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Wastewater Treatment Facilities in Shihanouk and Siem Reap Province

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Outline

1. Introduction
2. Legislation Relating to Wastewater Management (WWM).
3. Wastewater Treatment Facility in SH and SR Province.

Note :
- SH = Shihanouk Province
- SR = Siemreap Province

1. Introduction -1 / 5-

- Rapid population growth leading to high demand for water use for domestic such as household, business center, hotel, guesthouse and restaurant, ..etc other development process.
- As a result, a lot of treated and untreated wastewater discharge into public water source, retention wetland, and combined sewage .

1. Introduction – 1 / 5-

- In order to protect water quality and water environment, the RG has its policy by seeking fund and investor to build wastewater treatment plant in some potential areas.
- Several provinces and cities are at a glance of the RGC toward the proper environment and sanitation, especially the ESM of wastewater.

1. Introduction – 2 / 5 -

- According to limit operational budget, up to now only two main provinces has urban wastewater treatment plant are : SH and SR province, due to :
  - Rapid growth of population,
  - Fast developing,
  - Tourist region/areas.

1. Introduction – 3 / 5-

- Problem identification
  - Rapid population growth,
  - Fast developing,
  - Tourist area,
  - Frequent flooding ,
  - Negative impact on public safety

1. Introduction – 4 / 5 -

- Problem identification -cont-
  - Inundation of properties by combined storm water run off and wastewater,
  - Negative impact on public safety, access, public health, and the aesthetic quality of the urban environment significantly diminish the amenity of the area for the support tourism.

1. Introduction – 5 / 5 -

- Purpose
  - Preserve tourism resource by preventing environmental pollution , and enhance the district's natural scenery ,
  - Improve hygienic and sanitary condition by expending wastewater treatment plants,
  - Improve environmental friendliness by implementing sludge composition to recycle resource.

2. Legislation Relating to WWM – 1 / 6 -

- With the application of encouragement principle to investors who aimed at developing wastewater treatment facility some specific laws were approved such as :
  - Law on Environmental Protection and natural Resource management,
  - Sub-Decree on Water Pollution Control (April 6, 1999) :
    - Guideline on boosting sub-decree on water pollution control, and
    - Declaration on water pollution control monitoring at pollution source.

2. Legislation Relating to WWM – 2 /6 -

- Law on Environmental Protection and natural Resource management -cont-

Purpose of the law

  - The law, in common, addressed the summarized on Environmental field,
  - The law has identified to set up related sub-decrees as required,

2. Legislation Relating to WWM – 3 / 6-

- Law on Environmental Protection and natural Resource management -cont-

Feature of the law

– Water quality protection and conservation is significantly mentioned in the Chapter (iii) and (vi) :

  - These Chapters indicate the initiatives in management and protection water environment against all kinds of point and non-point sources of pollution.

2. Legislation Relating to WWM – 4 / 6-

- **Sub-decree on WPC**

Purpose of the sub-decree

– To minimize and phase out various activities that tend to pollute and/or polluted public water areas, including :

  - Improve wastewater management for sustaining good water quality suitable to human desires.

  - Another key point of the Sub-Decree was mentioned the responsibilities and obligation of owner/master of pollution sources in water environment management.

2. Legislation Relating to WWM – 5 /6 -

- **Sub-decree on WPC** -cont-

  Feature of the sub-decree

  – The Sub-Decree commonly focuses on:
    - The routine monitoring of water quality at public water areas and effluent, which discharged from industrial and other pollution sectors.
    - Clearly mentioned about proper treated wastewater, based on the effluent standard, can be discharged into receiving water, otherwise, the MoE will take action to fine who violated the legal tool.

2. Legislation Relating to WWM – 6 /6 -

- Sub-decree on WPC -cont-

  Feature of the sub-decree

  – Additionally, the Sub-Decree include standard for:
    - The public water areas and effluent standard.
    - The type of pollution sources required having a permission from MoE before discharging or transporting their wastewater.
    - Water Quality Standard in public water areas for bio-diversity conservation.
    - Water Quality Standard in public water areas for public health protection.

  – Law on Water Resource Management, and

  – Other relating legislations.

3.WWT Plant in SH Province

3. WWT Facilities in SH and SR province

WWT Plant in SH province - 1 / 9 -

- **Design background**
  - Project : Sihanouk Province Development Project (Part C : WW Management),
  - ADB Loan No.1725/2013-CAM (SF): 11.9 Mil-USD ,
  - Consultant : Nippon Jogesuido Sekkei Co. Ltd (Japan) cooperated with Sheladia (USA) and SAWAC (Cambodia)
  - Constractor: Hyudai Engineering cooperated with Seng Enterprise (Cambodia),

3. WWT Facilities in SH and SR province

WWT Plant in SH Province – 2 / 9 -

- **Design background** -cont-
  - Duration : 2 year (2003-2005).
  - Station site : covers 16.2000 m2.
  - The designed capacity : 5700m3/day of WW,
  - The actual capacity: 5000m3/day of WWT
  - Cover area : Mettapheap district (1/3 of total households in Mettapheap district)

3. WWT Facilities in SH and SR province

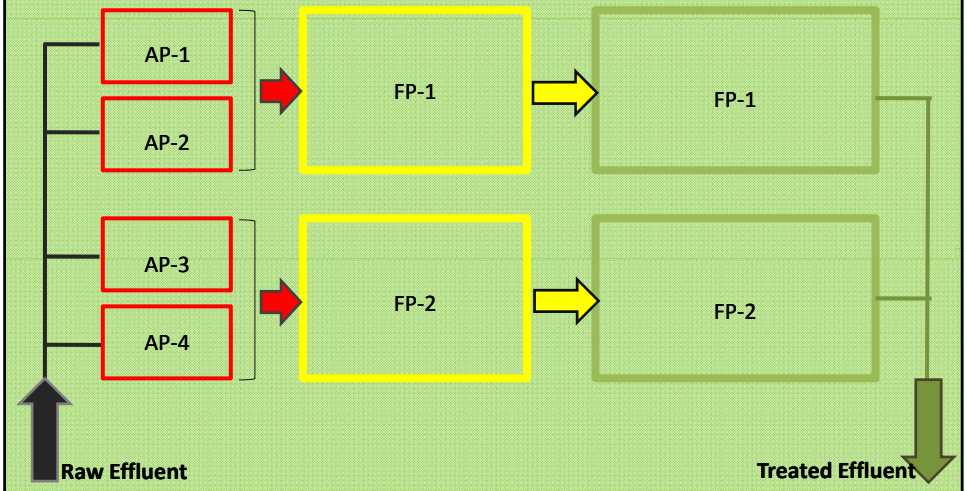
WWT Plant in SH Province – 3 / 9 -

- **WWT Tank**
  - WWT tank consisted of 8 ponds including:
    - 4 anaerobic pond,
    - 2 facultative pond, and
    - 2 maturation pond.

3. WWT Facilities in SH and SR province

WWT Plant in SH Province – 4 / 9 -

Flowchart of WWT Process



WWT Plant in SH Province - 5 / 9 -

Lesson learned

Best Practice

Production of Campaigning Materials

- T-shirt printing,
- Information booklet,
- Posters,
- Bill boards installed along TCD channel and in public areas,
- Bill boards printed on TUK-TUK.

WWT Plant in SH Province - 6 / 9 -

Lesson learned –cont-

- **Best practice**
  - Implementation of sewer service fees payment:
    - The collection fees base on the Inter-Ministerial PROKAS No. 2881 SK dated of 17 November 2006,
    - The procedure for fees collection include:
      - Service charge for connection,
      - Monthly user fees for sewer collection and treatment and maintenance.

WWT Plant in SH Province - 7 / 9 -

Lesson learned –cont-

- **Best practice**
  - Implementation of sewer service fees payment:
    - The fees collection as classified, with respect to the type of user:
      - Residential,
      - Hotels,
      - Guesthouses,
      - Restaurants, ..
      - Other type of customers,.....etc

WWT Plant in SH Province - 8 / 9 -

Lesson learned –cont-

Best practice

- **Category of fees collection** -

No	Type of Customers	Service Payment	
		Service Network Connection Fee $	Monthly Service Fees $
1	Residential	from 10$ to 40$	from 1 $ to 3.5$
2	Hotels	from 50$ to 15$	from 8.5$ to 52$
3	Guesthouses	from 20$ to 60$	from 3.5$ to 9$
4	Restaurants	from 30$ to 80$	from 4$ to 37$
5	Other type of customers	from 10$ to 72$	from 20$ to 53$

WWT Plant in SH Province - 9 / 9 -

Learned –cont-

- **Best practice**
  - – Monitoring:
    - There is a LAB but few TWW quality monitoring has been conducted per year,
    - MoE regularly takes TWW samples to analyze 1 time for 3 months.

3.WWT Plant in SR Province

WWT Plant in SR province - 1 / 9 -

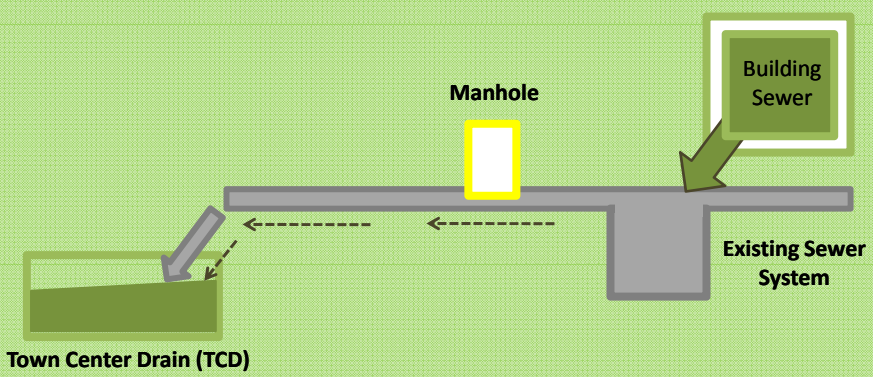
- **Design background**
  - Project : Mekong Tourism Development Project (Part A1 : SR WW Management),
  - ADB Loan No.1969-CAM (SF)
  - Consultant : NJS Co. , Ltd (Japan),
  - Contractor: China National Aero-Technology International Engineering Cooperation (CATIC).

WWT Plant in SR Province -2/9-

- **Design background** -cont-
  - Duration : 2 year (2007-2009).
  - Station site : covers 203,000 m2.
  - Designed capacity: 14,000m3/day
  - Actual capacity : 3000m3/day
  - Cover area : 2 communes and western part of SR river.

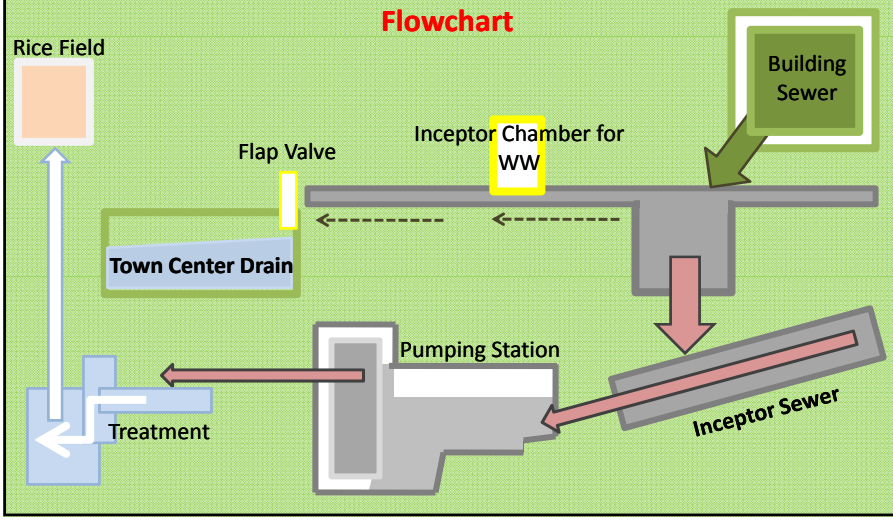
WWT Plant in SR Province -3/9-

Existing Flow Condition



WWT Plant in SR Province – 4 / 9-

Flow Condition After Project



WWT Plant in SR Province - 5 / 9-

Lesson Learned

- **Best practice**
  - Awareness campaigning program:
    - Production and implementation for behavior changes and childhood,
    - Production of media and dissemination for sewer service fees payment base on Inter-Ministerial PRAKAS .

WWT Plant in SR Province - 6 / 9 -

Lesson learned –cont-

Best Practice

Production of Campaigning Materials

- T-shirt printing,
- Information booklet,
- Posters,
- Bill boards installed along TCD channel and in public areas,
- Bill boards printed on TUK-TUK.

WWT Plant in SR Province - 7 / 9 -

Lesson learned –cont-

Best Practice

Campaigning workshop and training

- Project site visit,
- Campaigning workshop on Operation and Management of SR WW system (local, government officers and customers,..etc),
- Dissemination programs for communities of sewer service user of WWT.

WWT Plant in SR Province - 8 / 9-

Lesson learned –cont-

Best practice

- **Category of fees collection** -

No	Type of Customers	Service Payment	
		Service Network Connection Fee $	Monthly Service Fees $
1	Private Residential	from 20.5$ to 52$	from 1 $ to 9.5$
2	Hotels	from 41$ to 225$	from 8.5$ to 52$
3	Guesthouses	from 20.5$ to 72$	from 7.5$ to 36$
4	Restaurants	from 41$ to 62$	from 9.5$ to 47$
5	Other type of customers	from 10$ to 72$	from 10$ to 23$

WWT Plant in SR Province - 9 /9 -

Lesson learned –cont-

Best practice

– Environmental monitoring:

- Installed own LAB
- Sample taken (1 time/ month,)
- Parameter for analysis BOD, COD, pH, temperature, nutrient, DO, coliform, TSS, TDS, ..etc
- MoE is also conducted monitoring on TWW for 3 time per year.

Gaps for WWT Application and Service

PROVINCE	GAPS
Shihanouk	• Limit understanding and some of them reluctant to pay for TWW from their house, • Limit capacity to monitoring ands test on wastewater after treated that require more skillful officers for quality monitoring and testing, • Insufficiency of LAB facilities including reagents, • In practical, only 3,800m3 is collected (total volume= 5,700m3) that require more connection to further households and other areas,

Gaps for WWT Application and Service –cont-

PROVINCE	GAPS
Siemreap	• Limit understanding and some of them reluctant to pay for TWW from their house, • Lack of participation (only 40% are interested), • Only 70 % for network connection has been done, •There is no plan to extend capacity for WWT tank, •Lack or resource.

Opportunities

- Lesson learned for government to set up any kind of effective mechanism to the future,
  - To gain the increasing public participation,
  - Encourage private partner/ investor, supporting by existing legislations
- Improve hygienic and sanitary condition by expending wastewater treatment plants,
- Maintain and protect the environmental and natural resource, including aesthetic- those are basic of the development of green tourist (one main pillar addressing in the rectangular strategy, second phase of the RGC) .

Thank you for your attention!