Towards Sustainable Water Resources Management in the Philippines: 
Challenges and Issues to Secure Water for All

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Outline

• Rationale
• Water resources status and threats
• Issues and challenges
• Actions and partnerships towards securing water for all
• Summary and concluding remarks
• Recommendations
Rationale

• Water resources in Asia have already been threatened,
  – *both in terms of quantity and quality, and*
  – *they cast a shadow on sustainable development in the region;*

• The fundamental objective of water management is:
  – *to supply water where and when it is needed.*

Source: IGES, 2005
Rationale

Megatrends/threats:

- Climate change and climate variability
- Land use and cover change
- Increasing urbanization
- Accelerated population growth
Rationale

• However, past water management often emphasized “how to increase the water supply to meet the increasing demand” and paid little consideration to water resource conservation.

• Water management governance has often been fragmented, and coordination among water-related agencies has been weak.

Source: IGES, 2005
Rationale

- Water-related issues are broad, but there are two conspicuous issues that have commanded significant international attention.
  1) They are the supply of safe drinking water;
  2) the promotion of integrated water resources management (IWRM).

Source: IGES, 2005
## The Philippine Water Resources

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Area</td>
<td>300, 000 sq. km.</td>
</tr>
<tr>
<td>Annual average rainfall</td>
<td>2,454 mm</td>
</tr>
<tr>
<td>Annual average runoff</td>
<td>1,000 mm</td>
</tr>
<tr>
<td>Number of Principal River Basins</td>
<td>421</td>
</tr>
<tr>
<td>(Drainage A = 41 – 2,780 sq.km)</td>
<td></td>
</tr>
<tr>
<td>Number of Major River Basins</td>
<td>20</td>
</tr>
<tr>
<td>(Drainage A &gt; 990 sq. km)</td>
<td></td>
</tr>
<tr>
<td>Number of Natural Lakes</td>
<td>59</td>
</tr>
<tr>
<td>Groundwater Reservoir</td>
<td>50, 000 sq. km.</td>
</tr>
</tbody>
</table>

Source: 1971-2000 Climatological Normals, PAGASA
The Philippine IWRM Directional Framework, NWRB
Water Availability in the Philippines

Total renewable water resource (TRWR) = 479 km$^3$/yr: i.e., surface water runoff (444 km$^3$/yr), a portion of the rainfall that flows into streams and groundwater (180 km$^3$/yr), that portion which penetrates into the ground water reservoir, with an overlap of 145 km$^3$/year (AQUASTAT, 2007).

The major source of surface freshwater supply are the 421 river basins in the country, each with a drainage area of at least 40 sq. km.

Another surface freshwater supply sources are 59 natural, inland lakes, freshwater swamps and marshes.

There are four major groundwater reservoirs in Cagayan, Central Luzon, Agusan, and Cotobato. The total dam capacity - 4,753 MCM in 2000 consisting of about 54 small dams and 6 large dams.
### Water Resources Potentials (MCM/year)

<table>
<thead>
<tr>
<th>Water Resources Region</th>
<th>Groundwater</th>
<th>Surface Water</th>
<th>Total Potential</th>
<th>Water Demand in 2025</th>
<th>Estimated available water in 2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1,248</td>
<td>3,250</td>
<td>4,498</td>
<td>3,041</td>
<td>1,457</td>
</tr>
<tr>
<td>II</td>
<td>2,825</td>
<td>8,510</td>
<td>11,335</td>
<td>12,466</td>
<td>-1,131</td>
</tr>
<tr>
<td>III</td>
<td>1,721</td>
<td>7,890</td>
<td>9,611</td>
<td>18,168</td>
<td>-8,557</td>
</tr>
<tr>
<td>IV</td>
<td>1,410</td>
<td>6,370</td>
<td>7,780</td>
<td>10,052</td>
<td>-2,272</td>
</tr>
<tr>
<td>V</td>
<td>1,085</td>
<td>3,060</td>
<td>4,145</td>
<td>4,167</td>
<td>-22</td>
</tr>
<tr>
<td>VI</td>
<td>1,144</td>
<td>14,200</td>
<td>15,341</td>
<td>7,595</td>
<td>7,749</td>
</tr>
<tr>
<td>VII</td>
<td>879</td>
<td>2,060</td>
<td>2,939</td>
<td>2,729</td>
<td>210</td>
</tr>
<tr>
<td>VIII</td>
<td>2,557</td>
<td>9,350</td>
<td>11,907</td>
<td>1,956</td>
<td>9,951</td>
</tr>
<tr>
<td>IX</td>
<td>1,082</td>
<td>12,100</td>
<td>13,182</td>
<td>4,598</td>
<td>8,584</td>
</tr>
<tr>
<td>X</td>
<td>2,116</td>
<td>29,000</td>
<td>31,116</td>
<td>3,682</td>
<td>27,434</td>
</tr>
<tr>
<td>XI</td>
<td>2,375</td>
<td>11,300</td>
<td>13,675</td>
<td>4,141</td>
<td>9,534</td>
</tr>
<tr>
<td>XII</td>
<td>1,758</td>
<td>18,700</td>
<td>20,458</td>
<td>12,806</td>
<td>7,652</td>
</tr>
<tr>
<td>TOTAL</td>
<td><strong>20,200</strong></td>
<td><strong>125,790</strong></td>
<td><strong>145,990</strong></td>
<td><strong>85,401</strong></td>
<td><strong>60,586</strong></td>
</tr>
</tbody>
</table>

Source: Master Plan for Water Resources Development in the Philippines, JICA-NWRB
The Philippine Climate
(based on rainfall temporal occurrence)

Monthly Rainfall Curve (Ilocos Norte)

- Two pronounced seasons: Dry from Nov-Apr and wet the rest of the year.

Monthly Normal Rainfall (Aklan)

- Season not so pronounced; Relatively dry from Nov-Apr and wet the rest of the year.

Monthly Rainfall Curve (Camarines Norte)

- No dry season with maximum rainfall from Nov-Jan.

Monthly Rainfall Curve (Misamis Oriental)

- Rainfall more or less distributed throughout the year.

Source: PAGASA
Competing Water Uses

• **Agriculture use** is about 70% of the world’s total water use and about 82% for low-income and middle-income countries. Crop production is the largest water-consuming sector (UN-Water, 2006).

• **Domestic use** of water accounts for 8% worldwide. Clean water for basic human needs is small in terms of volume, but needs to be available in the home or, at the very least, close by.

• **Industrial use** of water accounts for 10% in low- and middle-income countries compared to 22% for competing uses for the whole world and up to 59% for high-income countries (World Bank, 2001)

• About 1.1 billion people lack access to improved *water supply* and 2.4 billion to improved *sanitation*.

• Asia has the highest number of people un-served by either water supply or sanitation.

Source: Amadore, 2008
Generators of Weather-related Natural Disasters

- Floods/flashfloods, landslides, water-related diseases – intense weather/climate systems (tropical cyclones, monsoon rains, La Nina, climate variability/change, etc.)
- Drought, forest fire, water-related diseases, etc. – El Nino phenomenon, climate variability/change

Source: Amadore, 2008
Renewable water resources

- Based on the total renewable water resource (TRWR) of 479 km$^3$/yr and on population figures of NSO:

<table>
<thead>
<tr>
<th>Year</th>
<th>Total renewable water resource (m$^3$/inhab/yr)</th>
<th>Resource per capita (litrers/inhab/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>7,890</td>
<td>21,616; 3,674</td>
</tr>
<tr>
<td>1995</td>
<td>6,980</td>
<td>19,125; 3,251</td>
</tr>
<tr>
<td>2005</td>
<td>5,618</td>
<td>15,391; 2,616</td>
</tr>
<tr>
<td>2007</td>
<td>5,407</td>
<td>14,816; 2,518</td>
</tr>
</tbody>
</table>

- The direct source (main) of renewable freshwater is rainfall.
- The decline in renewable water resources per capita per year in the computation above is mainly due to population growth.
- The fraction of the population with access to safe drinking water was only 36% (urban areas, 67%; rural areas, 20%) in 1970 but increased to 85% (urban, 90%; rural 77%) in 2002.
- The fraction of population with access to sanitation was 57% (urban areas, 90%; rural areas, 40%) in 1970 and 73% (urban areas, 92%; rural areas, 61%) in 2002.

**Comparison of Total renewable water resources (cubic km, km$^3$)/ Water withdrawal as percentage of renewable water resources**:

- Philippines – 479/4%; Malaysia – 580/1%; Mayanmar – 1,045/3%; Rwanda – 5.2/1%; Pakistan – 222/73%

Source: Amadore, 2008
### Competing Local Uses of Water

#### Trends in freshwater withdrawal (km³/yr)

<table>
<thead>
<tr>
<th></th>
<th>1995</th>
<th>2000</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agri.</td>
<td>21.1</td>
<td>21.1</td>
<td>25.4</td>
</tr>
<tr>
<td>Dom.</td>
<td>4.27</td>
<td>4.73</td>
<td>5.70</td>
</tr>
<tr>
<td>Ind.</td>
<td>2.30</td>
<td>2.69</td>
<td>3.20</td>
</tr>
<tr>
<td>Total,</td>
<td>27.7</td>
<td>28.5</td>
<td>34.3</td>
</tr>
<tr>
<td>%,TRWR</td>
<td>5.7</td>
<td>5.9</td>
<td>7.1</td>
</tr>
</tbody>
</table>

"Withdrawal" typically refers to water taken from a water source for use. It does not refer to water "consumed" in that use. The **domestic sector** typically includes household and municipal uses as well as commercial and governmental water use. The **industrial sector** includes water used for power plant cooling and industrial production. The **agricultural sector** includes water for irrigation, fishery and livestock (AQUASTAT, 2007).

#### In terms of total/domestic freshwater withdrawal per capita (liters/inhab/day)*

<table>
<thead>
<tr>
<th>Year</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>1,106/170</td>
</tr>
<tr>
<td>2000</td>
<td>1,020/169</td>
</tr>
<tr>
<td>2005</td>
<td>1,102/183</td>
</tr>
</tbody>
</table>

* A minimum of 20 litres/day/person of sufficient clean water is suggested, although the average water use in Europe and the USA ranges between 200 and 600 liters/day.

**Irrigation is agriculture's biggest user of freshwater**

Source: Amadore, 2008
SOURCES OF WATER POLLUTION

“Human – induced Activities”

Agriculture
Solid waste
Liquid waste
Industrial Waste

BSWM, 2009
Impacts to WR’ availability

→ Rainy Season

- Excessive Runoff
- Increasing Flood Peaks
- Flooding of lowland areas
- Severe Erosion
- Silted Rivers

BSWM, 2009
Reduced Stream flow

High Temp & Dry Soils

Declining Groundwater Level

Insufficient Water for Irrigation
- Reduction in Yield
- Total Crop Loss

Limiting Water Supply for Domestic Purposes

BSWM, 2009
Future Freshwater Availability (Philippines)

### Population Statistics (NS0, 2008) - Philippines:

- Total population (Census, 2007) = 88,574,614
- Projected total population (2025) = 120,224,500
- Projected total population (2040) = 141,669,900

**Total renewable water resource per capita (at constant, 479 km$^3$/year):**

*Water scarcity threshold is about 1,700 m$^3$/person/yr (4,657 L/P/D)*

- 2007 > 5,407 m$^3$ /inhab/yr = 14,816 liters/inhab/day
- 2025 > 3,984 m$^3$ /inhab/yr = 10,915 liters/inhab/day
- 2040 > 3,381 m$^3$ /inhab/yr = 9,288 liters/inhab/day

### Total freshwater withdrawal

<table>
<thead>
<tr>
<th>Year</th>
<th>Total freshwater withdrawal</th>
<th>Per capita water withdrawal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>27.7 km$^3$/yr or 75,890 ML/D; 1,106 liters/inhab/day</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>28.5 km$^3$/yr or 78,082 ML/D; 1,020 liters/inhab/day</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>34.3 km$^3$/yr or 93,972 ML/D; 1,102 liters/inhab/day</td>
<td></td>
</tr>
</tbody>
</table>

### Projected total water withdrawal

<table>
<thead>
<tr>
<th>Year</th>
<th>Projected total water withdrawal</th>
<th>Per Capita (Projection)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2025</td>
<td>47.2 km$^3$/yr or 129,342 ML/D; 1,076 liters/inhab/day</td>
<td></td>
</tr>
<tr>
<td>2040</td>
<td>57.4 km$^3$/yr or 157,479 ML/D; 1,112 liters/inhab/day</td>
<td></td>
</tr>
</tbody>
</table>

Source: Amadore, 2008
Pressures on local water resources

- **Population growth and economic development**: More people, rapid urbanization and lifestyle changes will increase water use and abstraction
  
  >>>> Total population - 88,574,614 (NSO Census, 2007)
  >>>> Projected total population (2025) - 120,224,500
  >>>> Projected total population (2040) - 141,669,900

- **Pollution of water bodies** alters chemistry and ecology of rivers, lakes and wetlands. Domestic sewage, industrial wastes and heavy use of fertilizers and agro-chemicals are polluting the streams and waterways at an alarming rate. Of the more than 400 rivers, about 40 rivers are polluted.

- **Land conversion** alters runoff patterns; inhibits natural recharge; fills water bodies with silt; alters natural flood control, habitats for fisheries, recreation, water supply, water quantity and quality

- **Infrastructure development** (dams, dikes, levees, diversions etc.) Loss of integrity alters timing and quantity of river flows, nutrient and sediment transport (flood plain fertility) and thus delta replenishment; blocks fish migrations

- **Over-harvesting and exploitation** depletes living resources, ecosystem functions and biodiversity; **groundwater depletion**

- **Climate variability/change and extreme climate events**

Source: Amadore, 2008
What can we do?

- Increase the resilience and coping capacity of the sector with the current and future changes (Adaptation)
- Limit the cause of climate change through measures that could slow down the build up of atmospheric GHGs concentrations by reducing current and future emissions and by increasing GHG sinks (Mitigation)
MMSU Water-related RDE Activities

- Water management, water re-use, low-cost micro-irrigations (MMSU undergraduate and graduate students, 1976-present);
- Irrigation water management for crop diversification and system management procedures (MMSU-IWMI, 1987-1990);
- Systems approaches on land use planning, crop, water resources management (MMSU-IRRI-PhilRice-UPLB-LGUs, 1996-2001);
MMSU Water-related RDE Activities

• Groundwater contamination (MMSU-IRRI-PhilRice, 1992-2002);
• Food safety and water quality monitoring (MMSU-NEDA-DBP-LGUs, 2007-2009);
• Groundwater management: Farmer water school (BWSM-ACIAR-MMSU, Nov-Jun, 2009);
• Proposals:
  – Water Resources Center
  – River Basin IWRM
  – Effect of Climate Change on Water Resources
Adaptation strategies

GLOBAL CHANGE IMPACTS

HUMAN WELFARE, PRODUCTIVITY AND ENVIRONMENTAL SUSTAINABILITY

SUSTAINABLE WATER RESOURCES MANAGEMENT

WATERSHED MANAGEMENT

• AGRO-FORESTRY
• SOIL & WATER CONSERVATION MEASURES
• PROTECTION FOREST
• REFORESTATION

EXCESS WATER MANAGEMENT

• DRAINAGE SYSTEM REPAIR DEVELOPMENT, DREDGING OF WATERWAYS AND CANALS
• RAINWATER HARVESTING
• COASTAL ZONE DEFENSES (e.g. TIDAL BARRIER)

WATER SUPPLY AUGMENTATION & CONSERVATION

• IMPROVEMENT / REHABILITATION OF SYSTEM
• WATER SAVING TECHNOLOGIES
• WASTEWATER REUSE
• REGULATED WATER RESOURCE DEVELOPMENT
• CLOUD SEEDING

REVIEW DESIGN INPUTS FOR WATER INFRA DEVT.

ENABLING NATIONAL POLICY ON WATER RESOURCES

Source BSWM, 2009
WATERSHED MANAGEMENT

VERTIVER GRASS TECHNOLOGY

TERRACING

PLANTED VEGETATIVE STRIPS/AGRO FORESTRY

MULTI-STOREY CROPPING

REFORESTATION

MULCHING & MINIMUM TILAGE

Source BSWM, 2009
EFFICIENT WATER UTILIZATION

EFFICIENCY AND PRODUCTIVITY

Source BSWM, 2009
RAINWATER HARVESTING

Small Water Impounding Project (SWIP)  
Small Farm Reservoir (SFR)  
Maasin SWIP, Talugtog, Nueva Ecija, Philippines  

Source BSWM, 2009
THE USE OF WATER FROM SWIP

Sto Rosario SWIP, Isabela
Irrigation

Libasan SWIP, Davao Norte
Fishery (pond)

Nocnoc SWIP, Nueva Viscaya
Recreation

Maasin SWIP, Nueva Vizcaya
Domestic use (washing)

Maguirig SWIP, Cagayan
Livestock

Samac SWIP, Ilocos Norte
Fishery (free spawning)

Nocnoc Water Supply
Domestic use (piggery)

Source BSWM, 2009
# Sustainable Water Management

## Integrated Water Management in a Basin

<table>
<thead>
<tr>
<th>Landscape</th>
<th>Coastal Plain</th>
<th>Alluvial Plain</th>
<th>Upland</th>
<th>Hilly to Mountainous</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water Regime</strong></td>
<td>Coastal AQUIFERS; Saltwater Intrusion</td>
<td>Runoff Deposition; Shallow AQUIFERS; Recharge Area; Water Contamination; Irrigation; Drainage &amp; Flooding Siltation; Return Flows from Irrigation</td>
<td>Runoff &amp; Replenishment Zone; Deep Well Area; Springs</td>
<td>Runoff &amp; Replenishment Zone; Difficult Area, Headwaters Zone</td>
</tr>
<tr>
<td><strong>Water Mgmt Strategies</strong></td>
<td>More Regulated Installation of STW</td>
<td>On-Farm Water Saving &amp; Conservation; On-Farm Water Storage; Regulated STW &amp; Deep Well Installation; Controlled Use of Agro-Chemicals; Utilization of Return Flows Through Diversion, Water Distribution Strategies</td>
<td>Rainwater Harvesting; Soil Moisture Conservation; Runoff Control</td>
<td>Runoff Control Protected Area</td>
</tr>
<tr>
<td><strong>Land Use</strong></td>
<td>Rice, Corn, Vegetables, &amp; Other Agricultural Crops,</td>
<td>Agro-forestry Cash Crops</td>
<td></td>
<td>Protection Forest, Cash Crops</td>
</tr>
</tbody>
</table>

Source BSWM, 2009
FRAMEWORK OF Farmer Water School

Multi-Cycle Approach

BSWM, MMSU, ATI

LGU ATs

First Batch Farmers

Emerging Champion Farmers

Farmers Group 1

Farmers Group 2

Farmers Group 3

Farmers Group n...

Source BSWM, 2009
FRAMEWORK OF Farmer Water School

Modules on water-related topics were developed to train technicians during the 1st Cycle on Nov 4-14, 2008 at ATI, MMSU; field works to apply modules; translate modules to local dialect for 2nd Cycle.
WASTEWATER RE-USE

Rule 13.3 of the IRR.  *Wastewater reused for irrigation and other agricultural purposes.* The DA through its implementing agencies and bureaus shall provide guidelines for the safe re-use of wastewater for irrigation and other agricultural purposes. Such guidelines shall form the basis for the DENR to set standards for the disposal on land and computation of wastewater discharge fee.

**Department of Agriculture - Administrative Order No. 26 dated November 21, 2007**

Supplemental Implementing Rules and Regulations Prescribing The Procedures and Technical Standards For The Issuance of a DA Certification Allowing For The Safe Reuse of Wastewater For Purpose of *Irrigation,* Fertilization, and Aquaculture, Pursuant to Section 22.C of R.A. 9275 Otherwise Known As The Philippine Clean Water Act of 2004.”

Source BSWM, 2009
“Water for All” Water Policy

• In 2001, the Asian Development Bank (ADB) outlined its vision for integrated water management in the region in its water policy.

• The policy recognizes the Asia and Pacific region's need to formulate and implement integrated, cross-sectoral approaches to water management and development. It also advocates that:
  – *water is a socially vital economic good*;
  – *water needs careful management*; and
  – *a participatory approach will help conserve and protect water resources*;
“Water for All” Water Policy

• The principal elements of the water policy are as follows:
  – Promote a national focus on water sector reform
  – Foster the integrated management of water resources
  – Improve and expand the delivery of water services
  – Foster the conservation of water and increase system efficiencies
  – Promote regional cooperation and increase the mutually beneficial use of shared water resources within and between countries
  – Facilitate the exchange of water sector information and experience
  – Improve governance and capacity building
Country Water Champions

- Bringing Water To The Rural Poor (ADB, 2004)
  - construction of 5,869 water supply facilities;
  - organization of 4,172 village water supply associations;
  - training of about 4,000 representatives of communities and local institutions;
  - On the sanitation side, the project has installed 126 public toilets, 252 school toilets, 91,400 household toilets and 64 water analysis laboratories.
Country Water Champions

• **Investment Priority;**
  • (India  Indonesia*  Pakistan  Philippines  Viet Nam )
  • Rural
    – Irrigation
    – Rural water supply and sanitation (WSS)
  • Urban
    – Urban WSS in Metro Manila, and outside of Metro Manila where water supply is managed by Water Districts and Local Governments
  • Basin
    – Policy reform; IWRM strategic plans

Source: ADB, 2006
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
  - Objective: To promote, and accelerate the development and balanced growth of the Laguna lake area with due regards for environmental management and control, preservation of un due ecological disturbance, deterioration and pollution.

- Marine Water Resources Protection
  - PD 979 Marine Pollution Decree of 1976
  - Objective: To control pollution discharge from ship.

- Conservation of Water Resources ownership, development and exploitation
  - PD 1067 Water Code
  - Consolidate legislation relating to ownership, development, exploitation and conservation of water resources

Source: WEPA, 2009
Chart of Policy System for Water Environment in the Philippines

Other Laws/Policies Related to Water Environment

- Presidential Decree 1151 (1977) The Philippine Environmental Policy
- Presidential Decree 1152 (1977) Environment Code of the Philippines
- RA 9003 Ecological Solid Waste Management Act of 2000
- RA 6969 Toxic and Hazardous and Nuclear Waste Act of 1993
- PD 1586 (1977) Environmental Impact Assessment
- PD 274 and PD 281 Rehabilitation of Pasig River
- DENR Administrative Order No. 2003-14 Series of 2004 Creating the Environmental Partnership Program to support Industry Self-Regulation towards improved Environmental Protection
- DENR Administrative Order No. 2003-26 Series of 2003 Revised Industrial Ecowatch System
- LLDA Rehabilitation Program (Launched in 1996)
- Environmental Users Fee System (Launched in January 1977 by the LLDA)
- Implementation of the Manila Bay Environmental Management Project (MBEMP)
- Implementation of the Philippine National Standard for Drinking Water
- Presidential Decree No 856 (1976) Sanitation Code of the Philippines

Source: WEPA, 2009
## Some Policies and Measures

<table>
<thead>
<tr>
<th>Underlying Causes</th>
<th>Phenomena</th>
<th>Policy Response</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1973</strong></td>
<td>Pasig River Pollution</td>
<td>• Strict implementation of the pollution control law</td>
</tr>
<tr>
<td>Industrialization</td>
<td></td>
<td>• Implementation of the Pasig Rehabilitation Program</td>
</tr>
<tr>
<td>Urbanization</td>
<td></td>
<td>• Implementation of PEPP</td>
</tr>
<tr>
<td>Influx of population</td>
<td></td>
<td>• Implementation of the Ecowatch Program</td>
</tr>
<tr>
<td>Indiscriminate dumping of solid waste</td>
<td></td>
<td>• Implementation of the ecological solid waste management act</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Implementation of RA 6969</td>
</tr>
<tr>
<td><strong>1983</strong></td>
<td>Occurrence of red tide in Philippine coastal water</td>
<td>• Strict implementation of the pollution control law</td>
</tr>
<tr>
<td>Rapid economic growth</td>
<td></td>
<td>• Effluent standard 1992</td>
</tr>
<tr>
<td>Increase industrial and domestic wastewater discharge</td>
<td></td>
<td>• Creation of a National Red Tide Task Force (NRTRP)</td>
</tr>
<tr>
<td>Limited domestic wastewater sewerage system</td>
<td></td>
<td>• Proposal of Guidebook on Toxic Red Tide Management</td>
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<td></td>
<td></td>
<td>• Proposal to expand domestic wastewater sewerage system</td>
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<tr>
<td><strong>2000</strong></td>
<td>Manila Bay is identified as a pollution hotspot</td>
<td>• Strict implementation of the effluent standards</td>
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<td>Over exploitation of natural resources</td>
<td></td>
<td>• Implementation of the Manila Bay Environmental Management Project</td>
</tr>
<tr>
<td>Urbanization and industrialization</td>
<td></td>
<td>• Proposal to expand domestic wastewater treatment facilities</td>
</tr>
<tr>
<td>Indiscriminate dumping of solid waste</td>
<td></td>
<td>• Proposal to implement domestic effluent standards</td>
</tr>
<tr>
<td>Rapid expansion of economic activities</td>
<td></td>
<td>• Implementation of the ecological solid waste management act</td>
</tr>
<tr>
<td>Population growth in the catchment areas of the rivers drainage into the bay</td>
<td></td>
<td>• Implementation of RA 6969</td>
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<td></td>
<td>Degraded water quality; critical need for water quality improvement and protection</td>
<td>• Strict implementation of the pollution control law</td>
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<td>• Implementation of the Environmental User Fee</td>
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<td></td>
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<td>• Implementation of the river rehabilitation project</td>
</tr>
</tbody>
</table>

Source: WEPA, 2009
Enabling Conditions
Priority Policies and Programs

• Medium Term Philippine Development Plan (2004-2010)
  General Strategy - Adoption of the IWRM approach
  - Identify/Establish Water Resources Regional Councils (WRRCs)/River Basin Organizations (RBOS)
  - Pursue Raw Water Pricing
  - Maintain and Sustain Data Collection and Data Base for Water Resources
  - Conduct Assessment in terms of availability and demands for prioritized water constraint areas

Source: NWRB
Enabling Conditions
Priority Policies and Programs

• Medium Term Philippine Development Plan (2004-2010)
  Specific Strategies

  – *Potable Water for the entire country by 2010 with priority given for 432 waterless municipalities outside Metro Manila.*
  – *Ensure that all barangays/municipalities will be provided with water supply sources have the corresponding sanitation facilities for proper disposal of wastewater / septage*
  – *Continue to provide adequate capacity building programs and technical assistance on water supply and sanitation*
  – *Develop technology options for water supply (solar desalination, windmill technology*)

Source: NWRB
Enabling Conditions
Priority Policies and Programs

- Medium Term Philippine Development Plan (2004-2010)

Specific Strategies

- Promote private sector investment
- Conduct groundwater resources and vulnerability assessment covering 310 priority LGUs
- Monitor drinking water of selected poor communities
- Complete the groundwater resources inventory in major urban areas, control extraction through moratorium

Source: NWRB
IWRM Plan Framework

• Outcome No. 1: Improved Effectiveness, Accountability, and Synergy among Water Related Institutions and Stakeholders

  – Strategic Theme No. 1
    Promoting Participatory Water Governance and Supportive Enabling Environment

  – Strategic Theme No. 2
    Strengthening Knowledge Management and Building Capacity for IWRM

Source: NWRB
IWRM Plan Framework

• **Outcome No. 2: Effective Protection and Regulation for Water Security and Ecosystem Health**
  
  – **Strategic Theme No. 3**
    
    *Ensuring Rational, Efficient and Ecologically Sustainable Allocation of Water*
  
  – **Strategic Theme No. 4**
    
    *Enhancing Effectiveness in Groundwater Management and Aquifer Protection*
  
  – **Strategic Theme No. 5**
    
    *Achieving Clean and Healthy Water*
  
  – **Strategic Theme No. 6**
    
    *Managing and Mitigating Risks from Water Related Disasters and Climate Change*

Source: NWRB
IWRM Plan Framework

• **Outcome No. 3: Sustainable Water Resources and Responsive Services for Present and Future Needs**
  
  – **Strategic Theme No. 7**
    
    *Promoting Water Conservation/Stewardship and Improving Water Use Efficiency*
  
  – **Strategic Theme No. 8**
    
    *Expanding Access and Ensuring Availability of Affordable and Responsive Water Supply and Sanitation Services*

Source: NWRB
IWRM Plan Framework

• **Outcome No. 4: Innovative Response to Future Challenges**

  – **Strategic Theme No. 9**
    • Exploring New Pathways to Water Resource Management
    • Water Sensitive Design and Water Rights Trading

Source: NWRB
Immediate Concerns

• Finalization of National IWRM Framework Plan
  – Issuance of Presidential policy directive to adopt and mainstream IWRM in the plans and programs / initiatives of partner agencies
  – Formation of technical advisory group for various strategic themes

• Development of National IWRM Strategic Plan

• Development of Flood Mitigation Plans for 20 Major River Basins

• Strengthening of Economic Regulatory Bodies

• Identifying incentives for investment into the sector

Source: NWRB
Other Key Issues and Challenges

• Planning process is highly centralized in the National Government; fragmented and sub-sectoral in approach.
• Mainstreaming IWRM Plans in the regional and local levels
• Insufficient investment for water supply and sanitation
• Lack of technical capability of implementing agencies (LGUs etc.)
• Necessity to improve coordination and systematic basic water data collection systems for efficient and effective flow of information
• Necessity to link freshwater management with coastal management
Summary

• There is enough water for every Filipino! The Philippines is blessed with plenty of raw water resources, through its abundant rainfall and natural storage in rivers, lakes, swamps, aquifers, etc.

• On the whole, the renewable freshwater resource greatly exceeds its present and even future needs.

• The greatest challenge is accessibility, i.e., bringing water to the users or at least near them.

• Population growth and economic development, water pollution, over-harvesting and exploitation, land conversion, and infrastructure development are presently exerting pressure on local water resources.
Concluding Remarks

• Sustainable water resources management is an issue of increasing global concern and is perceived as the major resource challenge;

• Sustainable development in ecological, economic and social systems can only be achieved if sufficient water is available at the right time, right amount and right place;
Concluding Remarks

• Innovative and joint R&D of specific case studies of appropriate water-saving and conservation technologies to aid policy options for water management are important;

• Building a network of researchers/scientists to further the development of system’s approach solutions, and the export and implementation of water-related technologies in foreign, including developing countries;
Recommendations

• Continued partnership, information and educational campaigns among all stakeholders on the sustainability of water for all.
• MMSU be included in this network of Science Council in Asia and Joint Project: ”Sustainable water resource management in Asia”; and
• Propose Philippines as venue for 2010 Science Council in Asia Water Resources Management Conference.
Thank You

Science Council of Japan