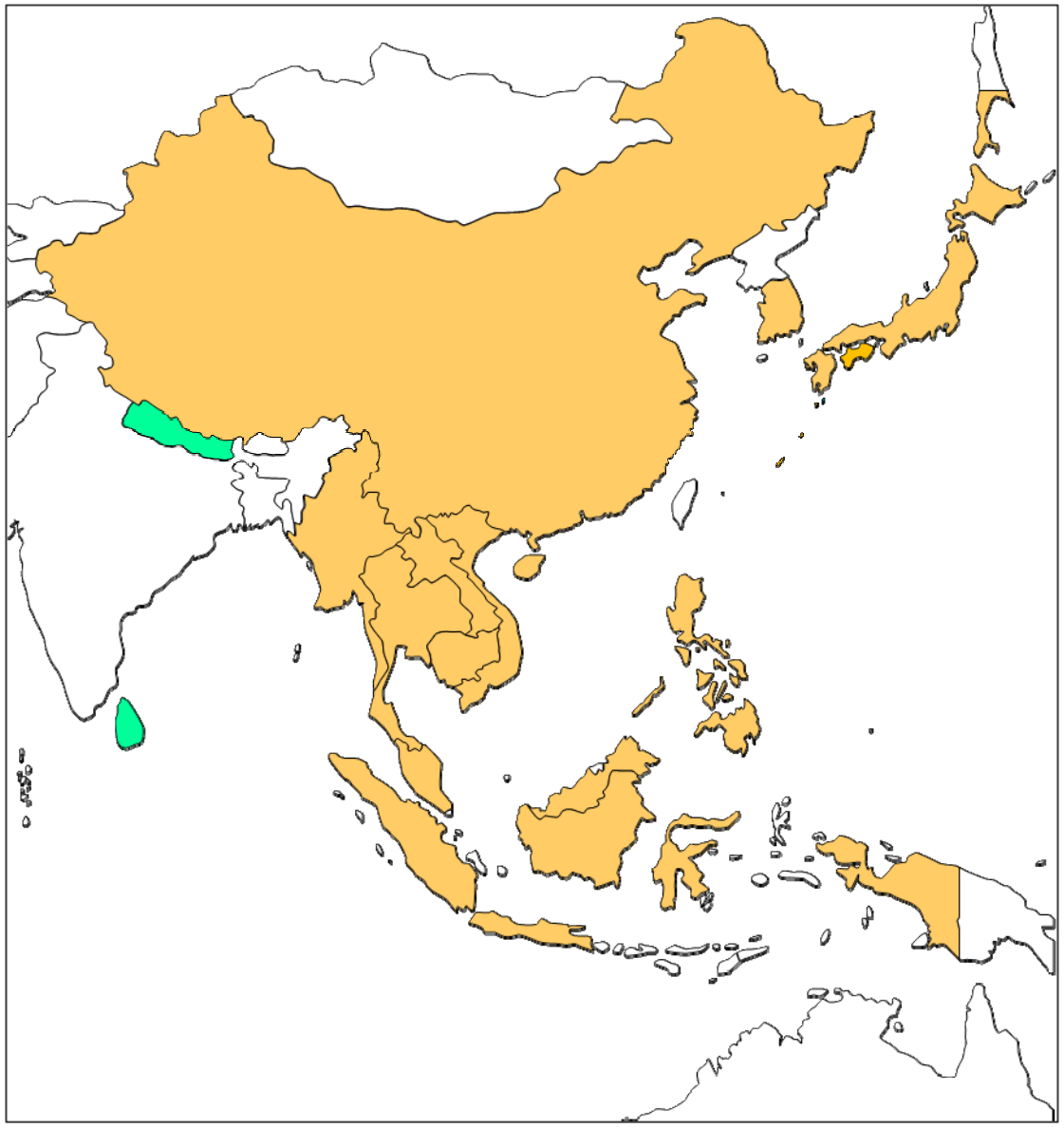
What is WEPA?

- **WEPA** is a partnership program on water environment management improvement in Asian countries
  - Water environment : quantity, quality, aquatic organisms, and habitat (3rd Japanese basic plan for environment)
- **An initiative of the Japanese Ministry of the Environment**
  - proposed at WWF3 in March 2003 and launched in 2004 (launch meeting in Jakarta, Indonesia)
- **Project period :**
  1st Phase: April 2004 - March 2009
  2nd Phase: April 2009 – March 2014

Objectives of WEPA

- To develop an information platform that will contribute to strengthening water governance and water environment conservation in Asia monsoon region ---> WEPA database
- To share the data, knowledge and experiences in the region with similar natural and socioeconomic conditions
- To contribute to the capacity-building of partner countries through collaborative work for database construction

WEPA Partner Countries



11 countries : 1st phase

- Cambodia
- China
- Indonesia
- Korea
- Lao PDR
- Malaysia
- Myanmar
- Philippines
- Thailand
- Viet Nam
- Japan

2 more countries from the 2nd phase

- Nepal
- Sri Lanka

Main Activities: WEPA First Phase

(1) Establishment of WEPA Database

- an information platform of water environment management

(2) Capacity development through WEPA activities

- through forums, symposiums, trainings

(3) Partnership development among WEPA countries

- human network development through meetings

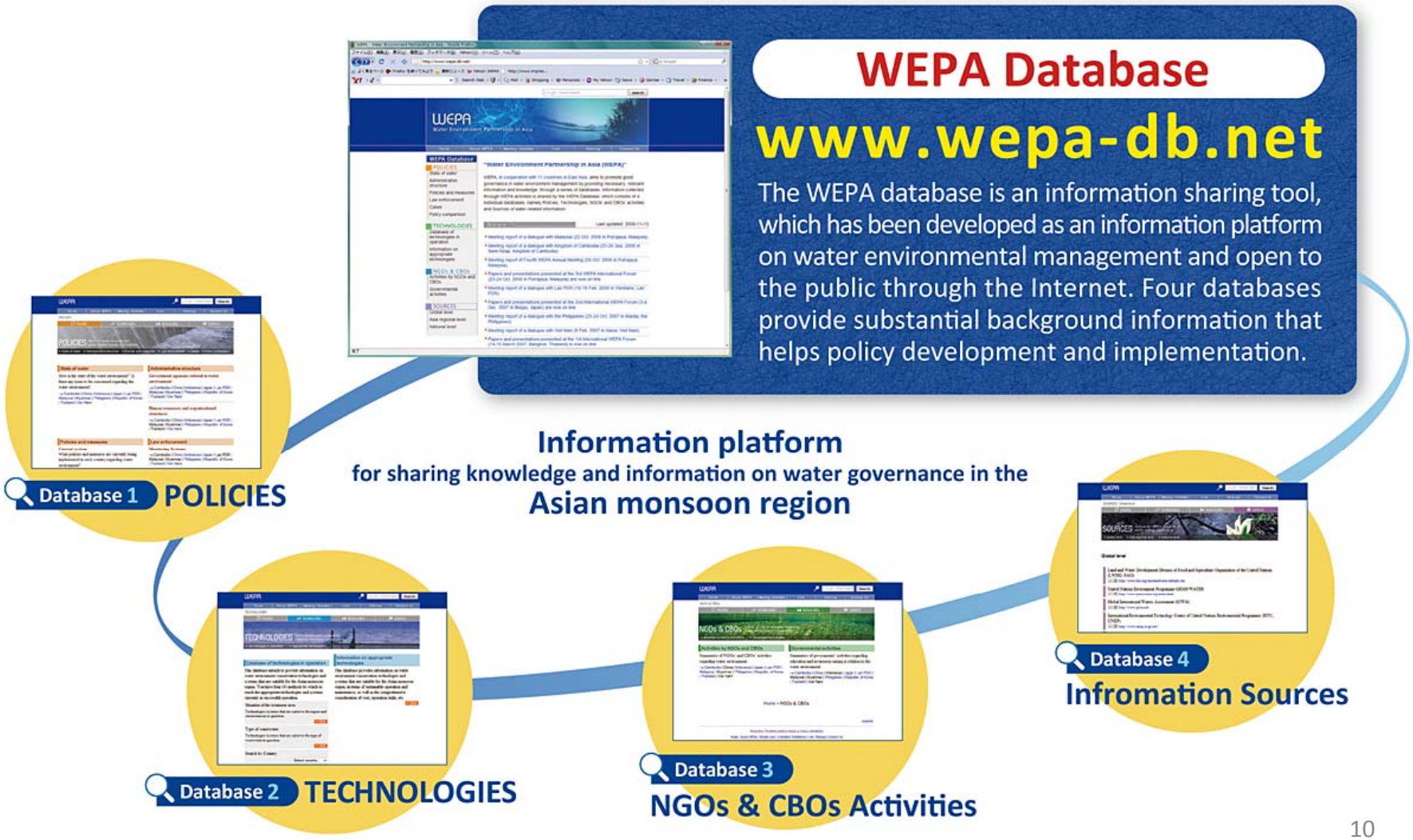
WEPA database Development

- **Primary target user : Government officials and aid-agency staff in charge of water environment conservation**
- **Original contents : 4 databases on water environment which contain original contents**
- **Partnership : Develop database contents by each partner country itself supported by MOEJ and secretariat**
- **Capacity building : Enhance partner's potential by the development of information platform**

WEPA database

- A tool of information sharing -

WEPA Database - a tool of information sharing



WEPA Home page : http://www.wepa-db.net/index.htm

Policy database provides information to know water environmental management in each WEPA country

Access to state of water for Indonesia

State of water

How is the state of the water environment? Is there any issue to be concerned regarding the water environment?

--» Cambodia | China | Indonesia | Japan | Lao PDR | Malaysia | Myanmar | Philippines | Republic of Korea | Thailand | Viet Nam

Organizational arrangement

Organizational structures and the related information such as the number of staff and local branches

--» Cambodia | China | Indonesia | Japan | Lao PDR | Malaysia | Myanmar | Philippines | Republic of Korea | Thailand | Viet Nam

Legislative framework

Laws, regulations and water environmental standards in each country

--» Cambodia | China | Indonesia | Japan | Lao PDR | Malaysia | Myanmar | Philippines | Republic of Korea | Thailand | Viet Nam

Law enforcement

Monitoring Systems

--» Cambodia | China | Indonesia | Japan | Lao PDR | Malaysia | Myanmar | Philippines | Republic of Korea | Thailand | Viet Nam

Budget and Expenses

--» Cambodia | China | Indonesia | Japan | Lao PDR | Malaysia | Myanmar | Philippines | Republic of Korea | Thailand | Viet Nam

Capacity Building

--» Cambodia | China | Indonesia | Japan | Lao PDR | Malaysia | Myanmar | Philippines | Republic of Korea | Thailand | Viet Nam

Background

How have water environmental policies responded to the emerging environmental changes and underlying causes?

--» Cambodia | China | Indonesia | Japan | Lao PDR | Malaysia | Myanmar | Philippines | Republic of Korea | Thailand | Viet Nam

Cases

State of Water for Indonesia

Information included: State of water resources, major basins, water quality status information

State of water environmental issues

Indonesia

Even though Indonesia water resources accounted has for almost six percent of the world water resources or about 21 percent total water resources in the Asia Pacific region, in fact clean water is becoming serious problem in Indonesia. Based on data shows that water consumption tends to increase significantly, total water demand in 2000 is approximately 156,000 millions m^3 per annum. It is predicted that the figure will be doubled to 356,575 million m^3 per annum by 2015. However the availability of clean water in term of quantity tends to decrease due to environmental degradation and pollution. The rate of water resources degradation accounted for 15-35 % per capita annually.

In the recent, at least 80 percent of 250 millions Indonesian has no access to piped water. Due to difficulties and limited access to clean water large number of people still using river for drinking water, bathing, and washing. There was an indication that people in the village uses river as drinking water resources tends to decrease from 22.8 percent to 22.5 percent during period 1999-2002. However, during the same period, there was an increasing trend people

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Access to legislative framework in Japan

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Cases

Legislative Framework in Japan

Legislative framework : **Japan**

Access to Basic Environmental Law in Japan

Chart of Policy System for Water Environment in Japan

Conservation of Water Quality

Conservation of Water Quality in Public Water Resources

Basic Environment Law (enacted May 1989) ▸Click

Objectives : Environmental Quality Standards for Water Pollutants
(Health + Living Environment)
(Monitoring of precautionary targets)

Common Measures

Water Pollution Control Law (enacted December 1970) ▸Click

Factory effluent control, notification of factory establishment, monitoring orders, continuous monitoring
Measures for household wastewater:

- Maintenance and construction of sewers, rural village wastewater treatment facilities, septic tanks, and the like

Special Measures in Enclosed Water Bodies

Lakes and Reservoirs

The Law Concerning Special Measures for Preservation of Lake Water Quality (enacted July, 1984) ▸Click

Planning of Plan for the Preservation of Lake Water Quality, Special Regulations

Basic Environmental Law in Japan

WEPA close

Basic Environment Law

Year of Enactment and Implementation	Enactment and Implementation in 1993
Purpose	The purpose of this law is to comprehensively and systematically promote policies for environmental conservation to ensure healthy and cultured living for both the present and future generations of the nation as well as to contribute to the welfare of mankind, through articulating the basic principles, clarifying the responsibilities of the State, local governments, corporations and citizens, and prescribing the basic policy considerations for environmental conservation. Source: Basic Environment Law (tentative translation)
Basic Principles	**Enjoyment and Future Success of Environmental Blessings** Environmental conservation shall be conducted appropriately to ensure that the present and future generations of human beings can enjoy the blessings of a healthy and productive environment and that the environment as the foundation of human survival can be preserved into the future, in consideration that preserving the healthy and productive environment is indispensable for healthy and cultured living for the people, and that the environment is maintained by a delicate balance of the ecosystem and forms the foundation of human survival, which is finite in its carrying capacity and presently at risk of being damaged by the environmental load generated by human activities. **Creation of A Society Ensuring Sustainable Development with Reduced Environmental Load** Environmental conservation shall be promoted so that a society can be formulated where the healthy and productive environment is conserved and sustainable development is ensured by fostering sound economic development with reduced environmental load, through practices on environmental conservation such as reducing as much as possible the environmental load generated by socio-economic and other activities, which are voluntarily and positively pursued by all the people sharing fair burden; and so that interference with environmental conservation can be anticipatively prevented through enhancing scientific knowledge. **Active Promotion of Global Environmental Conservation through International Cooperation** Global environmental conservation shall be actively promoted in cooperation with other countries, utilizing Japan's capacities and resources, and in accordance with Japan's standing in the international community, in consideration of the fact that global environmental conservation is a common concern of mankind as well as a requirement in ensuring healthy and cultured living of the people into the future, and that the Japanese economy and society is closely interdependent with the international community. Source: Basic Environment Law (tentative translation)

Basic Environmental Law in Japan : Environmental Quality Standard

Environmental Quality Standards

Summary	• Pursuant to the Article 16 (or the Article 9 of the Basic Law for Environmental Pollution at the establishment of the Basic Environment Law), the environmental quality standards for water pollutions are established (No. 59 announcement of Environmental Agency (current Ministry of the Environment), 1971, "Environmental Quality Standards for Water Pollution"). • Environmental standards are designed for the protection of human health, conservation of living environment and other benefits. Different standards are established for the protection of human health and living environment. • There are no legal requirements for local governors or polluters to meet standards since they are established only as goal or guidelines for maintaining a desirable environment, but are not legally enforceable. However exceedance of standards indicates that discharge controls and treatment measures are insufficient. In other words, the environmental standards play an indirect role in reinforcing the legally enforceable effluent standards and advanced measures for pollutant load control required by the Water Pollution Control Law.
Environmental Quality Standards for Protecting Human Health (parameters of human health)	• The 26 parameters have been established as the environmental quality standards for protecting human health (the parameters of human health) Table: Environmental Quality Standards for Protecting Human Health • Environmental quality standards for protecting human health should be applied uniformly to all public waters. The concentration for listed substances in public waters should always be maintained below standard values regardless of water use, the pollution source, or water quantity. • As the standard values are determined considering the health effects over a long-term ingestion period, the assessment of listed substances is performed using mean values of the detected concentrations in a year. • Additionally, 27 other substances have been designated as "monitoring substances". These substances have not been made directly into Environmental Quality Standards as of the present time, but they have been identified as needing further observation. Table: Monitoring Substances and Guideline Values
Environmental Quality Standards for Conservation of the Living Environment (parameters of the	• Public water bodies are categorized into three types: rivers, lakes, and coastal waters. Each type of water body is further classified into several groups, based on water usage, and standard values are established for each of these classes. Several factors were considered in the selection of water quality parameters while some were omitted intentionally. • As for the water quality standards for river, five important water quality parameters: pH, BOD, SS, DO, and

Basic Environmental Law in Japan : Environmental Quality Standard (Continued)

Access to Environmental Quality Standards for Conservation of the Living Environment (Rivers)

	Table: Monitor
Environmental Quality Standards for Conservation of the Living Environment (parameters of the living environment)	• Public water bodies are categorized into three types: rivers, lakes, and coastal waters. Each type of water body is further classified into several groups, based on water usage, and standard values are established for each of these classes. Several factors were considered in the selection of water quality parameters while some were omitted intentionally. • As for the water quality standards for river, five important water quality parameters; pH, BOD, SS, DO, and coliforms. Six water use classes from AA to E have been established for rivers. All standards are defined on the basis of daily averages. Table: Environmental Quality Standards for Conservation of the Living Environment (Rivers) • The environmental quality standards for lakes are composed of seven water quality parameters: pH, COD, DO, SS, coliforms, nitrogen and phosphorus. Four classes, from A to C, are set for water quality parameters: pH COD. DO, SS, and coliforms. Five classes are set for nitrogen and phosphorus, both of which can cause eutrophication in lakes and obstruct to use water. All the water quality standards are defined on the basis of daily average values. Table: Environmental Quality Standards for Conservation of the Living Environment (Lakes) • The coastal water standards uses water quality parameters: pH COD. DO, SS, N-hexane Extracts (oil, etc.), nitrogen and phosphorus. The three classes, A to C, were set for general water quality parameters: pH, COD, DO, SS, N-hexane Extracts (oil, etc.) while four classes, I to IV, were set for total nitrogen and phosphorus. Similar to the lake standards, the standards for all the parameters are defined on the basis of daily average values. Table: Environmental Quality Standards for Conservation of the Living Environment (Coastal Waters) • Environmental standards for water quality regarding to conservation of aquatic organisms were established as a part of "parameters of the living environment". In June 2006, environmental zoning was implemented for the first time at four rivers, including the Tama River, while drainage standards were put in place in November 2006. Currently, this standard includes only one toxic item, total zinc.

Evaluation of Compliance with Environmental Standards

Reference: Okada M, Peterson SA.(2000): "Water Pollution Control Policy and Management: the Japanese Experience". Gyosei, Japan, 287pp.

Reference: Ministry of the Environment, The Basic Law (http://www.env.go.jp/en/lar/blaw/index.html)

Environmental Quality Standards for Conservation of the Living Environment (Rivers)

WEPA

Environmental Quality Standards for Conservation of the Living Environment (Rivers)

Access to Basics for setting values → Basis for setting values ▶

A.

Parameter Class	Water use	Standard Values				
		pH	BOD	SS	DO	Total coliform
AA	Water supply class 1, conservation of the natural environment, and uses listed in A-E	6.5-8.5	1mg /L or less	25mg /L or less	7.5mg /L or more	50MPN / 100mL or less
A	Water supply classes 2, fishery class 1, bathing and uses listed in B-E	6.5-8.5	2mg /L or less	25mg /L or less	7.5mg /L or more	1,000MPN / 100mL or less
B	Water supply class 3, fishery class 2, and uses listed in C-E	6.5-8.5	3mg /L or less	25mg /L or less	5mg /L or more	5,000MPN / 100mL or less
C	Fishery class 3, industrial water class 1, and uses listed in D-E	6.5-8.5	5mg /L or less	50mg /L or less	5mg /L or more	-
D	Industrial water class 2, agricultural water, and uses listed in E	6.0-8.5	8mg /L or less	100mg /L or less	2mg /L or more	-
E	Industry water class 3 and conservation of environment	6.0-8.5	10mg /L or less	Floating matter such as garbage should not be observed.	2mg /L or more	-

(BOD: Biochemical Oxygen Demand, SS: Suspended Solids, DO: Dissolved Oxygen)

Basics for setting values

Environmental Quality Standards for Conservation of the Living Environment (Rivers)

Basis for setting values

1) pH

Generally, pH of rivers in
most intake facilities the
taken by water authoritie
5000m³/days. When the p
chlorination during water
corrosion in the treatmer
pH between 6.5–8.5 is des
range, it may cause irrita
plants and marine organis
severely affects the plan
pH causes discoloration c
range for proper plant gr
standard for agricultural

2) BOD

Self-purification aspects of rivers were given strong consideration when BOD standards were established for these water bodies. Waters having a BOD of less than 1 mg/l can be relatively unimpacted by humans and primary candidates for conservation. About 31.4%, 29.9% and 13.8% of drinking water sources in Japan, have BOD values less than 1 mg/l, 2 mg/l and 3 mg/l, respectively. If BOD exceeds 3 mg/l, it affects congulation and rapid sand-filtration processes in conventional water treatment plants, requiring expensive advanced water treatment. Therefore, BOD standards are set at 2 and 3mg/l. respectively, for class 2 and 3 waters.

For class I fisheries, BOD is set at less than 1 mg/l, since oligosaprobic fishes such as salmon and smelt require water with a BOD less than 2 mg/l. For class II fisheries, BOD is set at less than 2 mg/l, since mesoprobic fish such as carp require water with a BOD less than 3 mg/l. For class III fisheries, BOD is set at less than 3 mg/l, since class III fisheries require water with a BOD less than 5 mg/l. For class E, conservation of environment, BOD is set at less than 10mg/l to prevent odor caused by the anaerobic decomposition of organic matter.

3) Suspended solic (SS)

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Access to legislative framework in the Philippines

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Cases

Legislative Framework in the Philippines

Legislative framework : **Philippines**

Access to Water Usage and Classification

Chart of Policy System for Water Environment in the Philippines

Conservation of Water Resources

- Conservation of Water Quality ····· *PD 3931 (1964) as amended by PD 984 (1976) as repealed by PD 9275 Clean Water Act of 2004*
  Objective: To protect, abate and control pollution of water, air and land for more effective utilization of the resources
  - DAO 35 (1990) Revised Effluent Regulation ····· *Objective: This rules and regulations shall apply to all industrial and municipal wastewater effluent*
  - DAO 34 - Revised Water Usage and Classification Water Quality Criteria ····· *Objective: shall classify all bodies of water and comply with the water quality criteria*
- Conservation and Protection of Laguna Lake ····· *RA 4850 (1966) as amended by PD 813 (1975), PD 927 (1983)*
  Objective: To promote, and accelerate the development and balanced growth of the Laguna lake area with due regards for environmental management and control,

Water Usage and Classification

WEPA close

DENR Administrative Order No. 34 Series of 1990

Year of Enactment and Implementation	Enacted in 1990
Purpose	Water Usage and Classification
Control Area	Nationwide
Overview	Water classification is the primary component in water quality management for which goals/objectives of each of the water bodies are met. Three activities are involved namely: establishments of water bodies beneficial use, identification of water quality indicators (or criteria pollutants) and water quality suitable for each use. In the Philippines classification is a very important component of water quality management since the application of effluent standards are dependent on this classification. This administrative order classifies water bodies into five (5) classes, ie.e AA, A, A, C for inland fresh waters and four (4) classes for marine and coastal water, i.e. SA, SB, SC and SD.
Features	**Effluent Standards for different water quality parameters are described below:** **Water Usage and Classifications** A) Fresh Surface Water (river, lakes, reservoir, etc.)

Classification	Beneficial Use
Class AA	Public Water Supply Class 1. This class is intended primarily for waters having watersheds which are uninhabited and otherwise protected and which require only approved disinfection in order to meet the National standards for Drinking Water (NSDW) of the Philippines.
Class A	Public Water Supply Class 2. For sources of water supply that will require complete treatment (coagulation, sedimentation, filtration, and disinfection) in order to meet the NSDW.
Class B	Recreational Water Class 1. For primarily contact recreation such as bathing, swimming, skin diving, etc. (particularly those designated for tourism purpose.)
Class C	a. Fishery Water for the propagation and growth of fish and other aquatic resources. b. Recreational water class 2 (boating, etc) c. Industrial Water supply class 1 (from manufacturing processes after treatment)
Class D	1. For agriculture, irrigation, live stocks watering, etc.) 2. Industrial Water supply class 2 (e.g. cooling, etc.)Other 3. inland waters by their quality belong to this classification.

Water Usage and Classification : Water quality criteria

(b) Water Quality Criteria for Fresh Waters.

1. Conventional and Other Pollutants Affecting Aesthetics and Oxygen Demand.- Please refer to Table 1 for the parameters and limits or specifications according to classification and use of the receiving body of water (RBW).

Table 1 – Water Quality Criteria for Conventional and Other Pollutants Contributing to Aesthetics and Oxygen Demand for Fresh Waters (a)

PARAMETER	UNIT	CLASS AA	CLASS A	CLASS B	CLASS C	CLASS D (b)
Color	PCU	15	50	(c)	(c)	(c)
Temperature (d) (max. rise in deg. Celcius)	° C rise		3	3	3	3
pH (range)		6.5 – 8.5	6.5 – 8.5	6.5 – 8.5	6.5 – 8.5	6.0 – 9.0
Dissolved Oxygen (e) (Minimum)	% satnmg/L	705.0	705.0	705.0	605.0	403.0
5-Day 20° C BOD	mg/L	1	5	5	7(10)	10(15)
Total Suspended Solids	mg/L	25	50	(f)	(g)	(h)
Total Dissolved Solids	mg/L	500 (i)	1,000 (i)	–	–	1,000 (i)
Surfactants (MBAS)	mg/L	nil	0.2(0.5)	0.3(0.5)	0.5	–
Oil/Grease (Petroleum Ether Extracts)	mg/L	nil	1	1	2	5
Nitrate as Nitrogen	mg/L	1.0	10	nr	10(j)	–
Phosphate as Phosphorus	mg/L	nil	0.1(k)	0.2(k)	0.4(k)	–
Phenolic Substances as Phenols	mg/L	nil	0.002	0.005(l)	0.02(l)	–
Total Coliforms	MPN/100 mL	50(m)	1,000(m)	1,000(m)	5,000(m)	–
Or Fecal Coliforms	MPN/100 mL	20(m)	100(m)	200(m)	–	–
Chloride as Cl	mg/L	250	250	–	350	–
Copper	mg/L	1.0	1.0	–	0.05(o)	–

Footnotes for Tables 1, 2, 3 and 4.
(a)–Except as otherwise indicated, the numerical limits in Tables 1 and 3 are yearly average values. Values enclosed in parentheses are maximum values.
(b)–For irrigation purposes, **SAR** should have a minimum value of 8 and a maximum value not to exceed 18. **Boron** should not exceed 0.75 mg/L.
(c)–No abnormal discoloration from unnatural causes

Water Usage and Classification : Water quality criteria for toxics

2. Toxic and other Deleterious Substances. – The maximum limits for these types of pollutants according to classifications or use of the receiving body of water are found in Table 2.

Table 2 – Water Quality Criteria for Toxic and Other Deleterious Substances for Fresh Waters (For the Protection of Public Health)

PARAMETER	UNIT	CLASS AA	CLASS A	CLASS B	CLASS C	CLASS D
Arsenic (i)	mg/L	0.05	0.05	0.05	0.05	0.01
Cadmium (i)	mg/L	0.01	0.01	0.01	0.01	0.05
Chromium (i) (hexavalent)	mg/L	0.05	0.05	0.05	0.05	-----
Cyanide	mg/L	0.05	0.05	0.05	0.05	-----
Lead (i)	mg/L	0.05	0.05	0.05	0.05	-----
Total Mercury (i)	mg/L	0.002	0.002	0.002	0.002	0.002
Organophosphate	mg/L	nil	nil	nil	nil	nil
Aldrin	mg/L	0.001	0.001	–	–	–
DDT	mg/L	0.05	0.05	–	–	–
Dieldrin	mg/L	0.001	0.001	–	–	–
Heptachlor	mg/L	nil	nil	–	–	–
Lindane	mg/L	0.004	0.004	–	–	–
Toxaphane	mg/L	0.005	0.005	–	–	–
Methoxychlor	mg/L	0.10	0.10	–	–	–
Chlordane	mg/L	0.003	0.003	–	–	–
Endrin	mg/L	nil	nil	–	–	–
PCB	mg/L	0.001	0.001	–	–	–

Note:

1. Limiting values of organophosphates and organochlorines may in the meantime serve as guidelines in the interim period pending the procurement and availability of necessary laboratory equipment. For Barium, Cobalt, Fluoride, Iron, Lithium, Manganese, Nickel, Selenium, Silver and Vanadium, the 1978 NPCC Rules and Regulations, Section 69 may be considered.
2. For footnotes please refer to Table 1.

Policy database provides information to know water environmental management in each WEPA country

Access to Background in the Philippines

Policy Database : Background for the Philippines

Overview of development of water environmental management is explained

Background : **Philippines**

Underlying Causes	phenomena	Policy Response
1973 • Industrialization • Urbanization • Influx of population • Indiscriminate dumping of solid waste	Pasig River Pollution ►Click	• Strict implementation of the pollution control law • Implementation of the Pasig Rehabilitation Program • Implementation of PEPP • Implementation of the Ecowatch Program • Implementation of the ecological solid waste management act • Implementation of RA 6969
1983 • Rapid economic growth • Increase industrial and domestic wastewater discharge • Limited domestic wastewater sewerage system	Occurrence of red tide in Philippine coastal water ►Click	• Strict implementation of the pollution control law • Effluent standard 1992 • Creation of a National Red Tide Task Force (NRTTF) • Preparation of Guidebook on Toxic Red Tide Management ►Click • Proposal to expand domestic wastewater sewerage system
2000 • Over exploitation of natural resources • Urbanization and industrialization • Indiscriminate dumping of solid waste	Manila Bay is identified as a pollution hotspot ►Click	• Strict implementation of the effluent standards • Implementation of the Manila Bay Environmental Management Project • Proposal to expand domestic wastewater sewerage treatment facilities ►Click • Proposal to implement domestic effluent standards ►Click • Implementation of the ecological solid waste management act • Implementation of RA 6969

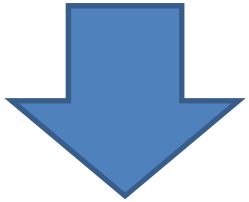
WEPA Policy Database - Status

	State of water	Org. Arrangements	Legislative Framework	Law Enforcement			Background	Cases
				Monitoring system	Budget /Expense	CB		
Cambodia								
China								
Indonesia								
Korea								
Laos								
Malaysia								
Myanmar								
Philippines								
Thailand								
Viet Nam								
Japan								

Green column = Data available, Blue column = No Data

Technology Information Database

- **List of technologies/systems for wastewater treatment and/or remediation of water environment**
  - **Overview**
  - **Design and operational condition**
  - **Influent & effluent quality**
  - **Operation & maintenance, etc.**



Information on technologies and systems currently in good operation which are useful for decision makers to introduce appropriate technologies for the region

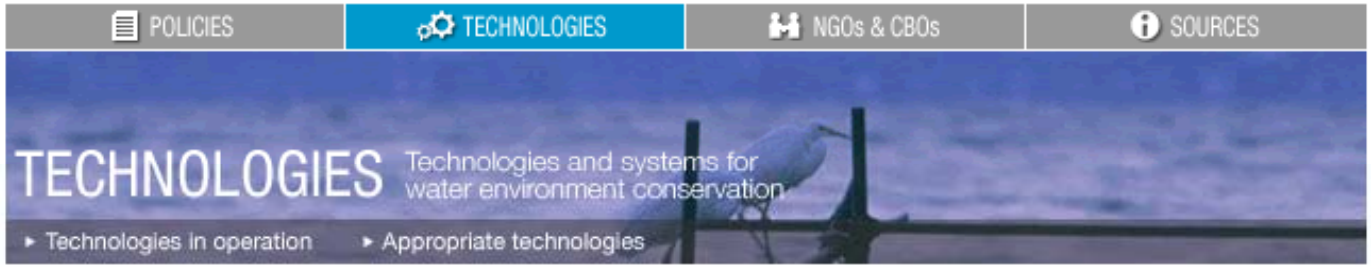
Information on wastewater treatment facilities

Wastewater treatment facility in operation for more than 3 years

Items	Data
General Information	Name and Location, Description
Treatment Process	Treatment Type, Process Flow Diagram
Process Performance (Design)	Effluent Quality, Performance, Amount of Treated Wastewater, Electric Consumption, Amount of Sludge Generation
Process Performance (Actual)	Effluent Quality, Performance, Amount of Treated Wastewater, Electric Consumption, Amount of Sludge Generation
Cost	Initial Cost, Operational Cost
Others	Contact Address, Picture

WEPA Home page : http://www.wepa-db.net/index.htm

Technology database provides information to know water environmental management in each WEPA country



Database of technologies in operation

This database intends to provide information on water environment conservation technologies and systems that are suitable for the Asian monsoon region. You have four (4) methods by which to reach the appropriate technologies and systems currently in successful operation.

Situation of the treatment area

Technologies/systems that are suited to the region and circumstances in question.

Click

Type of wastewater

Technologies/systems that are suited to the type of wastewater in question.

Click

Search by Country

Select country...

Keyword search

Search technologies/systems by selecting keywords.

Click

Information on appropriate technologies

This database provides information on water environment conservation technologies and systems that are suitable for the Asian monsoon region, in terms of sustainable operation and maintenance, as well as the comprehensive consideration of cost, operation skills, etc.

Click

Access to situation of the treatment area

Situation of the treatment area

Database of technologies in operation | Situation of the treatment area

Choose a type of treatment area, and you will see a list of wastewater treatment technologies/systems.

Type of your treatment area of wastewaer treatment

Large city	▸Click
Medium or small city	▸Click
Suburban area (city fringe area)	▸Click
Rural area	▸Click
Tourist area	▸Click
Industry	▸Click

Access to rural area

<Classification guideline for Approach 1>

Categories	Wastewater *1	Guideline (draft)
Large city	Domestic wastewater Ambient water	Population density > 4,000 persons / km²
Medium or small city	Domestic wastewater Ambient water	Population density: 500 – 4,000 persons / km².
Suburban area (city fringe area)	Domestic wastewater Ambient water	Between city area and rural area (Progress of urbanization is observed)
Rural area	Domestic wastewater Ambient water	Small towns and villages in farming area
Tourist area	Domestic wastewater Ambient water	Resort and commercial area (To protect surrounding water environment)
Industry	Industrial wastewater	

Rural area

Database of technologies in operation | Situation of the treatment area

Rural area

1. Sewage Treatment Plant (Indonesia)
2. Okutama-cho Ogouchi wastewater treatment center (Japan)
3. H District Environment Center (Night soil treatment plant) (Japan)
4. Johkasou for residence(Japan)
5. Johkasou for residence(Japan)
6. Johkasou for residence(Japan)
7. Johkasou for housing complex(Japan)
8. Johkasou for housing complex(Japan)
9. Johkasou for housing complex(Japan)
10. Johkasou for housing complex(Japan)
11. Kawano Area Wastewater Treatment Plant (Japan)
12. Imaichi Clean Center (Yorii-town Rural Sewerage System Wastewater Treatment Plant) (Japan)
13. Kubokawa-town Domestic Wastewater Drain Purification Facility (Japan)
14. Son La Tuberculosis Hospital Wastewater Treatment Facility (Viet Nam)
15. Wastewater Treatment Facility in Tuyen Quang General and Tuberculosis Hospitals (Viet Nam)

Access to sewage treatment plant (Indonesia)

Sewage treatment plant (Indonesia)

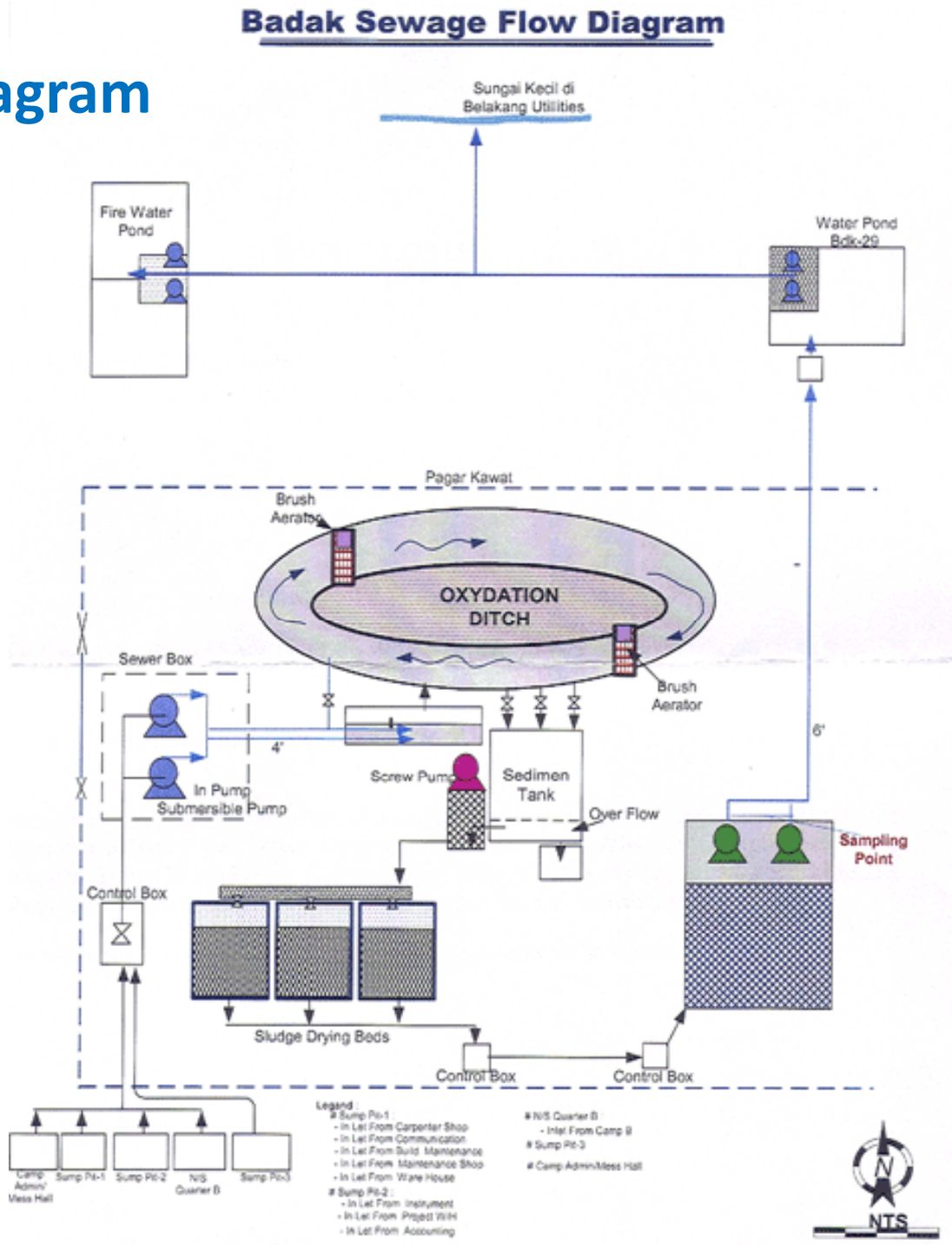
Access to process flow diagram

Wastewater treatment facility identification	Facility name	Sewage Treatment Plant
	Facility location	VICO Indonesia, Muara Badak - Eat Kalimantan
Facility overview	Operating period	25 years ago
	Wastewater characteristics	Wastewater from camps, offices and food processing
	Treatment process	Standard oxidation pond process
	Process flow diagram	See attached
	Specification of reactors & primal equipment	1. Submersible Pump Design : 120 A ; Pressure = 1000 psi 2. Oxidation Ditch Cap. Design : 603 m³ 3. Sediment Tank Cap Design : 197 m³ 4. Drying Bed Cap Design : 120 m³ (as per unit) 5. Centrifugal Pump Design : 15.4 A ; Pressure = 250 psi 6. Slurry Pump specification unknown 7. Brush Aerator specification unknown

Facility Operation status	Daily amount of treated wastewater	Actual	184 m³/day	Design	250 m³/day
	Annual electric consumption	Actual	40 A with 380 volt	Design	Same as the actual Ampere
	Annual amount of sludge generation	Actual	About 2.11 DSt	Design	Unknown DSt

Process performance (Influent & effluent water quality)				
Actual		Influent quality	Effluent quality	Performance
	SS	84.5	53	37%
	BOD	43.5	12	72%
	COD	N/A	N/A	N/A
	T-N	N/A	N/A	N/A
	T-P	N/A	N/A	N/A
	Coliform group	N/A	N/A	N/A
	Fecal coliforms	N/A	N/A	N/A
	E. coli bacteria	N/A	N/A	N/A

Process flow diagram



Rural area

Database of technologies in operation | Situation of the treatment area

Rural area

Access to Johkasou for residence (Japan)

1. Sewage Treatment Plant (Indonesia)
2. Okutama-cho Ogouchi wastewater treatment center (Japan)
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15. Wastewater Treatment Facility in Tuyen Quang General and Tuberculosis Hospitals (Viet Nam)

Johkasou for residence (Japan) : continued

	Specification of reactors & primal equipment	Anaerobic filter tank: 1.813 m³ (including flow control unit) Floating media tank: 0.313 m³, Biofilm tank: 0.049 m³ Treated water tank: 0.042 m³, Disinfection tank: 0.011 m³ Rated output for blower: 86W			
Facility Operation status	Daily amount of treated wastewater	Actual	1.06 m³/day	Design	1.00 m³/day
	Annual electric consumption	Actual	748 kWh	Design	748 kWh
	Annual amount of sludge generation	Actual	-	Design	24 DS-kg

Process performance (Influent & effluent water quality)

Design

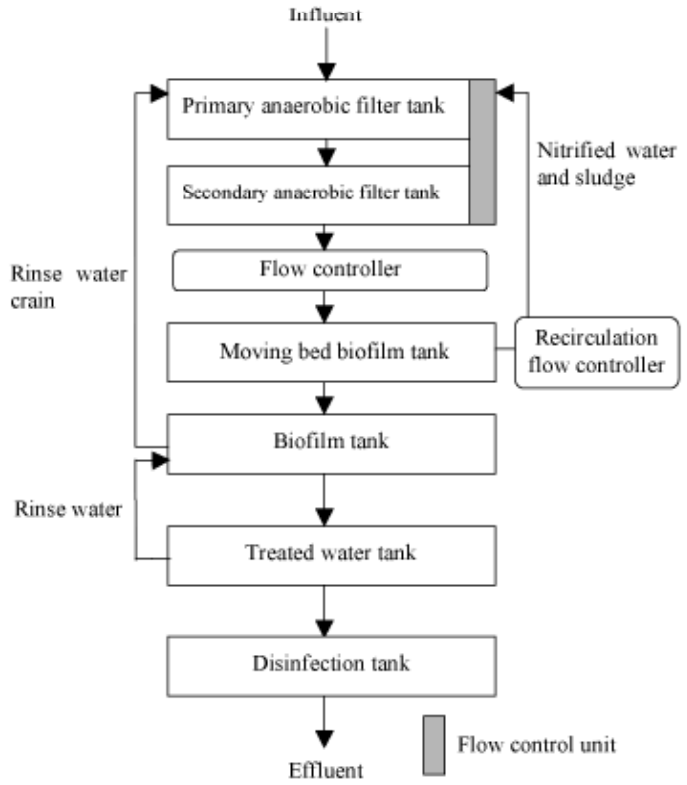
	Influent quality	Effluent quality	Performance
SS	250 mg/L	15 mg/L	>94%
BOD	200 mg/L	20 mg/L	>90%
COD (Cr, Mn)	N/A	N/A	-
T-N	50 mg/L	20 mg/L	>60%
T-P	N/A	N/A	-
Coliform group	N/A	N/A	-
Fecal coliforms	N/A	N/A	-
E. coli bacteria	N/A	N/A	-
Other	N/A	N/A	-

Actual

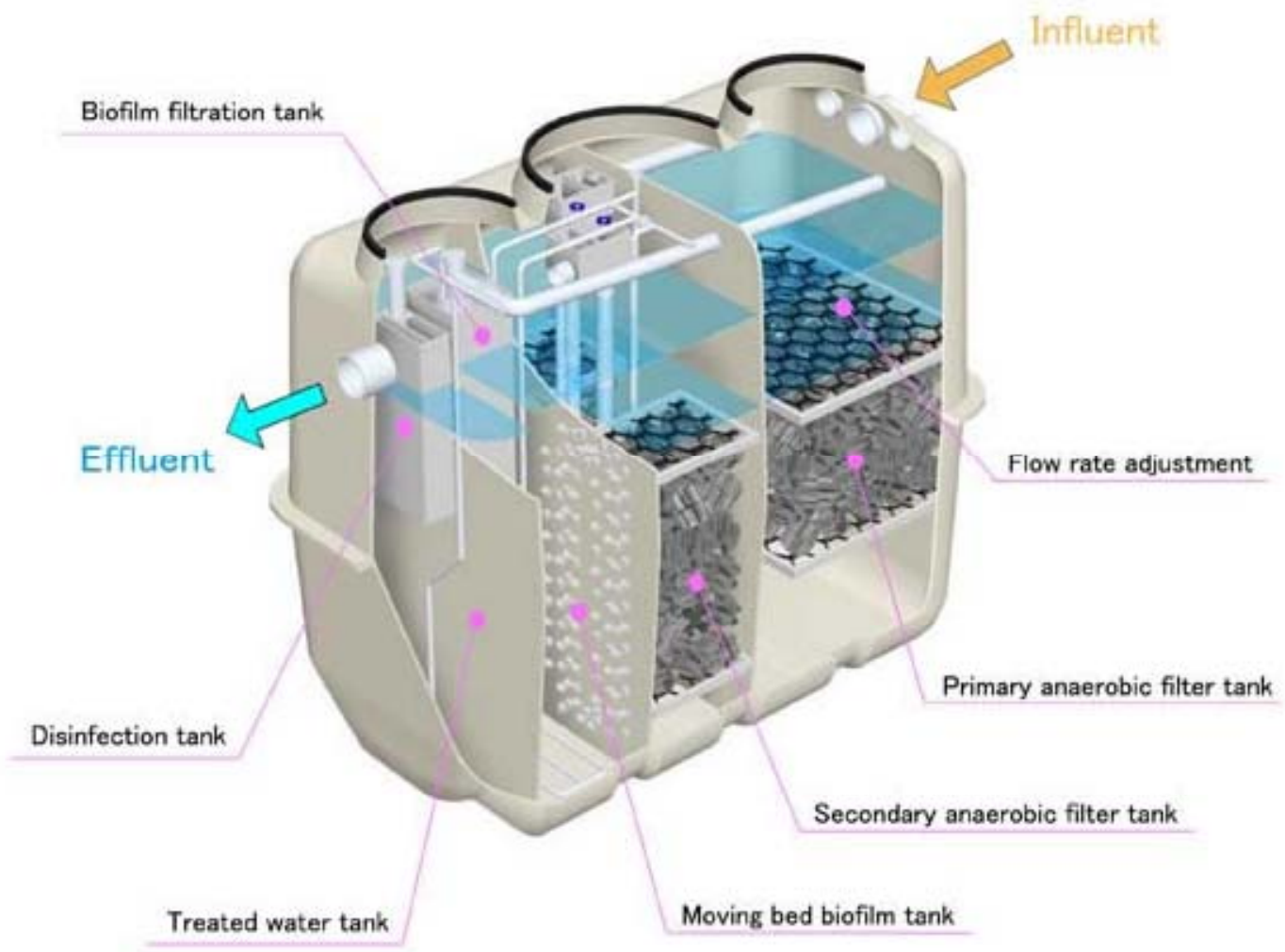
	Influent quality	Effluent quality	Performance
SS	59 mg/L	9 mg/L	85%
BOD	74 mg/L	14 mg/L	81%
COD (Cr, Mn)	64 mg/L	24 mg/L	63%
T-N	21 mg/L	15 mg/L	29%
T-P	-	5.2 mg/L	-
Coliform group	N/A	N/A	-
Fecal coliforms	N/A	N/A	-

Johkasou for residence (Japan)

Access to picture

Wastewater treatment facility identification	Facility name	Johkasou for residence
	Facility location	Ootsuki City, Yamanashi Prefecture
Facility overview Picture >	Operating period	since August 1998
	Wastewater characteristics	Domestic wastewater (household wastewater + night soil)
	Treatment process	Anaerobic treatment (Anaerobic filter) + Advanced treatment (Biological nitrogen removal process with floating media)
	Process flow diagram	

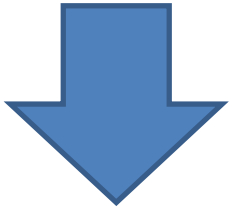
Picture



Overview of the main components

Activities by NGOs & CBOs

- **Cases of activities by NGOs and CBOs**
- **Cases of governmental activities on education and awareness raising**

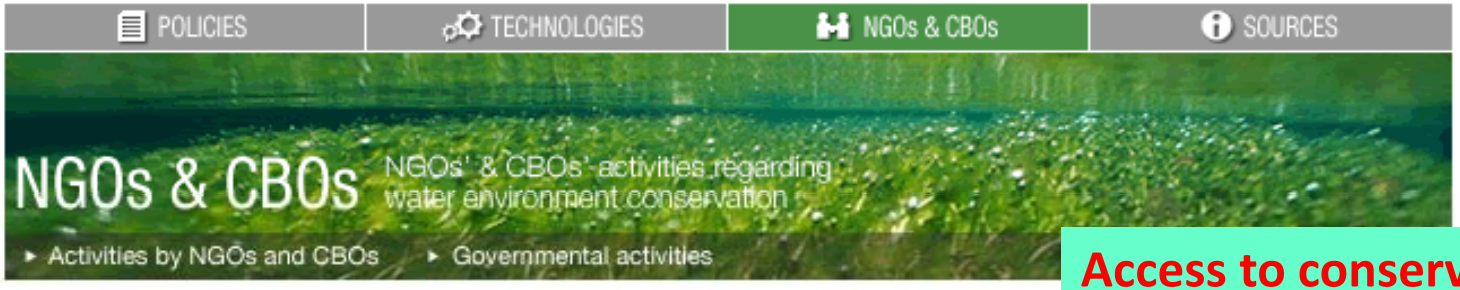


Practical cases of NGOs' and governmental activities to promote them

NGOs & CBOs database provides information on the activities for water environmental conservation in each WEPA country

Numbers of NGO/CBO Activities in WEPA database

NGOs & CBOs activities in Indonesia



Access to conservation of forest in North Sulawesi

Activities by NGOs and CBOs **Indonesia**

	Type of Activity	Organization	Area
1	Conservation of Forest in North Sulawesi	Herry Rompas	Minahasa, North Sulawesi
2	Utilization of weeds in East Java	JULITA JOYLITA WAHYU MUMPUNI	Surabaya, East Java
3	Construction of tunnels, dams and irrigation systems in Bali	SUBAK TIRTA AMERTA	Badung, Bali
4	Construction of water tunnels in West Sumatra	Zamrisyaf	Agam, West Sumatra
5	Construction of water tunnels in Central Java	Haji San Munadi	Pemalang, Central Java
6	Construction of power plant with water turbine in North Sumatra	Father B. Tarigan	Karo, North Sumatra
7	Construction of water tunnels in West Java	Abdul Rozak	Tasikmalaya, West Java
8	Construction of irrigation system in Lampung	Village community of Sukaraja	North Lampung, Lampung

Conservation of forest in North Sulawesi

Activities by NGOs and CBOs **Indonesia**

Case 1: Conservation of Forest in North Sulawesi

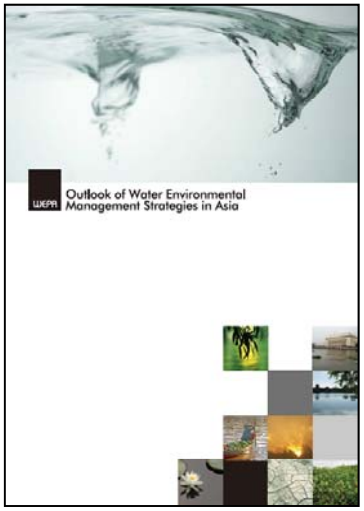
Type of Activity	Conservation of forest
Organization	Herry Rompas
Area	Minahasa, North Sulawesi

Summary

He is involved in reforesting the riverbanks of Tondano by creating Campacca forest and forest of other trees, land conservation, development of city forests, formation of farmer groups, road opening, producing counseling and information pamphlets on environment. His dedication was driven by his love of natural environment and his concern on the critical condition of the supporting area of water catch area of Tondano lake. During the rainy season erosion and sedimentation take place and shallow the lake. In 1985 he started planting trees that have a double function to preserve and regulate water and to give earning to the people, namely the Campacca trees (Michelia campacca), nantu, mahogany, and other cover trees.

The area where he planted the trees covered 43 hectares in 4 locations. The number of trees that he planted are as many as 26,000 consisting of 20,000 campacca trees, 4,500 mahogany trees and 1,500 nantu trees. He also planned to plant eaglewood trees. The impact of his work is to beatify the environment around the lake of Tondano, saving the spring, preserving the water catch area of Tondano lake. Consequently, the benefit of the lake, including as the resource of power plant and tourism spot, can be preserved.

State of Water Quality in WEPA Countries

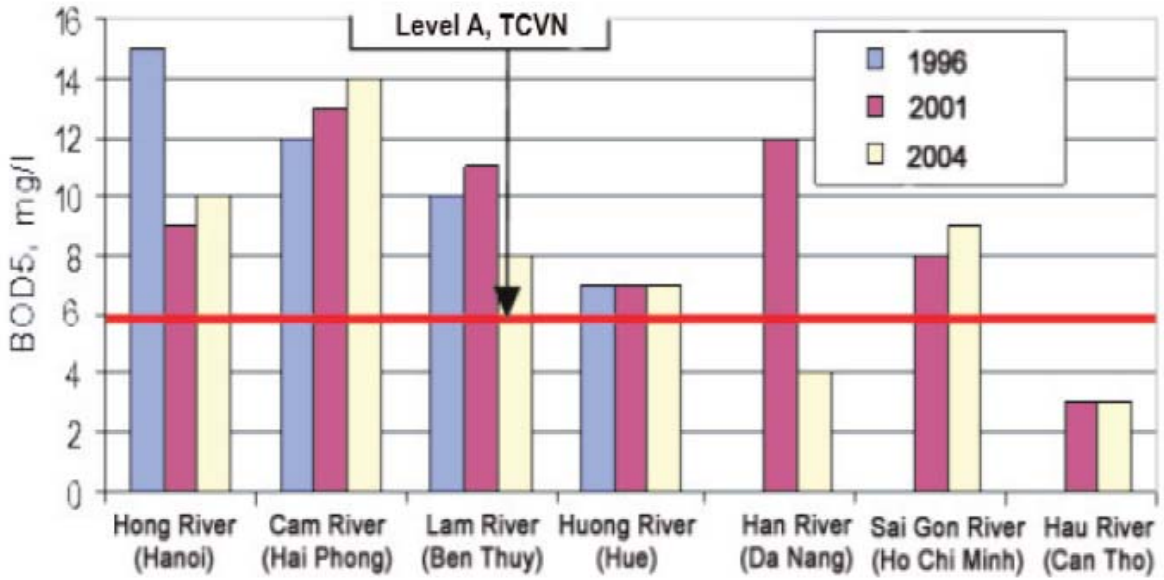


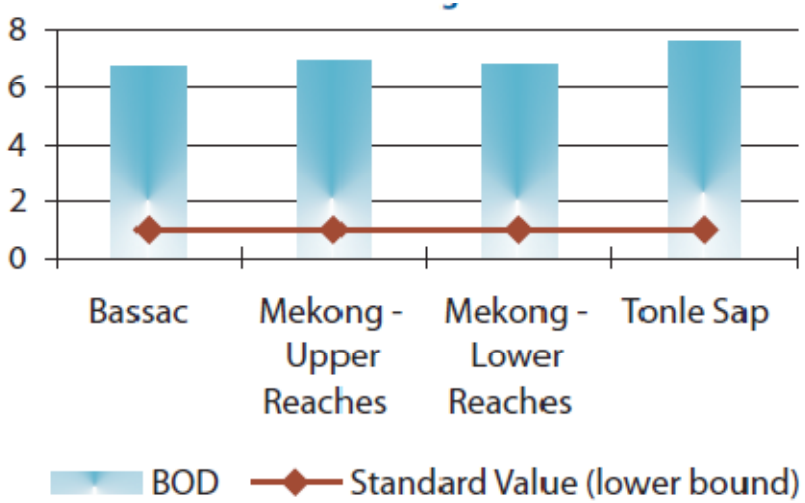
From WEPA Outlook of Water Environment Management Strategies in Asia (2009) and WEPA database

Increase Stress to Water Quality

Annual Average BOD in Rivers in Cambodia (1999-2001)

(WEPA database: Original Source: "Cambodia Environment Monitor 2003" (World Bank, 2003))





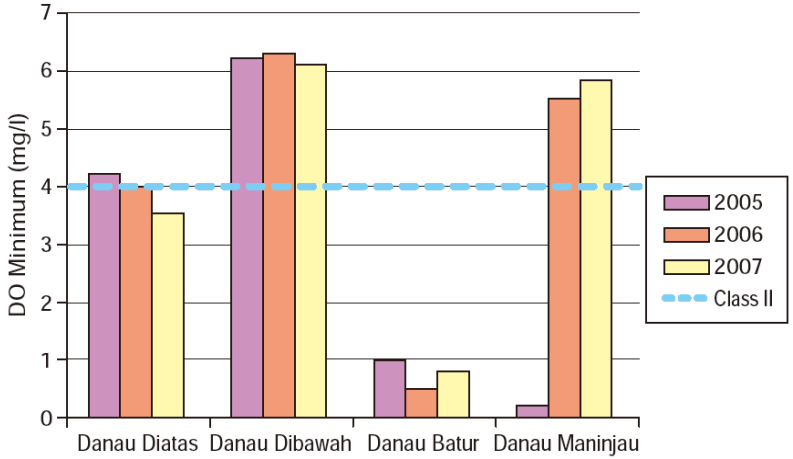
Source: Department of Environmental Pollution Control, Ministry of Environment, 2002.

Changes in BOD in main rivers of big cities in Viet Nam

(WEPA Outlook. Original source: VEPA, MONRE State of the Environment Report 2005)

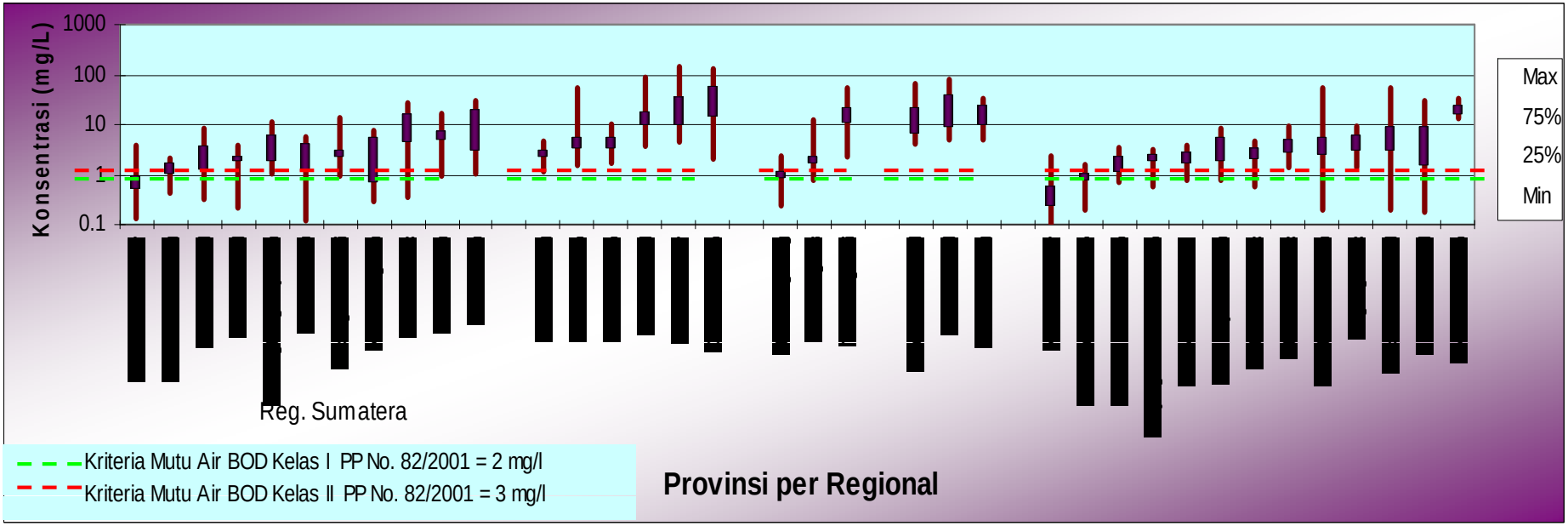
Exceeding water quality standards in major water bodies of WEPA countries

Increase Stress to Water Quality: contimued



Minimum Concentration of DO in Lake Water in Indonesia 2005-2007

(WEPA outlook. original source: The State of Environment, Ministry of Environment, Indonesia 2008)



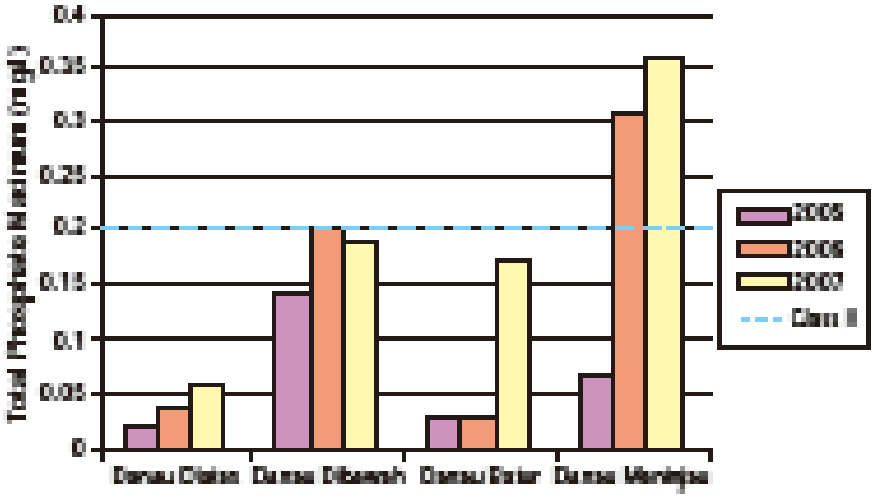
BOD in river in Indonesia 2008

(presentation by Halimah Syafrul Msi, WEPA Dialogue in 2009)

And more….

Eutrophication

- About half of 27 major lakes and reservoirs in China under national water quality monitoring program failed to meet the standards of Category V (agricultural use and landscape)
- Most lakes in inner cities are suffering from eutrophication (MONRE Viet Nam 2005)

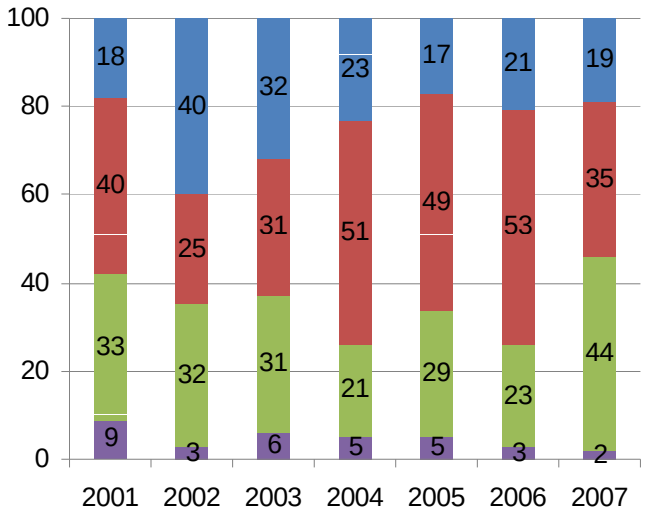


Maximum Concentration of TP in Lake Water in Indoensia 2007-2007
(source: The State Ministry of Environment, Indonesia 2008)

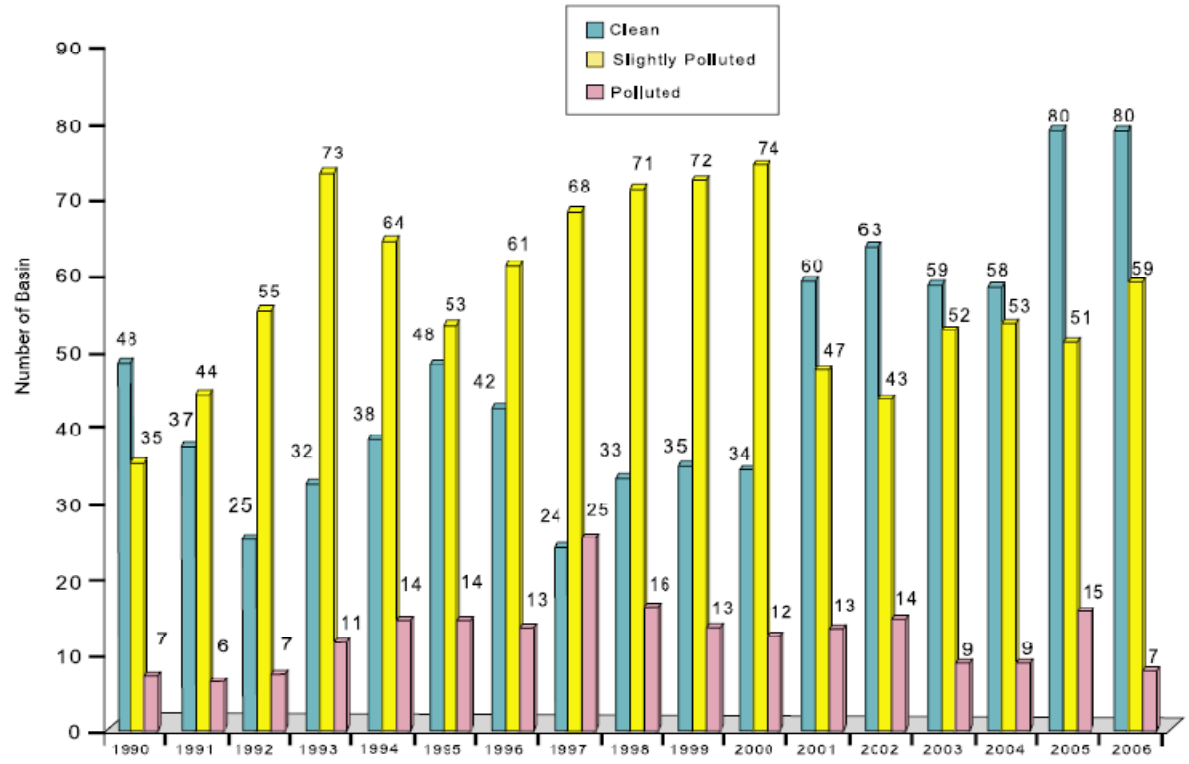
Hazardous chemicals/ Heavy metals

- Toxic substances have been identified in some water bodies in the region, whereas not prevailed but serious impacts to the local societies

But there are good news, too….



Water Quality in Thailand by Water Quality Index, 2001-2007
(source: PCD 2002, 2005, 2007)



Water Quality Trend of River Basins in Malaysia, 1990-2006
(Source: EQR 2006)

- Good
- Fair
- Deteriorated
- Highly Deteriorated

Some countries such as Malaysia and Thailand see the improvement of serious water quality problems.

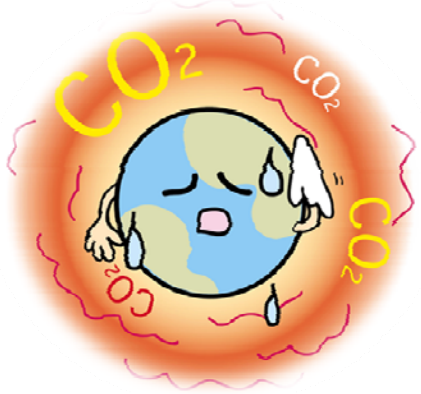
Pollution Sources

- **Domestic sources are recognized major source of pollution or increasing pollution loads**
  - Domestic sources contributed 33 % of total BOD loads in the Philippines (EMB 2007) and 42 % in Thailand (PCD 2006).
- **Wastewater from industries**
  - Total discharge from industrial zones/parks: 500,000 – 700,000 m^3/day (estimated) in Viet Nam. In addition to organic pollutants, industries cause pollution of toxic substances (chemicals and heavy metals) .
- **Agricultural Sources**
  - Pesticide, fertilizer and animal wastes are considered as the cause of pollution.

Quick Evaluation of the 1st Phase

	Achievement	Future Challenges
Development of WEPA Database	The database was fulfilled by necessary information provided by partner countries, participants of international forums and etc.	To translate “information” in the database into “knowledge” that contributes to improvement of water environmental governance.
Capacity Development	WEPA provided opportunities of gaining knowledge	To increase effectiveness of capacity building
Development of Human Network and Partnerships	Network of WEPA partner countries has been developed.	To enhance network; To deliver messages from the network to the regional/international dialogues

The 2nd phase of WEPA



April 2009 – March 2014

- The next challenges to cope with the common and emerging issues -

Specific goals of the 2nd phase

1. Identification of areas which need policy intervention through extended analysis of water environmental governance in each WEPA country, based on the information accumulated in the WEPA database and dialogues with partner countries.
2. Sharing “knowledge” and find “options of solution” through discussion on common and/or emerging issues (e.g. climate change adaptation, urban wastewater management) among partners.
3. Delivering message from WEPA on necessary actions for improvement of water environmental governance in WEPA partner countries and asking int’l collaboration where necessary.
4. Enhancing knowledge and capacity of WEPA partners through WEPA activities

Impacts of Climate Change on Water Environment

- More hot days → increase in water temperature (W.T.)
  - reaction rate → water quality

    1 - 2 ℃ increase in drinking water temperature → increase in THMFP

    and/or other reactions to produce toxic substances
  - thermal stratification → water quality

    dimictic lake → monomictic lake → meromictic lake
- Heavy rainfalls: increase in pollutant runoff → water quality

- Observed changes:
  - Lake Ikeda: 2-3 ℃ water warming → no autumn circulation →anoxic bottom in winter
- Projected changes:
  - Lake Biwa north basin: 1.5 ℃ water warming →no circulation in 100 years similar to L. Ikeda?
  - 0.8 - 2.0 mg/l increase in COD by 1 ℃ warming

National Institute for Environmental Studies, Japan（2006）

Integrated Management

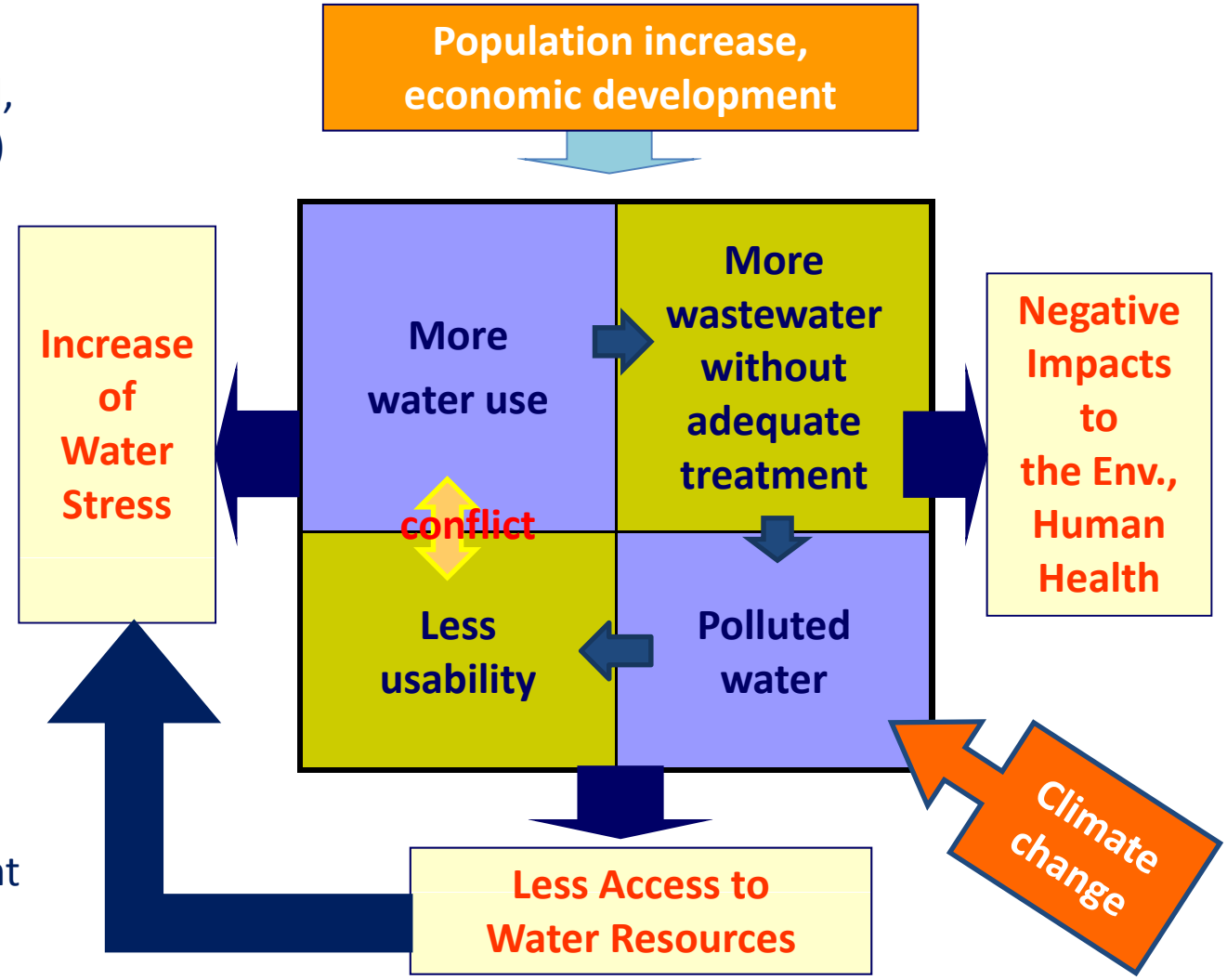
To improve water quality, we need to consider a lot of elements such as…

[Water Domain]

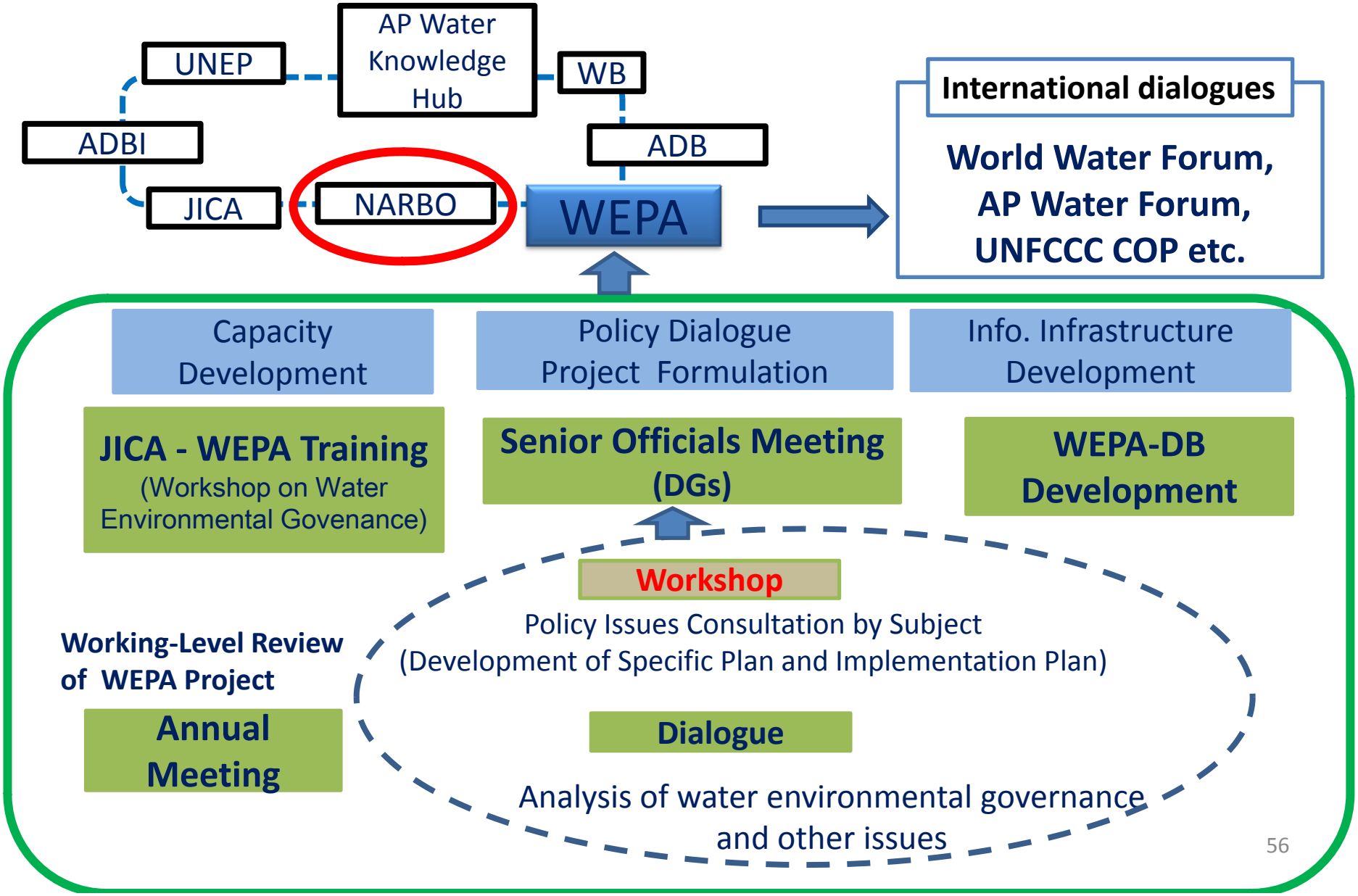
- Wastewater (Industrial, Agricultural, Domestic)
- Sanitation
- Forest destruction
- floods (health hazards)
- infrastructure development
- Water allocation
- People's awareness (perception) to water resources

[External]

- Population
- Economic Development
- Climate change



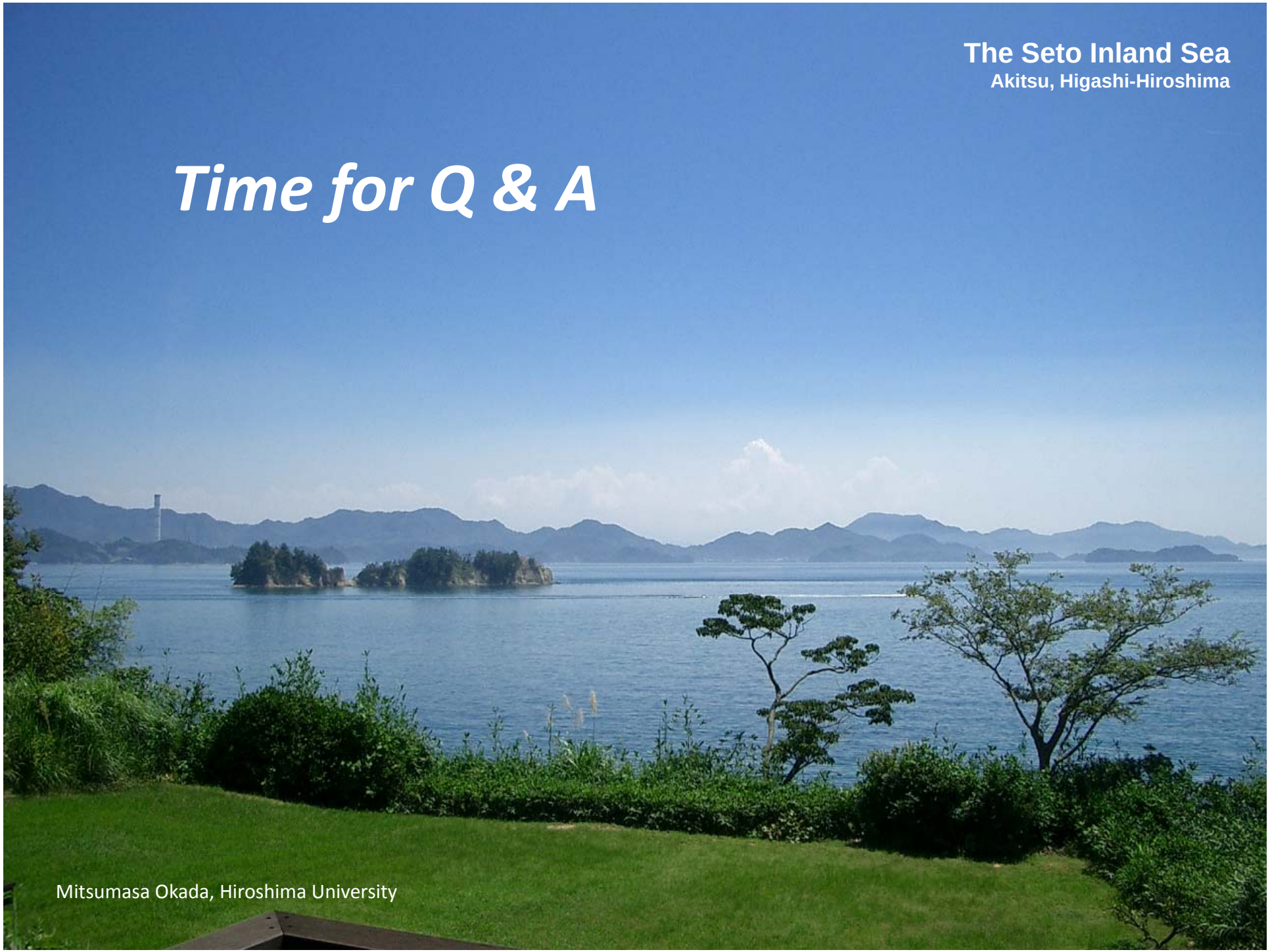
How to achieve the objectives?



Points of consideration to promote IWRM

- How to include water quality aspects in water environment management or river basin management?
  - assessment needs
  - knowing each other – between water resource and water quality managers (networking)
  - role of RBO

- Climate change impacts on water quality are not well understood. How we prepare?



Time for Q & A

Mitsumasa Okada, Hiroshima University