SWITCH WORKSHOP ON INTERGRATED URBAN WATER MANAGEMENT

WASTEWATER REUSE AS A CLIMATE CHANGE ADAPTATION MEASURE

CASE OF CAN THO CITY

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Climate change ranks among the top five developing countries most impacted by climate change.

Has been identified as being particularly susceptible to the impacts of extreme climate events and climate variability.
These two extreme weather conditions will occur much more often.
Temperature increases from 33 - 35 °C to 35 - 37 °C

Rainfall decreases about 10 - 20%

The dry seasons are predicted to lengthen and intensify

Total annual rainfall in An Giang, Can Tho and Soc Trang will decrease about 20%, and rainy season will start 2 weeks later.

With the use of Global Circulation Models (GCMs) combined with the downscaling regional climate model PRECIS and series of data from 1980 - 2000, University Chulalongkorn - Thailand and Climate Change Research Institute - Can Tho University (Vietnam) have done the forecasting for the year 2030-2040 that many areas in the Mekong Delta will get serious impacts due to climate change.
humidity has a trend of decreasing 5%

Rainfall decreasing 200mm/year

air-temperature increasing 0.2 °C

sun radiation increasing 200 hours/year

From 2000 to 2007 in Hau river at Tan Chau, water level is decreased 0.8m, meanwhile the max water level in Can Tho is increased 0.3m with decreasing rainfall in the area facilitate salinity to intrude deeply into the land

In the dry season of the year 2006, 2007 and 2008 water discharge of Hau river was only 800 m³/s instate of 1250 m³/s in about 30 years ago
Rain water with total average calculation for 10 year (1999 - 2008) is about 2.3 billion m³/year. If making use of this source, it’s nearly enough for domestic use in 3 months in the dry season. However, it’s not possible to harvest 100% of the rainwater.

WATER RESOURCES

SURFACE WATER

GROUND WATER

Over-extraction, saltwater intrusion, and pollution

Designed capacity: 163,558 m³/day
Actual extraction: 101,061 m³/day

Depression of groundwater level in Tra Noc Industrial zone

Well 5 m³/day: 32,000; 50 m³/day: 400; 500 - 1000 m³/day: 30; 200 GWP in 2010
158 rivers and canals
779 km of main (primary) canals
2000 km of secondary canals
120 - 150 tertiary canals in each rural district

Discharge water in Bassac river: about 200 billion m³/year.
Rainy season: about 81% of the annual discharge
Dry season: about 19%
In exhausted months from March to May: only about 4%
Water quality

Organic pollution in river/canal system of Can Tho City

COD in canal system (9/2010)

Total N in canal system (9/2010)

Total P in canal system (9/2010)

Pollution sources???
WATER POLLUTION DUE TO COD FROM DOMESTIC WASTEWATER

• According to WHO people in the city have discharged household waste at an average of 0.87kg/day/person

• If this amount of pollution is diluted with rainwater in the year, it will cause rainwater polluted.

• In 1999 every person in Can Tho city polluted rainwater with 12mgCOD/l;

• In 2008 it is up to 16 mg COD/l

• It exceeds the Vietnamese standard level A1 with water source for water supply for domestic use (QCVN 08: 2008/ BTNMT).

• Moreover, the idea of diluting wastewater to achieve standards is nowadays not acceptable anymore.
WATER POLLUTION DUE TO COD FROM WASTEWATER OF FISH POND

- 12,216 fishponds: average of a 2m depth (varies from 1.5 – 4m)
- upon renewing the pond water discharge amounts of up to 70 million m³/day = 27 billion m³/year
- The content of COD in fishponds can be up to 80mg/l.
- If this wastewater is diffused with the flow of the Hau River in the best conditions, the river water will carry 10mg/l of COD (exceeds QCVN 08: 2008/BTNMT)
- For pond “Tra” fish breeding in Thot Not District:
  - 25.9% of the farmers discharged pond effluents into the Hau River,
  - 34.3% into the canals,
  - 5.6% into settling ponds, and
  - 34.3% into paddy fields.
- Most of respondents (60.2%) reported that they dumped wastewater into public water sources, while 39.8% dumped it onto private land.
WATER POLLUTION DUE TO COD FROM AQUATIC PRODUCT PROCESSING INDUSTRY

- Aquatic product processing wastewater daily: 15,000 m³
- Average COD: 1,500 mg/l.
- Rivers and canals in Can Tho City receive 22,500 tons of COD every day.
- At this moment, most of the industrial estates in Can Tho City do not possess a concentrated wastewater treatment system.
- Presumably, two-thirds of the COD concentration is disposed of, leaving just one-third of the unprocessed COD to be diffused with Hau River water.
- However, the concentration of COD after dilution is up to 13.6 mg/l,
- Exceeds the Standard QCVN 08: 2008/BTNMT
So, only one of those sources can make water quality in river/canal system of Can Tho city exceeds the permissible limitation of the current National Standard QCVN 08: 2008/ BTNMT.

Meanwhile, Can Tho has all those 3 sources.

This is the reason that concentration of COD in surface water is increasing every year even with high flow of Hau river and pollution water if wash out to the sea everyday.
Sewage system in Can Tho city

WWTP

Total amount of 18.7 million Euros
Vietnam approximately 52%
KfW and 48%

Capacity 22,550 m³/d,
Maximum hydraulic flow of 0.726 m³/sec

Mechanical treatment and biological reduction of BOD and COD
TCVN - B LEVEL

TCVN 5945 - 2005

BOD: 50 mg/l
COC: 80 mg/l
INCREASING POPULATION

URBANISATION

INDUSTRIALISATION

SALINITY INTRUSION

ACID WATER SPREADING

POOR W.W MANAGEMENT

POOR RUNOFF WM

INCREASING WATER DEMAND

CLIMATE CHANGE

DROUGHT

WATER SCARCITY

PRESSURES

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REUSE WASTEWATER AS A CLIMATE CHANGE ADAPTATION MEASURE
Cropping calendar, monthly rainfall and water demands in Can Tho
Advantages of reuse of wastewater in agriculture

• Conserves water (by recycling and groundwater recharge);
• Is a low-cost method for sanitary disposal of municipal wastewater;
• Reduces pollution of rivers and other surface water;
• Conserves nutrients, thereby reducing the need for artificial fertilizer;
• Increases crop yields; and
• Provides a reliable water supply to farmers
• Use for pushing seawater purposes
Thank you very much
For your attention