Proceedings

National Workshop on Waste Water Treatment Systems and Sanitation Services in Cambodia

Phnom Penh, 27-28 October, 2014
Proceedings of the

National Workshop

On

Waste Water Treatment Systems and Sanitation Services in Cambodia

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Contents

BACKGROUND ........................................................................................................................................... 3
SCOPE OF THE WORKSHOP AND OBJECTIVES .................................................................................. 4
  Overview of the Programme Agenda .................................................................................................. 4
DAY 1 PROCEEDINGS ........................................................................................................................... 4
  Session 1: Opening and overview and current state of DEWATS in the region and in the country .................................................................................................................. 4
  Session 2: Taking stock of waste water management and sanitation practices in Cambodia: challenges, barriers, policies and solutions for DEWATS ............................................................. 5
  Wrap-up and Closing Remarks ........................................................................................................... 11
DAY 2 PROCEEDINGS ........................................................................................................................... 12
  Session 4: Summary on the Work Plan and the Way Forward ................................................................ 12
ANNEXURE ............................................................................................................................................... 16
  Annex 1: List of Participants .................................................................................................................. 16
  Annex 2: Agenda ................................................................................................................................... 19
  Annex 3: Presentation on Policy Guidelines for DEWATS ..................................................................... 21
  Annex 4: Presentation on effective policy analysis on DEWATS and FSM, business models from the region and potential applications of sanitation toolkits .................................................................. 45
  Annex 5: Presentation on Sewerage and Wastewater Management in Cambodia ................................. 64
  Annex 6: Presentation on DEWATS Introduction and Wastewater Management in Cambodia .................................................................................................................................................. 89
  Annex 7: Presentation on Financing Frameworks for DEWATS ............................................................ 104
  Annex 8: Directions for group discussions ........................................................................................... 116
BACKGROUND

By 2011, the population of the Asian and Pacific region without access to safe drinking water was halved from the 1990 level, but the sanitation-related component of the target is still far from being achieved. \(^1\) 10.3 million people in Cambodia, 2.9 million in Lao PDR and nearly 21.8 million people in Viet Nam did not have access to improved sanitation. \(^2\) The lack of sanitation and wastewater treatment leads to faecal contamination of fresh water sources endangering the health of the population at large. According to a WHO report \(^3\), diarrhoeal disease is cited as the second leading contributor to the Global disease burden causing a loss of 72.8 million Disability Adjusted life years (DALYs). Improving sanitation and hygiene are front line actions that can prevent diarrhoeal and other water related (including water borne and water washed) diseases.

In addition, studies conducted by the World Bank Water and Sanitation Programme \(^4\) show that Cambodia, Lao PDR and Viet Nam suffer an annual economic loss of $450 million, $193 million and $780 million respectively. These losses are accounted for by direct health impacts, costs for accessing clean drinking water, additional time to access unimproved sanitation and tourism losses.

Improved sanitation and wastewater management is crucial to maintain water security. It can bring significant benefits to poor communities, particularly women and ensure the health of eco-systems and local populations. Lack of awareness amongst policy makers and the relatively high costs of sewage collection and treatment often deter investments.

In this context, ESCAP and UN-Habitat are implementing a joint project to address the fast-growing problem of untreated wastewater through promotion of Decentralised Wastewater Treatment Systems (DEWATS). DEWATS provides an appropriate and low-cost solution in many situations in the rapidly urbanising areas of developing countries where other systems are not suitable. DEWATS also provides a great business opportunity and community empowerment.

The project is implemented in Lao PDR, Cambodia and Vietnam and is focusing on building the capacity of policy makers and planners for better wastewater management through regional and national level policy studies and workshops. It will also establish or strengthen existing institutions, which can function as a regional resource centre or referral point for expertise on DEWATS. Promotional materials and a guidance manual for policy makers and planners will be developed and widely disseminated in 2014-16.

The Ministry of Public Works and Transport with support from ESCAP and UN-HABITAT has organised the national workshop in Cambodia to take stock of the current situation and to enhance existing strategies and policies with mechanisms of implementation and the roadmaps to enable sustainable sanitation and wastewater treatment systems/services in Cambodia.

This workshop is sensitising policy makers and planners of Cambodia in finding sustainable wastewater management approaches through sharing the national and regional level policy studies

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1 ESCAP, 2013, Statistical Yearbook
4 WSP, 2009, Economic Impacts of Sanitation in South East Asia. Jakarta (cite references)
and practices within the joint ESCAP and UN-HABITAT project on “Strengthening capacity of policymakers in South-East Asia to promote policies and developing plans for improved wastewater treatment and reuse in urban and peri-urban areas”, implemented in Lao PDR, Cambodia and Viet Nam.

SCOPE OF THE WORKSHOP AND OBJECTIVES

The goal of the national workshop is to identify policy issues and a national vision on wastewater treatment systems and sanitation and to enhance knowledge and awareness of policy makers, local government officials and other experts on sustainable sanitation services, in particular on DEWATS within urban and peri-urban communities in Cambodia.

The specific objectives of the workshop are as following:

1. To review and discuss national vision on access to wastewater treatment systems and sustainable sanitation services; to identify challenges and barriers, as well as institutional, technical, financial policies and solutions, to enable DEWATS in the country;

2. To assess the current policy situation and efforts on DEWATS and its integration within national planning cycles and future programming in Cambodia;

3. To discuss on DEWATS policy papers, work plan and future cooperation with national and regional knowledge networks.

Overview of the Programme Agenda

The workshop takes stock of the country challenges, policy and practices of wastewater management and sanitation in Cambodia, presented by the senior national officials and experts and facilitates interactive discussions on national vision enabling environment for the implementation strategy of wastewater treatment systems and sustainable sanitation services.

DAY 1 PROCEEDINGS

Session 1: Opening and overview and current state of DEWATS in the region and in the country.

The workshop was opened by His Excellency Lim Sidenin, Secretary of State, Ministry of Public Works and Transport, who expressed gratitude for all the participants for their attendance. His Excellency presented an overview of the workshop, activities, aiming to identify policy, and scope of the discussions of DEWATS. His Excellency also thanked UN-Habitat and ESCAP for their cooperation in organising the workshop.
Following the Minister’s opening remarks, Mr. Avi Sarkar, Regional Advisor, South East Asia Urban Basic Services Branch of UN-Habitat, welcomed all the participants and expressed his gratitude to the Ministry of Public Works and Transport (MPWT) for their cooperation and hosting of the workshop. Mr. Sarkar explained that this initiative is under a bigger initiative of ESCAP and UN-Habitat to strengthen wastewater management in South East Asia. He summarised the goals of the workshop, these being to identify policy issues and a national vision, and to raise awareness of the potential of different wastewater treatment options. Mr. Sarkar then summarised the workshop objectives.

The third speaker was Ms. Aida Karazhanova, Economic Affairs Officer at ESCAP, who presented on the policy guidelines for DEWATS, which ESCAP is currently developing (see Annex 3 for the presentation). Ms. Karazhanova invited participants to contribute to the guidelines. She informed the participants that the Asian Institute of Technology (AIT) has been identified as a partner, as a Regional Centre of Excellence for Promoting DEWATS. Ms. Karazhanova’s presentation covered the foundation for sustainable sanitation services (3S); three steps and ten focus areas of the Policy Guidance Manual on DEWATS; and key messages concerning the policy frameworks, sustainability of service delivery, demand creation, capacity building, financing mechanisms and regional cooperation.

Following on from Ms. Karazhanova’s presentation, Dr. Suthirat Kittipongvises, from AIT, spoke on effective policy analysis on DEWATS and faecal sludge management, and good business models from the region (see Annex 4). The presentation looked at regulatory frameworks for DEWATS in Thailand and Viet Nam, considered key challenges and made recommendations. The focus then turned to a business model for faecal sludge management, with a good practice case study from Thailand. Dr. Suthirat concluded her presentation by alerting participants to the availability of some water and sanitation toolkits which have been developed for people working in the sector.

Session 2: Taking stock of waste water management and sanitation practices in Cambodia: challenges, barriers, policies and solutions for DEWATS

Session 2 began with a presentation by Mr. Heng Rathpiseth, Director of the Department of Sub-National Public Infrastructure and Engineering, MPWT, which covered the present status of water pollution and sewage works and Government organisation and strategy (see Annex 5 for Mr. Heng’s presentation). Mr. Heng shared that the Minister had recommended that the Ministry draft a policy. The Department of Sub-National Public Infrastructure and Engineering is responsible for wastewater. Regarding water quality, Mr. Heng explained that the Ministry of Environment set guidelines in 1999. Water quality varies seasonally, for example, in Siem Reap water quality met the standard in February but not in July which is in the rainy season. There is a lack of funds and human resources to expand networks and currently sewage works discharge to lakes while many households discharge directly to the sea. An Urban Wastewater Management Plan prioritises coastal areas, Tonle Sap Lake and the Asian Highway Corridor Number 1. Mr. Heng expressed the view that DEWATS may be appropriate for small urban and rural areas. There is no national policy for wastewater management and the Ministry would welcome technical support from UN-Habitat and ESCAP for drafting a law.
The second presentation of Session 2 was given by Mr. Nuth Makara, Technical Coordinator of BORDA, who spoke on DEWATS Introduction and Wastewater Management in Cambodia (refer to Annex 6). Mr. Makara gave an overview of BORDA’s work globally and of wastewater management in general before focusing on decentralised wastewater treatment systems and details of BORDA’s work on DEWATS in Cambodia.

**Session 3. Group Discussions on Effective Policy Frameworks, Technical Solutions and Innovations, and Financial Sustainability of 3S, Viability and Co-Benefits from DEWATS Stakeholder Frameworks and Solutions for DEWATS in Cambodia:**

The session commenced with a presentation by Mr. Christoffer Larsson, consultant for ESCAP, on financing frameworks for DEWATS (refer to Annex 7). Mr. Larsson began his presentation by looking at sanitation coverage statistics in Cambodia before detailing sanitation related costs at both the household and the national level. He then looked at benefit cost ratios for sanitation and some benefits of DEWATS, including the potential for job creation. Mr. Larsson considered how demand might be stimulated and how supply might be increased. The final part of his presentation focussed on ways to achieve sustainable financing of wastewater management for both private households, and the industry and business sector. The point was made that industry and business need to be driven by regulation, while demand needs to be increased from households.

Following Mr. Larsson’s presentation, participants were divided into three groups and were given directions for group discussions (see Annex 8), facilitated by ESCAP. The groups were asked to:

1) Define our national vision
2) Define our mission
3) List the challenges to achieve the vision
4) Cluster/group challenges based on institutional, technical, and financial aspects
5) Suggest how to create demand from people to have access to sanitation and DEWATS?
6) Turn the challenges into strategic targets (short-medium and long-term).
7) Propose: how to achieve targets and how to implement the strategy?
   i) List the drivers (institutions, policy, regulation, service provider?)
   ii) List the potential source of funding (government, donor, private, microfinance, loans, etc.) and financing strategy
   iii) List technologies

Following the discussions, each group shared their responses/views to the raised questions. The following responses are taken from the records of the three parallel group discussions which were summarized as the groups’ presentations to the plenary.

**National vision:**
Government would have to develop clear national policies in waste water treatment development and management in big cities and urban areas through short-term, middle, and long-term targets:
- Short-term: set up septic tank/DEWATS and expand scale in household by 2025
- Medium-term: connect septic tank from households to centralized septic tank by 2030
- Long-term: provide services to all citizens by 2050

Sustainable development, management and usage of waste water infrastructure

**Mission:** With improving the existing waste water treatment plan we would improve the health care at the same time through:
(i) Building more wastewater treatment plants;
(ii) Building DEWATS;
(iii) Encouraging the private sector to cooperate, with support from the donors and government; technical support from players for Cambodia, as an LDC
(iv) Establishing the law and regulatory framework in water and sanitation:
This mission should include awareness raising; evaluation and monitoring of systems; preparation of a framework, related to design; cooperation with all stakeholders and development partners, in particular:
- Establish the policy, regulation, and strategy on development plan;
- Create management policy and regulation;
- Monitoring and evaluation;
- Application of the new creative idea and modern technician;
- Integrated institution and partnership (for example: through bottom-up approach);

**List the challenges to achieve the vision:**
- Cambodian people don’t clearly understand public health and that the service should contribute to the improvement of health;
- People don’t pay for wastewater treatment/ People and businesses are not willing to pay/ Little willingness to pay;
- Vision is a political decision. The top priority: address the lack of finance or a lack of law and regulation;
- Changing behavior is the first priority; this could be done through training, education and law enforcement. If people don’t want to pay, we need to do something, for example, if people don’t want to pay, their water supply could be cut off.
- The service provider has to provide a good service and provide confidence to the users/customers.
- We don’t have a law. We need to disseminate and enforce a law/ there are laws but very little enforcement.
- Limited capacity for implementation and promotion of law (short term).
- Lack of regulation on wastewater treatment (short term)/ There is not a clear regulatory framework. People can’t be fined because there is no regulatory system to define a fine;
- Technical point of view, knowledge is limited;
- Equipment, technical modules are the challenge, especially for operation and maintenance/ Lack of equipment;
- There is no monitoring, for example no monitoring of the air system, so it is dangerous to check the sludge;
- Limited budget/financial problems. The budget for public infrastructure is limited and is not enough to meet demand;
- Lack of investment;
- Although people in cities can construct septic tanks, the poor don’t have the ability to construct them to the standard required by guidelines;
- The private sector does not have a good awareness or understanding of wastewater treatment so they don’t participate in investing;
- Limited human resources and technical capacity;
- An important aspect is the willingness of policy makers to work on wastewater and sanitation;
- Cooperation between technicians and policy makers does not always flow smoothly;
- Lack of participation from the public sector. Although there is a joint declaration from the Ministry of Finance, households are still discharging wastewater in their own ways;
- Responsibilities are not clearly allocated to institutions, especially responsibilities relating to regulation;
- Lack of monitoring and evaluation of systems;
- There is still wastewater discharged to rivers, including from industries and factories;
- Fees for connection and service are very expensive. We can learn from Vietnam where the fee is based on the amount of water supplied;
- There is no legal norm on charges. Country needs to develop the “fees table” through cooperation with the Ministry of Economy and Finance.

**Cluster/group them based on institutional, technical, and financial.**

**Institutional:**
- Lack of regulation on waste water treatment (short-term)
- Limited capacity on implementation and promotion on law (short-term)
- Limited awareness from private sector on waste water treatment (medium-term)

**Technical:**
- Limited knowledge on waste water treatment (short-term)
- Lack of equipment for operation and maintaining (Medium + long-term)

**Financial**
- National budget is limited (medium)
- Livelihoods of citizens are still under standard (short-term)
- No investment from private sector (medium + long-term)

**Suggest how to create demand from people to have access:**
- Raise awareness and educate citizens on the benefits of wastewater treatment, including health benefits;
- Encourage citizens to connect their septic tanks to the public sewerage network;
• Encourage people to participate in operation and maintenance in order to achieve sustainable management;
• Need to construct infrastructure more broadly and nationwide;
• Educate suppliers to build their technical capacity and improve their transparency and accountability.

**Turn the challenges into targets (short-medium and long-term).**

**Medium –term**

• Set up a strategy, maybe with action plan that is less than 5 years.
• Set up a technical working group.
• Look for a master plan for wastewater treatment.
• Operation and maintenance is important too.
• Explore and implement Pro-poor Public Private Partnership (5P) for Sustainable Sanitation Services (3S)

**Long-term (2035)**

• Implement 5P (pro-poor? pro-phosphorous? Phnom Penh PPP?).
• Expand the wastewater treatment plan.
• Need support from the private sector.

**How to implement?**

1) List of the Drivers (institutions, policy, regulation, service providers)

• Clarify who is responsible for a wastewater treatment plan. After this we can formulate a policy and a strategy;
• The service provider is also involved;
• Law and regulation. Finalise regulation as quickly as possible. Need to develop a national policy and a regulatory framework on the management of wastewater;
• Financial assistance is needed;
• Technical assistance is needed, including for law and regulation;
• Capacity building. Develop human resources;
• Stakeholder participation;
• Need to consider land, for example, if a lagoon is to be developed, a large space will be required;
• Monitoring and evaluation of construction;
• Assess the applicability of new technologies;
• Cooperate with line ministries and other development partners;
• Ministries involved include MPWT, MOE, MoH, MEF, MRD, MoWRAM. Discharge to rivers involves more Ministries, and there are also sub national committees involved.

2) List of the source of funding (government, donor, private, microfinance, loans, etc.) and financing strategy:

• Government
• Donor
• Microfinance schemes
• Clear national policies and financial program on waste water treatment (how much spend per year, how much from government, donors, private sector, and development partners)
• Government subsidies to the poor.

3) List of technologies.

• Decent systems are needed. In some cases, we need to centralize (Phnom Penh and Siem Reap);
• Select appropriate technologies based on specific situations

During the session discussion took place on a number of points as summarised below.

Question: What action can be taken against those who don’t connect to the public network?
Response: Mr. Larsson noted that it’s difficult for households but, for industry, penalties can be applied, for example, downgrading a hotel’s star rating. It is easier to enforce connection for new buildings, for example, to enforce that all new apartment buildings connect. For existing buildings, connection could be enforced at the next transfer. Ms. Karazhanova suggested that waste and water are not mixed at the beginning of the process and that unserviced people may pay for new technology such as no-flash technical systems and dry toilets (ref examples in Sweden, Australia, or development of a new technology in SEA)

Question: A major problem is blockages caused by fat from restaurants. How can this problem be solved?
Response: Ms. Karazhanova proposed thinking of the fat as a resource and finding a SME as a service provider to deal with it. Mr. Makara, from BORDA, explained that BORDA has only worked with households so it’s a small problem. The intake from a household needs a screen to block the fat from entering the system.

Question: Should industry and household waste be combined or separated?
Response: Mr. Makara explained that BORDA focuses on domestic waste only. If they were to work with industry, a new technology would need to be found.

Question concerning the ministerial responsibilities for wastewater treatment and sanitation.
Response: There is a need for an inter-ministerial committee like the national committee on disaster management. Mr. Heng, Director of the Department of Sub-National Public Infrastructure and Engineering, MPWT, shared that there is a decree allocating responsibility for wastewater treatment to MPWT. MPWT received funding from ADB in 2007. JICA is undertaking a study. Other relevant Ministries include the Ministry of Environment (MoE), which is responsible for water quality, and the Department of Water Hygiene, which is under the Ministry of Rural Development (MRD). The Ministry of Industry and Handicraft (MIH) deals only with clean water.

Question: Who is responsible for financial mechanisms for wastewater treatment?
Response: Mr. Heng reported that MRD is responsible for clean water and sanitation development projects. MPWT is responsible for wastewater treatment and sanitation. There was a 2007 ADB loan and a loan from Korea. The MoU was signed by MPWT and the Ministry of Economy and Finance (MEF).

At the conclusion of the group presentations and discussion, Ms. Karazhanova thanked the three Youth Network representatives who had assisted in recording the discussions.

Wrap-up and Closing Remarks
Mr. Vanna, UN-Habitat (Cambodia), shared that all the relevant line ministries had been invited to participate in the workshop. BORDA, GRET and JICA were present but invitations had also been sent to ADB, the WB, and UN. Mr. Vanna invited BORDA and GRET to participate in the session the next day, which was to focus on how to move forward from the workshop.

Mr. Sarkar, of UN-Habitat, thanked His Excellency, the DDG of PWT, for his participation, as well as the other high officials. Mr. Sarkar had observed the quality, intensity and enthusiasm which were apparent in the discussions, and which showed the commitment of the participants. Mr. Sarkar noted that all the points had been covered to achieve the objectives which were set at the beginning of the day. He went on to summarise the day’s proceedings, highlighting key points from the presentations. Ms. Karazhanova had emphasized the need to learn from past experiences, focus on sustainability and 5P for 3S. Dr. Suthirat, in her presentation on effective policy, had spoken of ADB’s wastewater revolution and had shared success stories. Mr. Heng had given an excellent presentation highlighting the challenges relating to finance and operation and maintenance, as well as expressing the need to encourage and support policy development and to support the government’s efforts to mobilise resources. Mr. Larsson had spoken on important issues including stimulating demand, strengthening the regulatory framework and enticing investments. The energy in the ensuing group discussions had been amazing. Mr. Sarkar thanked the translator and all participants.

His Excellency Vong Piseth, Deputy Director General of MPWT, began his closing remarks by noting that this is the first workshop of its kind to discuss wastewater and sanitation in Cambodia. His Excellency noted two trending points in terms of technology and finance. These concerned the amount of water required for wastewater management and ways in which the amount of water can be reduced. As a country’s development and living standards improve, then water consumption concurrently increases. Japan uses 240 litres per capita per day but developing countries like Cambodia use 30-40 litres per capita per day. By 2050 the main cities will face problems of water consumption. His Excellency noted that the workshop had discussed the main challenges and he pointed out that we are at a crossroads in terms of how to develop Cambodia in a sustainable way. His Excellency had been assigned by the Minister to work on how to prepare legal regulations, to measure interventions, to achieve national policy and to look at how to move forward. He had invited the Ministry of Economy and Finance (MEF) and others to discuss this issue. He remarked on the need to consider the connection between water consumption and wastewater management. He also drew attention to the fact that the main urban infrastructure is MPWT’s key focus. Wastewater and sanitation are related to the drainage system and flood water protection. These are all related to road construction and form the main mandate for the Ministry. The year 2020 has been set as the target for at least ten main cities to have wastewater management systems. His Excellency
concluded his remarks by thanking UN-Habitat, ESCAP and MPWT for successfully hosting the workshop and providing technical staff with the opportunity for discussion and for learning.

Mr. Vanna thanked His Excellency for his excellent remarks and expressed his appreciation to the participants who had been involved in the workshop for the day.

**DAY 2 PROCEEDINGS**

**Session 4: Summary on the Work Plan and the Way Forward**

At the beginning of the session, Ms. Karazhanova, of ESCAP, picked up on points from the preceding day’s group discussions as an introduction to looking at the way forward. Ms. Karazhanova reminded the participants that ESCAP and UN-Habitat are working together to support South East Asian countries. There is a guidance manual in progress and participants’ inputs into the manual are welcome. The three sections of the manual focus on policy, case studies and implementation strategy.

There is a need for short and long term targets towards having wastewater being treated before being discharged. Another need is for technical assistance to develop a law. Issues raised include:

- penalties and the loss of fees
- monitoring and evaluation, and maintenance
- stimulating demand for wastewater treatment
- shifting from decentralised to centralised wastewater management and the appropriateness of different technologies to suit different contexts
- financial strategies, including a trust fund
- aligning a programme to household level as well as to industry

ESCAP is advocating a 5P for 3S approach. A suggested short term goal is setting up an inter-ministerial group and a technical working group (TWG) to develop the law. Other goals concerned technical aspects of maintenance and proposals on raising awareness.

In referring to ESCAP and UN-Habitat’s joint project, Mr. Sarkar, of UN-Habitat, informed participants that the project will try to develop some PPP projects. He requested guidance in how the project can assist in achieving short term goals in Cambodia. Ms. Karazhanova added that AIT has been selected as a regional centre of excellence, and will develop online training which will be available at no cost to policy makers. AIT has good projects which are supported by JICA and the Bill and Melinda Gates Foundation.

*His Excellency Vong Piseth* suggested summarising the outputs from the previous day’s discussions and highlighting what needs to be done in the short, medium and long term in the Cambodian context. He also suggested looking at the idea of a trust fund, while at the same time being sensitive to Cambodia’s laws relating to finance. His Excellency pointed out that this sector will require a large budget to achieve its goals, and it will require the cooperation of the Government and the private sector. A starting budget for wastewater management is $300 million. In order to make it more feasible to obtain the budget, it needs to be broken down into sections which can be allocated to
different contributors, including those from the private sector. There is also a need for help with drafting a law.

Ms. Karazhanova (ESCAP) reviewed points from the previous day’s proceedings. Key points included the institutional framework, the current wastewater situation in Cambodia, the difference between engaging households and controlling industry, and technologies which don’t combine wastewater and clean water.

Mr. Larsson (ESCAP consultant) reiterated some points from the previous day. Wastewater management for business and industry needs to be driven by regulation, and penalties are needed to enforce payment. Many industries are required to have their own on-site system. Perhaps something can be withheld to enforce compliance, for example, hotel ratings can be downgraded in the case of non-compliance. For newly constructed houses, wastewater management can be made a requirement for building permits. Mr. Larsson went on to describe an MoE biogas programme in Cambodia in which households can borrow money under a microfinance scheme which is supported by ADB, GIZ, SNV and other stakeholders. Mr. Larsson suggested setting up a similar national programme for DEWATS and then increasing the demand for DEWATS. Stakeholders such as BORDA could then become involved and funds could be sought from the government, donors and foundations.

Dr. Suthirat, from AIT, asked if the government has information about the demand for wastewater treatment, and she suggested that the national university could perhaps conduct a national study to ascertain whether or not people can pay and to look into financing mechanisms. In response to Dr. Suthirat’s question, His Excellency Vong Piseth shared the experience in Siem Reap, where the tariff is 60% for the middle class and business and industry. The lower tariff is 40%. The tariff only covers the cost of operation and maintenance and the Government subsidises investment. In Cambodia there is a mindset of never paying for wastewater. That is now changing. Cambodia is not a developed country but has invested a lot to make sure that we clean up at an early stage. We are still working out how to proceed. We are trying to build a centralised treatment plant by 2020. The Government has a clear policy, and wants to provide a service to low income people. Industry and business need to pay to connect to the system. There will need to be a lot of study, surveys, public consultation. People understand how to participate but are not willing to pay the bill.

Further requests were made for technical assistance with maintenance. Financial assistance will be required from stakeholders such as ADB, WB and JICA. It was noted that, in Sihanoukville, 3343 connections had been made to an ADB funded waste water treatment system. Although it is not a flat area, some areas are not suitable for gravity flow systems so ADB is assisting in building a pump station to pump waste from the tourist area. A connection fee is charged for a household septic tank to be connected to the system at the front of the house. This connection fee is a problem to households and so it has been suggested to ADB that people pay a monthly fee.

Following the discussion, Mr. Sarkar suggested listing Workshop Recommendations from the Government side. His Excellency Vong Piseth brought up the idea of a framework agreement between MPWT and ESCAP. He also explained that there is a need for guidelines and standards or technical specifications for septic tanks. His Excellency went on to explain the links to basic
infrastructure. Approximately 40% of Cambodia’s land area is around Tonle Sap Lake but 60% of the population lives there and around 80% of Cambodia’s farmers. It is necessary to protect the low-lying areas. The first project, in Siem Reap, required an investment of $3 million for wastewater management. However, there is a problem with flooding. The Siem Reap River needs to be expanded so that the river has the capacity to carry more water at flood times, thereby preventing the town from flooding. The town centre drainage system is a key component in preventing flooding. Without this basic infrastructure in place, it is difficult to move forward.

Further discussion ensued on MPWT’s needs such as ideas on how to set up mechanisms and a framework to reach the goals. Mr. Sarkar then asked if there was a strategy document in place. He observed that many good strategies were being suggested. These looked like the missing pieces of a puzzle. The problem is that all the pieces are needed now. Mr. Sarkar therefore advocated strategising and developing a succinct strategy paper including steps to achieve goals. The Government can then link with different donors who can each take responsibility for a different part of the strategy.

Mr. Heng, from MPWT, clarified that there is a need for technical assistance for sewage law and guidelines or specifications.

Mr. Larsson emphasised the importance of combining all ideas. For septic tanks a market survey could show how much people were willing to pay, how they could pay, whether subsidies were required and, if so, who should be subsidised. It is important to ask the public what they want.

With regard to septic tanks, it was noted that they must be sealed so that there is no chance of water seeping down to the underground water.

His Excellency Vong Piseth shared the desire for the new government strategy to be bottom up. He also related the government policy of subsidising 50% on any new roads to villages, and suggested the idea of a subsidy on well designed septic tanks.

The Deputy Chief of Wastewater Management in Siem Reap city reported that some NGOs had already started implementing decentralised systems but there are no guidelines on sustainability and maintenance and these are very much needed.

Mr. Vanna stated that Cambodia does not want guidelines from other countries but instead wants their own guidelines suited to the Cambodian context. The strategy is based on the rectangular strategy. The Ministry of Planning has developed a National Strategy Development Plan (2014-2018), and then each Ministry has to prepare its own 5 year strategy plan. It was pointed out that it takes a long time to formulate policy, rules and regulations, with 1-2 years being required for approval.

The discussion turned to septic tanks. His Excellency suggested a review. The septic tank is currently standard. It should meet a new requirement on the quality of the outflow. At the moment there is nothing regulating the quality of the outlet. Mr. Makara, from BORDA, stated that the traditional septic tank is still used and approved. In Cambodia there are lots of engineers who can design
appropriate septic tanks. Mr. Makara advocated concentrating on regulation and national policy. There is confusion between Ministries and this is hindering solutions being found.

Ms Karazhanova undertook to look for specifications from different countries as part of the case study section of the guidelines produced by ESCAP. She highlighted ESCAP’s role in assisting countries to support the SDGs and the post-2015 agenda. Ms. Karazhanova will assist in developing application to get donors’ support to development of the policies. She noted that many things can be done in parallel. If BORDA and GRET, among others, continue their work, then we can try and get some technical assistance from their donors. What ESCAP needs is a commitment from the Government and a request for technical assistance. Perhaps ADB can contribute in microfinance.

Mr. Sarkar, speaking for UN-Habitat, undertook to look into providing assistance for developing a strategy and technical assistance on developing specifications. He reiterated the value in starting with a strategy document.

Dr. Suthirat invited the participants to contact AIT for technological consultations. The AIT team looks at lots of different alternative technologies.

As the session came to a close, Mr. Vanna thanked BORDA, GRET and the different partners such as MRD and MOE. He expressed the hope that the different parties would keep in touch and share experiences and learn from each other.

His Excellency Vong Piseth shared short, medium and long term goals for how to achieve in the Cambodian context. The aim is for 98% access to septic tanks by 2030. We should come up with practical ways of doing this. His Excellency reflected that the participants had come up with some concrete workshop recommendations. He thanked all the participants for their time and their contribution to the workshop.

In summary, the workshop recommendations are as following:

1. Framework Agreement between Government (MPWT) and ESCAP and UN-Habitat;
2. Strategy by Govt (2-3 pages) on wastewater treatment and sanitation services, including:
   • Objectives, for ex. by 2030 population should have 100% access to Sustainable Sanitation Services (3S);
   • Laws, regulations;
   • Technical guidelines for septic tanks
   • Technical specifications to protect low land area to ensure water quality and set up mechanism and framework to reach out the goals;
3. Establish TASK FORCE (later sub-working group) on wastewater management services at inter-ministerial level, involving donors, partners, UN-Habitat, ESCAP;
4. Formulate the joint proposals for Technical Assistance based on the Govt. Strategy

THE END
### ANNEXURE

**Annex 1: List of Participants**

**Ministry of Public Works and Transport**  
Sub-Nation Public Infrastructure and Engineering Department

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**Names of Participants in the National Workshop on Waste Water Treatment Systems and Sanitation Services in Cambodia**  
**Date:** 27 October 2014

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28 October 2014

The Kingdom of Cambodia

National Workshop on Waste Water Treatment Systems and Sanitation Services in Cambodia

Date: October 2014

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<td>ក៏</td>
<td>២ ២ ៨ ១៧</td>
</tr>
</tbody>
</table>
### Annex 2: Agenda

**Day 1, 27 October 2014**

<table>
<thead>
<tr>
<th>Time</th>
<th>Proposed Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00</td>
<td>Registration</td>
</tr>
<tr>
<td>08:00 – 08:50</td>
<td>Ministry of Public Works and Transport (MPWT)</td>
</tr>
</tbody>
</table>

**Session 1: Opening and Overview and Current State of DEWATS in the region and in the country.**
Facilitator: MPWT (TBD)

<table>
<thead>
<tr>
<th>Time</th>
<th>Proposed Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30 – 08:50</td>
<td>Opening Statement</td>
</tr>
<tr>
<td>08:50 – 09:00</td>
<td>Overview on Workshop Objectives, Expected Outcomes and Impacts</td>
</tr>
<tr>
<td>09:00 – 09:30</td>
<td>Policy Guidelines</td>
</tr>
</tbody>
</table>

**Session 2. Taking a stock on waste water management and sanitation practices in Cambodia: challenges, barriers, policies and solutions for DEWATS**
Facilitator: MPWT

<table>
<thead>
<tr>
<th>Time</th>
<th>Proposed Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:30 – 10:00</td>
<td>Presentation of national policies on opportunities for decentralized wastewater treatment services</td>
</tr>
<tr>
<td>10:00 – 10:15</td>
<td>Break</td>
</tr>
<tr>
<td>10:15 – 11:00</td>
<td>DEWATS Introduction and Wastewater Management in Cambodia</td>
</tr>
</tbody>
</table>

**Session 3. Group Discussions on Effective Policy Frameworks, Technical Solutions and Innovations, and Financial Sustainability of 3S, Viability and Co-Benefits from DEWATS Stakeholder Frameworks and Solutions for DEWATS in Cambodia:**
Facilitator: UN-Habitat

<table>
<thead>
<tr>
<th>Time</th>
<th>Proposed Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:00 – 11:50</td>
<td>Sustainable Financial Frameworks for DEWATS</td>
</tr>
<tr>
<td>11:50 – 12:00</td>
<td>Introduction to 3 Group Discussions on (1)-DEWATS vision, issues, Implementation Strategy; (2)- Technical Solutions and Innovations; and (3)- Financial Sustainability</td>
</tr>
</tbody>
</table>

**Lunch**

<table>
<thead>
<tr>
<th>Time</th>
<th>Proposed Speaker</th>
</tr>
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<tbody>
<tr>
<td>13:30 – 15:30</td>
<td>Group Discussions</td>
</tr>
</tbody>
</table>

**Break**

<table>
<thead>
<tr>
<th>Time</th>
<th>Proposed Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>15:15 – 15:30</td>
<td>Three presentations of the group discussions, 10 min each</td>
</tr>
</tbody>
</table>

**Wrap-up the Day 1**

<table>
<thead>
<tr>
<th>Time</th>
<th>Proposed Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>16:30 – 17:00</td>
<td>Mr. Avi Sarkar, Regional Technical Advisor, UN-Habitat</td>
</tr>
</tbody>
</table>

**Closing remarks**

<table>
<thead>
<tr>
<th>Time</th>
<th>Proposed Speaker</th>
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</thead>
<tbody>
<tr>
<td>17:00</td>
<td>By MPWT</td>
</tr>
</tbody>
</table>

**Closure of Day 1**
Day 2, 28 October 2014 (Small group with selected participants)

<table>
<thead>
<tr>
<th>Time</th>
<th>Proposed Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Session 4: Summary on the Work Plan and The Way Forward</strong> Facilitator: UN-Habitat</td>
<td></td>
</tr>
<tr>
<td>08:30 – 09:30</td>
<td>Presentation on the summary of discussions</td>
</tr>
<tr>
<td></td>
<td>Rapporteur, TBD</td>
</tr>
<tr>
<td>09:30 – 10:30</td>
<td>Updates of the proposed draft Policy Study, Regional Guidelines on DEWATS and possible joint proposal for resource mobilization</td>
</tr>
<tr>
<td></td>
<td>Mr. Sok Vanna, UN-Habitat</td>
</tr>
<tr>
<td>10:30 – 11:30</td>
<td>Discussions</td>
</tr>
<tr>
<td>12:00</td>
<td>Closure of the Workshop</td>
</tr>
</tbody>
</table>
Annex 3: Presentation on Policy Guidelines for DEWATS

Policy Guidelines for DEWATS

National Workshop on
Wastewater Management and DEWATS
27-28 October, 2014
Phnom Penh, Cambodia
By Aida Karashanova, ESWRS/EDD/ESCAP
karashanova@un.org

Outline

1. Foundation for Sustainable Sanitation Services (3S)
2. Three Steps and Ten Focus Areas of the Policy Guidance Manual on DEWATS
3. The Way Forward
1: FOUNDATION FOR 3S

- Post 2015 Agenda and Proposed Targets for SDG Goal 6:
  - Ensure availability & sustainable management of water & sanitation for all
  - 6.1 by 2030, achieve universal and equitable access to safe and affordable drinking water for all;
  - 6.2 by 2030, achieve access to adequate and equitable sanitation and hygiene for all, and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations;
  - 6.3 by 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and increasing recycling and safe reuse by x% globally;
  - 6.4 by 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity, and substantially reduce the number of people suffering from water scarcity;
  - 6.5 by 2030 implement integrated water resources management at all levels, including through transboundary cooperation as appropriate;
  - 6.6 by 2030 protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes;
  - 6.a by 2030, expand international cooperation and capacity-building support to developing countries in water and sanitation related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies;
  - 6.b support and strengthen the participation of local communities for improving water and sanitation management.
The Lack of Sustainable Sanitation Services (35)

UN WATER: "sanitation" covers:

- safe collection, storage, treatment and disposal/re-use/recycling of human excreta (faeces and urine);
- management/re-use/recycling of solid wastes (trash, rubbish);
- drainage and disposal/re-use/recycling of household wastewater (often referred to as sullage or grey water);
- drainage of storm water;
- treatment and disposal/re-use/recycling of sewage effluents;
- collection and management of industrial waste products;
- management of hazardous wastes (including hospital wastes, and chemical/radioactive and other dangerous substances)

### Household Water Security

**Human Rights/Equity**
- **Water Supply**
- **Sanitation**
- **Health**

**Means/Instruments/Tools**
- Policy
- Technologies
- Legal Aspects
- Institutional Aspects
- Wastewater Issues
- Financial Instruments

<table>
<thead>
<tr>
<th>Status of MDG targets</th>
<th>Data Collection, Monitoring</th>
<th>Climate concerns</th>
<th>Technology</th>
<th>Management and Coordination</th>
<th>Financing and Investments</th>
<th>Capacities, Networks</th>
</tr>
</thead>
</table>

### Policy Instruments: Low Carbon Green Growth Roadmap, ESCAP, 2012

<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic instruments</td>
<td>Water pricing</td>
<td>Increase of block tariffs, providing subsidies to the lower-income households, etc.</td>
</tr>
</tbody>
</table>
| Governance structures | Integrated water resource management | 1. Integrating water resource provision and a wastewater treatment system  
2. Optimizing water infrastructure  
3. Promoting an environment-friendly water cycle system |
|                    | Distributed wastewater management system | Has 3 main objectives:  
1. Public health improvement  
2. Energy and water conservation  
3. Environmental protection  
Helps to avoid water losses and save energy consumption, has low-cost and site-specific opportunities |
|                    | Reuse and recycling | Minimizes freshwater demand and reduces wastewater treatment needs. The following treatment technologies can be used: membranes, wetlands, sand filters, and waste stabilizing ponds. |
|                    | Low impact development (LID) | Local and decentralized measures, mitigate development impacts to land, water and air by mimicking natural drainage, using small-scale practices, managing stormwater at the source, using simple and natural practices and making landscape and infrastructure multifunctional |
Integration in Water Resource Management

The water governance structure is vertically integrated to better coordinate policies and encourage bottom-up water management. Horizontal integration can include several water management components within the water system and across sectors and institutional boundaries.

- Water system: Water resource catchment and storage, resource conservation, ecosystem maintenance, flood mitigation and water security.
- Cross-sector: Energy system, land use, urban design, health and sanitation policies and agriculture policies.

**Value Chain**

- Demand creation
- Collection
- Transport
- Treatment
- Disposal/Reuse

**Types of Services**

- Osmotic water reuse
- Osmotic without reuse
- Sewer connections to sewer network
- Partial on-site treatment
- Decentralized treatment facilities
- Treatment plans
- Re-use sludge (energy, agriculture)

**Environment**
Sanitation Ladder

- Decentralized approach as a bridge towards centralized system
  → step-wise approach towards city-wide centralized sanitation
- Good sanitation and hygiene behavior as foundation for sanitation development

Start

On site facilities

Collective Facilities at community level

City-wide Centralized Facilities

Good sanitation and hygiene behavior
Pro-Poor approach

Stimulation of social entrepreneurship at the community level → Poverty Reduction

Policy Framework

PPP and 5P

Supplement and overcome government budgetary constraints
Allocate project-risks effectively between the public and private sector
Each stakeholder offers a unique capability and assumes unique responsibilities
Raise the likelihood of success

<table>
<thead>
<tr>
<th>Category</th>
<th>Public-Private Partnerships</th>
<th>Pro-Poor Public-Private Partnerships</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projects</td>
<td>Mainly large-scale infrastructure</td>
<td>Community-based infrastructure</td>
</tr>
<tr>
<td>Role of the poor</td>
<td>Consumers that receive indirect benefits</td>
<td>Partners in business ventures</td>
</tr>
<tr>
<td>Stakeholders</td>
<td>Government and private sector</td>
<td>Broad number of institutions. Each of them play a distinct role while fulfilling their respective needs</td>
</tr>
<tr>
<td>Focus</td>
<td>Financial outcomes</td>
<td>Overall social and economic development</td>
</tr>
</tbody>
</table>
What are the **New Ways of Financing Sanitation and 3S**?

**A Paradigm Shift:**
- Development of Financing for Tangible Results
- Move to Outcome Models
- Impact Investment
- Service economy

**1. Release supply-side constraints**
- Encourage scale to reduce unit costs
- Loan Financing to bring in players
- Enable Partnerships & Collaboration

**2. Cause social movements**

**3. Capture externalities**

**4. Incentivise economic scale**

**5. Distribute the benefits: equity focus**
The Way Forward For Policy Makers (ctd.)

Financial Leverage
- Explore innovative strategies to attract investments from the private sector, governments and donors
- Leverage the potential contributions from households themselves
- Organize work of service providers

KEY MESSAGES (Ctd)

On Institutional and Legal Policy Leverage
- Establishing a coordinating mechanism to address water and sanitation questions
- Raising awareness and improving understanding of benefits of water supply and sanitation
- Establishing simple, independent and transparent regulatory environments
2: THREE STEPS AND TEN FOCUS AREAS

Focus Areas within the Process Cycle for DEWATS
FA1: Vision and set up targets
FA2: Assessment of 3S strategies
FA3: Analysis of institutions and partners
FA4: Cost-benefit analysis
FA5: Assess scenarios
FA6: Choose system and technology
FA7: Keep increasing demand
FA8: Ensure investment needs and financing schemes
FA9: Ensure sustainability
FA10: Make evaluation
FOCUS AREA 1: VISION AND SET UP TARGETS

Cycle of Sanitation Development

EVALUATION

IMPLEMENTATION

PREPARING ANNUAL ACTION PLAN

PLAN SYNCHRONIZATION

PREPARING A CITY WIDE SANITATION STRATEGY
FOCUS AREA 2:
ASSESS SANITATION STRATEGIES AND
SOCIO-ECONOMIC IMPACTS OF DEWATS
Assessments of SSS Status

- Quantitative assessment
- Cost-efficiency and cost-effectiveness
- Cost-benefit analysis
- Environmental benefit assessments

- Assessment of economic incentives and cost recovery
  - Fee and tariff-based measures, subsidies
  - Economic instruments: waste tariffs, pollution charges ("polluter pays")
  - Cost recovery
  - Discharge permits

FOCUS AREA 3
ANALYSE INSTITUTIONS AND PARTNERS
FOCUS AREA 4
ANALYSE COSTS AND BENEFITS
FOCUS AREA 5
ANALYSE DEWATS STRATEGIC FUTURE
Assess Strategic Future of DEWATS

1. Sanitation mapping
2. Scenarios for DEWATS
3. Cost benefit of scenarios
4. Stakeholder consultation of scenarios
5. Setting prices for wastewater services

Price Aspects:
- Affordability
- Fairness and equity
- Transparency and feasibility
- Political acceptability
- Designing and enforcing of cost-recovery
- Subsidies
- Revenues from water tariffs

FOCUS AREA 6
CHOOSE THE TECHNOLOGY SYSTEM
A few studies and examples within Presentation on SP for 33 examples to follow. In addition:

- Biogas in Cambodia
  
  [Link](https://www.youtube.com/watch?v=ZKdruVBlHck&feature=youtu.be)

- Pro-Phosphorus PPP (SP) by Sweden and Australia
  
  [Link](http://vimeo.com/13365354)

**FOCUS AREA 7**

**KEEP INCREASING DEMAND FOR DEWATS**
FOCUS AREA 8:
ENSURE FINANCIAL AND INVESTMENT CLIMATE FROM GOVERNMENT, DONORS AND ENTREPRENEURS
The SP project should explore investment options for SS into multi-stakeholder collaborative models.

Social Mission
Financial Incentives
Delivering high returns
Making financial equity become social equity

FOCUS AREA 9:
ENSURE SUSTAINABILITY OF DEWATS
Sustainability Elements

- Financial: continuity of DEWATS products and services through local financing (free from foreign funds)
- Institutional: sustained and functional local DEWATS systems with capable institutions, policies and procedures
- Environmental: sustainable management of water and waste flows that is considerate of the natural environment and climate and can be recycled and reused.
- Technical: operation & maintenance of hardware, by local people, that preserves not depletes (natural) resources
- Social sustainability: demand-driven, inclusive (equity), gender equal, culturally sensitive and needs-based approach to WASH

FOCUS AREA 10:
MAKE EVALUATION
Evaluate DEWATS

- Effectiveness of planning processes
- Assess progress in development
- Assess benefits of sanitation development

Ex: number of household connected to local sewer, on-time payment of tariffs/fees, timely and efficient desludging of septic tanks, O&M of other DEWATS components, how often services is interrupted

Ex: National performance measurement framework and International benchmarking network

3: KEY MESSAGES
KEY MESSAGES

- Learn from the past DEWATS experiences and assessing ways to bring DEWATS at scale;
- Ensure sustainability of service delivery through Pro-Poor Public-Private Partnerships for Sustainable Sanitation Services (5 P for 3 S), resource recovery and enabling a sanitation value chain with capacity building of supply chain interveners;
- Create the demand, including from the poor, for sustainable sanitation services facilitating integration of DEWATS to centralized systems;
- Strengthen the capacities of all interveners and creating a regional platform for dialogue, knowledge management and innovation among the three countries;
- Enhance innovative financing and financial viability of sanitation facilities by improving affordability, by smoothing and subsidizing sanitation expenditures, by using OBA, outcome-based financing models and other financing mechanisms (microcredit, revolving funds...);
- Enhance regional cooperation among policy makers and experts on decentralised sanitation solutions through a Regional Resource Centre.

Thank you
Annex 4: Presentation on effective policy analysis on DEWATS and FSM, business models from the region and potential applications of sanitation toolkits

Effective Policy Analysis on DEWATS and FSM, Business Model from the Region and Potential Applications of Sanitation Toolkits

Did you know?

- Globally, more than 3.4 million people die annually from water, sanitation, and hygiene-related causes. Nearly all deaths, about 99%, occur in the developing world (WHO, 2008)

- By the end of 2011, 2.5 billion people in the world still lacked access to an improved sanitation facility and about 1 billion still practice open defecation

- In India, 626 million people are without proper sanitation but 893 million have mobile phone
"Sustainable Decentralized Wastewater Management in Developing Countries"

- Asian Institute of Technology-NATS (Naturally Acceptable and Technologically Sustainable)
- Bill & Melinda Gates Foundation

Innovative solutions for the world’s bottom billion poor

"Sustainable Decentralized Wastewater Management in Developing Countries"

(i) Expanding and improving sanitation without central sewers

(ii) Making sanitation services safe and sustainable by addressing the failure to effectively transport, treat and reuse waste captured in on-site facilities
What is a sanitation about?


- A sanitation system is **more than the TOILET**
- It has to do with management issues: disposal and potential reuse of treated urine and faeces, greywater discharges, comfort, affordability, health aspects, etc.
Presentation Contents
“Regulatory Framework for DEWAT/FSM in Developing Countries”

- Regulatory Framework
- Policy synthesis
  - Thailand
  - Vietnam
- Business Model
- Potential Applications of Sanitation Toolkits

THAILAND
Government of Thailand’s regulatory framework for DEWAT and FSM

Treatment Plant
PUBLIC HEALTH ACT, B.E. 2533 (A.D. 1992)

Management
DETERMINING PLANS AND PROCESS OF DECENTRALIZATION TO LGO ACT, B.E. 2542 (A.D. 1999)

Transportation
PUBLIC HEALTH ACT, B.E. 2535 (A.D. 1992)

Ministerial regulation on the prescribing rate offer for fecal sludge collection and transportation, B.E. 2545 (A.D. 2022)

Key Ministries

Ministry of Natural Resources and Environment
ONCP: Drafting and implementing regulations on environmental quality and sewerage
PCD: Water standard setting
DEGP: Raising public awareness of water and sanitation issues

Ministry of Public Health
Bureau of Environmental Health: Establishing technical guidelines and developing manuals on integrated sewerage management
Health Law Administration Group: Enhancing law enforcement

Ministry of Interior

Local authorities

Key Schemes

Other relevant federal departments

Multilaterals involved in sanitation in Thailand

Political Context

49
<table>
<thead>
<tr>
<th>Law</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhancement and Conservation of National Quality Act, 1992 (B.E.2535)</td>
<td>- Setting up the Office of the National Environmental Board (NEB) in charge of overall environmental management issues</td>
</tr>
<tr>
<td></td>
<td>- Determining environmental quality standards for water, SW</td>
</tr>
<tr>
<td>Public Health Act, 1992 (B.E. 2535)</td>
<td>- Establishing criteria for controlling public nuisance caused by the disposal of sewage, solid waste, and water drainage</td>
</tr>
<tr>
<td>Building Control Act, 1979 (B.E. 2535)</td>
<td>- Developing the &quot;Manual on Integrated Septage Management&quot;</td>
</tr>
<tr>
<td>Public Cleanliness and Orderliness Act, 1992 (B.E. 2535)</td>
<td>- Determining the fee for collection, transportation, and disposal of sewage and solid waste</td>
</tr>
<tr>
<td>Public Toilet Development Master Plan, 2013-2016 (B.E. 2556-2559)</td>
<td>- Construction of community WWTP according to Act</td>
</tr>
<tr>
<td></td>
<td>- Prohibiting any activities that are likely to cause dirtiness to public places and forbidding the dumping of sewage into the waterways</td>
</tr>
<tr>
<td></td>
<td>- 50% of Thai households to have a seated toilet by 2016</td>
</tr>
<tr>
<td></td>
<td>- 10% of targeted public places providing at least 1 seated toilet by 2016</td>
</tr>
<tr>
<td></td>
<td>- 50% of Thai households having hygienic, sufficient and safe public toilets by 2016</td>
</tr>
<tr>
<td></td>
<td>- 50% of LGOs having sanitary waste disposal by 2016</td>
</tr>
</tbody>
</table>

**VIETNAM**
### Government of Vietnam’s regulatory framework for DEWAT and FSM

<table>
<thead>
<tr>
<th>Key Ministries</th>
<th>Key Schemes</th>
<th>Other relevant federal departments</th>
<th>Multilaterals involved in sanitation in Vietnam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ministry of Natural Resources and Environment</strong></td>
<td><strong>Ministry of Public Heath</strong></td>
<td><strong>Ministry of Construction</strong></td>
<td>Hanoi University of Civil Engineering (HUCE)</td>
</tr>
<tr>
<td>Implementation of environmental protection legislation (e.g. water resources, natural resources, etc.)</td>
<td>- Establishing the standards on water quality and sanitation</td>
<td>- Implementing policies on the construction of wastewater and sanitation system in the country</td>
<td>ADB</td>
</tr>
<tr>
<td></td>
<td>- Developing the guideline and national code on the design and construction of septic tanks</td>
<td>- Updating design standards for septic tank</td>
<td>WORLD BANK</td>
</tr>
<tr>
<td><strong>Ministry of Planning and Investment (MPI) and Ministry of Finance (MOF)</strong></td>
<td><strong>Provincial People’s Committee</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arranging financing for sanitation programs approved by government</td>
<td>Directing and inspecting the implementation of environmental regulation of their locality (e.g. water supply, drainage, and sanitation)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Law on Protection of the Environment: No.52-2005QH11
- Establishing national environmental standards
- Providing waste management rights and obligations of entities engaged in solid waste management activities
- In terms of FSM, Decree 88 introduces an external user fee for wastewater treatment

### Orientation for the development of urban sewerage and drainage, 1999
Upgrading domestic sewerage system and cancellation of pit latrines (Dry and bucket latrines should be eliminated from Hanoi by 2001 and from all cities in Vietnam by 2005). Orientation is required for 100% coverage of sewerage service in urban areas such as HCM, Hanoi

### Strategic orientation for sustainable development (Vietnam agenda 21), 2004
Priority activities of sustainable utilization of water resources are: Promotion of WWT to reduce amount of emission and reuse WW
- Raising up public’s awareness about appropriate utilization and protection of water resources

### Vietnamese Environmental Standards
- Design standard for septic tank (TCXDVN51-1984)
- Surface water quality standard (TCVN 5942-1995)
- General requirements for the use of wastewater and their sludge for watering and fertilizing purpose (TCVN 5298-1995)
POLICY SYNTHESIS

POLICY SYNTHESIS: THAILAND

- Lack of clarity communication between LGOs and community related to DEWAT and FSM
- FSM is a low priority for both national and LGOs
- No certified enforcement agency for DEWAT and FSM
- Low level of awareness and understanding of connection between water quality and health impacts
- Some goals of sanitation policy remain somewhat unclear
  i.e. sanitary toileting behavior
### POLICY SYNTHESIS: VIETNAM

| National authority has not mandated or policy guidance on septage management | Many institutional organizations overlap their responsibilities i.e. MoNRE, MOC | No certified enforcement agency for DEWAT and FSM |
| Vietnam’s laws specify only the design, construction, operation of septic tanks but do not regulate laws governing collection and treatment of septage | Budgets are not sufficient enough to cover the running expenses for DEWATs/FSM in rural area | Septic tanks are normally not designed due to lack of law enforcement by LGOs |

### Key challenges of regulatory implementation and practices in case study countries

- Government’s priorities
- Occurrence of overlapping organization
- Quality of the law enforcement
- Availability of budget funds
- Inefficiency and ineffectiveness in local government administration
- Lack of expert and skilled workers
- Lack of awareness and intention among lay people
Common Barriers for sustainable sanitation services

- Lack of vision, urban policy and planning
- Low citizen’s demand
- Priority on sewage
- Fragmented public and private sector
- Not a priority in national budgeting

ADB’s Concept of the WWM revolution

(i) Knowledge Drive: Sustainable environmental sanitation case studies

(ii) Technology Drive: Specific technology datasheets and its application

(iii) Financing and incentive Drive: Pro-feasibility studies with financing mechanisms to WWM investment projects

(iv) Awareness Drive: Stakeholders networking
Business Model

FS Treatment plant in Thailand

- Anaerobic digestion with sand drying bed: Banthasuri City Municipality
- Constructed wetland: Ranong Sub-district municipality
- Leved Lagoon - Thongtawin service company
- Stabilization pond: Naethekud PAA
# Key features on FSM of Private and LAO models

<table>
<thead>
<tr>
<th>Factors</th>
<th>Types of service provider</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Operated by LOAs</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Municipality provides FS collection, transportation and operated the FS treatment plant by themselves.</td>
</tr>
<tr>
<td><strong>Key Players</strong></td>
<td>Municipality - Municipality - Private company - Municipality - Municipality - Outsource</td>
</tr>
<tr>
<td><strong>Financial support</strong></td>
<td>Government Agency - Personal Budget - Commercial Banks, NGOs - Government Agency - Fund</td>
</tr>
<tr>
<td><strong>Licenses</strong></td>
<td>No (Own by municipality) - Yes - No (Own by municipality) - Yes</td>
</tr>
<tr>
<td><strong>Service areas</strong></td>
<td>One responded area - Several areas - Several areas - Several areas</td>
</tr>
<tr>
<td><strong>Annual Remuneration</strong></td>
<td>No - The private company have to pay annual remuneration to municipality. - No</td>
</tr>
<tr>
<td><strong>Goal/Attitude</strong></td>
<td>Nonprofit organization - Profit organization and business sectors - Nonprofit organization - Nonprofit organization</td>
</tr>
</tbody>
</table>

## How to start FSM Business? – Private Company

1. Identify Value Proposition
2. Identify Customer Segment
3. Channels
4. Customer Acquisition Management
5. Revenue Stream
6. Key Resources
7. Key Activities
8. Key Partnerships
9. Cost Structure
10. Marketing

Government Agency
- Personal Budget
- Commercial Banks, NGOs
- Government Agency
- Fund

Nonprofit organization
Public Service

Profit organization and business sectors
Nonprofit organization
Public Service
Nonprofit organization
Public Service
How to: Access to Capital Financing

Commercial Bank

For what the money to spend to?

What are the details of your investment?

What is the information of your business?

Are there guarantees used as establishment?

Do you UNDERSTAND in such business or not?

Consult, advice for preparation before submitting

Filling application form with business plan

The staff checks correctness of documents

Estimate the price of guarantee

Verify Credit Bureau and waiting the business

The staff analyzes credit and approve the price of guarantee

Waiting for the results from consideration the credit

Source: SME Bank, 2014

How to: Access to Capital Financing

Environmental Fund

Office of Natural Resources and Environmental Policy and Planning (ONEP)

Company submits the project documents and application form to ONEP

Sub-committees consider and propose project

Committees analyze and approve the project

Approve Establish and submit management plan and disbursement plan to ONEP within 30 days

Environmental Fund is established according to “The Enhancement and Conservation of National Environmental and Quality Act, B.E. 2535 (A.D.1992)”. It is a financial measure program to encourage government organizations and private enterprises to responsible for environment and natural resources in Thailand based on Polluter Pay Principle (PPP).

Approximately 60 Days

Source: ONEP, 2013
How to: Access
Office of Natural

Project Document and Plan Applications includes:
1. Company and Project Information
   - Project Area Information: population, land use, geographic condition
   - Brief history of the business and current position
   - Brief description of CCC
2. Existing Problems
3. The objectives of the project
4. Project policies, strategies and environmental plan accordance
5. Target area and target group (customers)
6. Time plan (not exceed 3 years)
7. Operation Plans
   - Time plan and activities
   - Role Responsibilities of organizations
8. Financial Plan
   - Management plan
   - Operation
9. Performance Indicator
   - Qualitative analysis
   - Quantitative analysis
10. Management Plan
    - Company Structure and management strategies
11. Expected Outcome
12. Project Evaluation

Important Documents:
1. Certificate of Company/Partnership Registration
2. Company Financial Statement
3. Business certificate such as Permit for factory operation, VAT registration, Company profile, etc.

Case 1:
Annual licensed fee for faecal sludge collection and transportation

FS service company
1. Contact LAO to licensing, and apply requested document for submission:
   - Company registration certificate
   - Company financial statement
2. Check the validity of the documents within 7-15 days
   - Lao must have license issued from Department of Land Transport
   - Check to make sure valid and in good order
3. Sign the contract and pay annual licensed fee usually 5,000 THB (46.39 USD)
   - can be less than or more than 1,000 THB depends on LAC
   - FSM license is separated into collection at transportation (2,000 THB) and FSM final disposal (2,000 THB)

Local Administration Organization
Municipality, Sub-district Administration (SAO)

Municipality officer will issue the FS collection and transportation license to the private companies:
- The license is available upon request, the companies have to renew every 1-3 years
- 1,000 THB/year

by AIT
Case study of good practice in Thailand: Thongtawil Service Company, Rayong Thailand

Waste-to-energy biogas utilization

SWOT analysis

Four factors strongly affected to FSM and sanitation

Organization resources: Man Materials and Facilities

O&M: Collection, Transportation Treatment and Reuse

Financial aspect: Money and Budget

Policy: Law & Regulation, Knowledge support
Recommendations

**SHORT-TERM (≤1 yr)**

- Develop national guidelines on DEWAT/FSM: **MOPH**
- Clarify the roles for national and local governments: **MOPH + LGAs**
- Increase enforcement of scheduled desludging and promote public-private partnership: **LGAs and private sectors**
- Provide regular training and exposure for policy makers and operator: **MOPH + LGAs + Private + Academia**
- Strengthen exiting manual on FSM: **MOPH**
- Rehabilitate existing treatment facilities: **LGAs**

**MEDIUM/LONG TERM (>5 yrs)**

- Integrate FSM/DEWAT into national environmental planning: **MOPH + MoNRE**
- Create financing mechanisms for sanitation services: **MOPH + LGAs**
- Developing and sustaining regional collaboration: **MOPH + LGAs + Regional partners**
- Research funding program/Pilot projects for alternative technologies: **Academia**
- Develop promotional campaigns/promote public awareness: **Media**
Relevant Toolkits for Policy Makers

 Toolkit has been developed through the Water Utility Partnership (WUP) Project. Funding has been provided by the European Commission. The project is managed by the Water and Sanitation Program on behalf of the (WUP), supported by the World Bank’s Africa Infrastructure Unit.

The aim is to provide sector practitioners, policy and decision-makers access to information on current trends and knowledge gained from past experience regarding water supply and sanitation service delivery to low income urban areas.
Water and Sanitation Toolkits:

**In School**

Worldwide, an estimated 72 percent of the primary school-age children attend school. In most developing countries, the sanitary and hygienic conditions at schools are often appalling, characterized by the absence of proper functioning water supply, sanitation and hand-washing facilities.

*World Bank (2005)*

**Water and Sanitation for All: A Practitioner’s Companion**


**Water and Sanitation Toolkits:**

*World Bank (2005)*

**In School**

Worldwide, an estimated 72 percent of the primary school-age children attend school. In most developing countries, the sanitary and hygienic conditions at schools are often appalling, characterized by the absence of proper functioning water supply, sanitation and hand-washing facilities.

*World Bank (2005)*
Challenge:
How can we develop such toolkits in our country??

Thank you
Annex 5: Presentation on Sewerage and Wastewater Management in Cambodia

A Presentation on Sewerage and Wastewater Management in Cambodia

By: Heng Rathpiseth
Director of Department
27-28 October 2014

CONTENT

- General Information
- Government Strategy
- Organization Chart
- Status of water pollution of rivers, lakes and bays
- Present Status of Sewage Works
- Tentative Theme of Improvement Plan
- Conclusion
General Information

- South East of Asia. North connected by the Laos, the East to the Vietnam, the South by the Gulf Sea of Thailand and the West by the Thailand.
- Land Area: 181,035 km².
- Population: 14.3 million
- The main religion: Buddhism
- Capital City: Phnom Penh
- Population: 1,614,440
- Total Member of Provinces and Municipalities: 24
- Total of District: 1,596
- Total of Communes: 14,354
- GDP Annual Growth Rate: 7.20% (Average)

Government Rectangular Strategy and Goal

1. Good Governance
   - Favourable macroeconomic and financial environment
   - Improving health service
   - Society building and human resource development
   - Public administration reform
   - Productivity and competitiveness enhancement of agricultural sector
   - Land reform and innovation

2. Raising living standards
   - Education improvement
   - Employment and income redistribution
   - Public services and housing development
   - Rural development and poverty alleviation

3. Peace, political stability and social order
   - Personal safety and security
   - Stability and improvement of social order
   - Peaceful political system

4. Integrating development plan
   - Consolidation of national development plan
   - International cooperation and development
   - Improvement of development results
   - Sustained economic growth
Government Rectangular Strategy and Goal

In accordance to government Rectangular strategy and Goal, wastewater treatment is one importance part that involve in Preparing a Master Plan for Urban Infrastructure Development, in particular public transport in urban areas and connectivity of production centers on the outskirts of municipalities, main economic poles, industrial zones and special economic zones to reduce traffic congestion, improve national economic efficiency and competitiveness, as well as enhance welfare of people and ensure environmental sustainability through consistency with the framework of land management and urban planning including National Policy on Housing, laws related to land management, urbanization and construction, National Strategy on Development of Municipal and Urban Areas, installation of solid and liquid waste management system as well as fire prevention and firefighting system.

Speech: H.E Yim Chhayly

Wastewater Treatment is importance action as described in speech H.E Yim Chhayly in attached report.
Status of water pollution of rivers, lakes and bays

Sources of pollution

In Cambodia, land and water resources and their associated biota are considered to be major environmental concerns. Commercial forestry, agriculture and mining affect the country’s surface water system along with the Mekong River upstream trans-boundary factors working through the regional surface water network and local rivers to affect the primary resources of the Tonle Sap Lake and its tributaries. Additionally, urban/town and industrial pollution sources, aquaculture, and mining contribute to water quality deterioration and affect the productivity of the inland fisheries, which is also increasingly influenced by intensified commercial and artisanal fishing practices. Wastewater sanitation and solid waste management are affecting the urban/town water environment as well.
Status of water pollution of river, lakes and bays

Situation of Rivers, Lakes, Bays

River, Lakes and Bays water quality data from the Ministry of Environment has been available since 1999. The water quality indexes are compiled by the Ministry of Environment including pH, Conductivity, Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Fecal Coliform, and Total Suspended Solids (TSS), NO2, NO3, and PO4. The following figures indicate water quality in watercourses with high concentration of Fecal Coliform for a few months in a year where population density is high, and is compared to the National Water Quality Standard of the Ministry of Environment (Fecal Coliform <5000).
Status of water pollution of river, lakes and bays

Environmental Wastewater Quality Standard
Issued under Sub-Decree on Water pollution control by Ministry of Environment to regulate, prevent and reduce the water pollution for protection of human health and conservation of biodiversity.

Standards for Effluent Discharge to a Water Body

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Protected public water body</th>
<th>Public water body and sewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>-</td>
<td>6 - 9</td>
<td>5 - 9</td>
</tr>
<tr>
<td>BOD5</td>
<td>mg/L</td>
<td>&lt; 30</td>
<td>&lt; 80</td>
</tr>
<tr>
<td>COD</td>
<td>mg/L</td>
<td>&lt; 60</td>
<td>&lt; 100</td>
</tr>
<tr>
<td>Total Suspended Solids</td>
<td>mg/L</td>
<td>&lt; 50</td>
<td>&lt; 80</td>
</tr>
<tr>
<td>Total Dissolved Solids</td>
<td>mg/L</td>
<td>&lt; 1,000</td>
<td>&lt; 2,000</td>
</tr>
<tr>
<td>Nitrate (NO3⁻)</td>
<td>mg/L</td>
<td>&lt; 16</td>
<td>&lt; 20</td>
</tr>
<tr>
<td>Phosphate (PO4³⁻)</td>
<td>mg/L</td>
<td>&lt; 2.0</td>
<td>&lt; 6.0</td>
</tr>
<tr>
<td>Ammonium (NH3)</td>
<td>mg/L</td>
<td>&lt; 5.0</td>
<td>&lt; 7.0</td>
</tr>
<tr>
<td>DO</td>
<td>mg/L</td>
<td>&gt; 2.0</td>
<td>&gt; 1.0</td>
</tr>
</tbody>
</table>

Present Status of Sewage Works
Present Status of Sewage Works

Present status of sewerage and sanitation
Sewerage and Sanitation in Cambodia are very poor because of financial and technical reasons. Domestic wastewater and urban sewage are commonly collected by sewerage system and run off to drainage and retention pond/lake or wetland afterward for self-purification (through natural treatment process), and finally runs off to the main watercourse.

All sewerage and sanitation in Cambodia Cities are old that were constructed during France’s colonial without maintenance or reconstructing even after 30 year civil war. In the result, many Cities of Cambodia are flooded in the raining season. In 2012, Project for construction of drainage pipe as follows:
- Prey Veng (Ø800 mm): 2,130.00 m
- Battambang (Ø800 mm): 1,600.00 m
- Phnom Penh (Ø800 mm): 3,630.00 m
- Kambong Thom (Ø800 mm): 1,645.00 m
- Odaor Meanchey (Ø800 mm): 330.00 m
- Peaoh Vihear (Ø600 mm): 150.00 m

In 2013, Project for construction of drainage pipe as follows:
- Kambong Cham (Ø800 mm): 325.00 m
- Kambong Chhnang (Ø600 mm-Ø800 mm): 1,086.00 m
- Odaor Meanchey (Ø800 mm): 3,130.00 m
- Pursat (Ø600 mm): 1,200.00 m
- Stung Treng (Ø1000 mm): 1,200.00 m
- Svay Rieng (Ø1200 mm-Ø1500 mm): 1,600.00 m

In 2014, Project for construction of drainage pipe as follows:
- Kambong Chhnang (Ø600 mm-Ø800 mm): 1,983.00 m
- Stung Treng (Ø600-Ø800 mm): 1,511.00 m
- Svay Rieng (Ø800 mm-Ø1500 mm): 2,389.00 m
- Siem Reap (Ø800 mm-Ø1000 mm): 3,771.00 m
- Kampot (Ø600 mm): 187.00 m
Present Status of Sewage Works

Operation and Maintenance

- Throughout the ADB project in Siem Reap, pumping stations were constructed, but there are O&M problems causing shutdown.
- Existing screen has only coarse screen with no fine screen and its cause pump clogging.
- Frequent failure of pump due to the mechanical problem takes too long to repair.
- Existing activated carbon odor control cannot reduce nuisance odor emission and O&M cost is too high due to the replacement of filter.
- Irregular maintenance problems for sewer manholes, septic tank causes poor wastewater treatment efficiency.
- Open drains have insufficient capacity for stormwater.
- Removing of sewages by manpower as shown on the photos above.
- Open drains filled with unstable structure, soil, garbage and gasses due to irregular maintenance.
- Many hotels, guesthouses, restaurants, and private house discharge wastewater into the existing drainage and canal in the city, which is heavily polluted due to lack of maintenance and enforcement by dwellings, which partially block the canal in various places.

Therefore, it is necessary to provide more suitable sewerage and drainage system in the city and urban area not only to ensure safety in health of Cambodians but also attracting international tourists.
Present Status of Sewage Works

Urban Wastewater Management Plan

Existing wastewater treatment plants
Present Status of Sewage Works

Example Wastewater Treatment Plant and Sewerage System in Sihanouk Ville

Wastewater treatment plant was constructed in May 2003 under ADB loan and completed July 2005. The wastewater unit is currently operated under the administration of the Department of Public Works and Transport and financial management is under the Ministry of Public Works and Transport and Ministry of Economy and Finance in the form of semi-autonomous entity.

Sewage collection system: 65.60 km
- 7.348 km of trunk
- 6.125 km of collector sewer lines
- 42.195 km of main lateral
- 10.1 km branch lateral lines for 3,344 service connections.

The system covers an area about 221.5 ha and serves about 30,000 people partly in Sangkat 1,2, and 3 of Phnom Penh city, Phnom Penh Province plus 1,200 m3/day wastewater from brewery (CAMBREW). The System is Separate System.

Sulfide generation about 300 mg/L BODS at 30°C, effective BODS of about 738 mg/L. Slope requirements is 1.25 times the values for and effective BODS of 500 mg/L. All sewer components be protected from sulfide related corrosion.

The sludge is kept to dry on free surface area after that are collected out for agriculture using.
Present Status of Sewage Works

Example Wastewater Treatment Plant and Sewerage System in Siem Reap City

Wastewater treatment plant was constructed in June 2007 under ADB loan and completed December 2009. The wastewater unit is currently operated under the administration of department of public works and transport and financial management is under the Ministry of Public Works and Transport and Ministry of Economy and Finance in the form of semi-autonomous entity.

The treatment plant operated by natural gravity flow. Sanitary and storm sewers come from public go to pumping station, capacity 14,000 m³ per day and to 6 difference pond system which the operation system as mention below:
- two anaerobic pond
- sludge drying bed
- two facultative pond
- two large maturation pond which size is totally 120,000 m². Please see the attached photos.

The treatment capacity is 3000 m³ per day, cover area 265 hectares in areas with high population density. The water quality percentage from treatment plant is about 80 to 80%.
Example Wastewater Treatment Plant and Sewerage System in Siem Reap City by ADB
**Present Status of Sewage Works**

Wastewater Treatment Plant and Sewerage System in Siem Reap City funded by Korean

- **Construction of Siem Reap Sewerage System**
  - **Target Year:** 2020
  - **Service Area:** 1,062 ha (West 988 ha, East 307 ha)
  - **Wastewater Treatment Plant:** 5,224 m³/day out of 10,000 m³/day
    - (8,000 m³/day including ADB project's capacity of 2,776 m³/day)
  - **Relay Pumping Station**
    - West District: Capacity of 13,127 m³/day
    - East District: Capacity of 11,335 m³/day
  - **Sanitary Sewer System:** 11 km
    - West District: D300~D600 mm, L=4.416 m
    - East District: D200~D600 mm, L=5.525 m
  - **Town Center Drain (Storm Drainage):** 4.849 km
    - SD-W: 2 Box 5.0 m x 2.0 m L=3.233 m, SD-E1: Box 5.5 m x 2.0 m L=2.246 m

- **Improvement of Siem Reap River**
  - River Retention Improvement, L=4.0 km (Upstream L=1.0 km, Downstream L=2.4 km)
  - Replacement of Floodgates & Side Channel: 1 set

---

**Present Status of Sewage Works**

Wastewater Treatment Plant and Sewerage System in Siem Reap City funded by Korean

- **Service Area**
  - Existing ADB Area
  - Areas with high population density
  - Water Supply area
  - Areas with a large concentration of hotels and tourism activity

<table>
<thead>
<tr>
<th>District</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>West</td>
<td>361.4</td>
</tr>
<tr>
<td>East</td>
<td>391.4</td>
</tr>
<tr>
<td>South</td>
<td>291.4</td>
</tr>
<tr>
<td>Total</td>
<td>1,062.2</td>
</tr>
</tbody>
</table>
Present Status of Sewage Works

Wastewater Treatment Plant and Sewerage System in Siem Reap City funded by Korean

Project Layout

Present Status of Sewage Works

Wastewater Treatment Plant and Sewerage System in Siem Reap City funded by Korean

Priority for Sanitary Sewer
Large consumers such as hotels, guesthouses and restaurants
Existing ADD service area
Heavily polluted area (through both combined and separated system)

Schedule of Sewer

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>Total</th>
<th>West District</th>
<th>East District</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>51,322</td>
<td>19,381</td>
<td>31,941</td>
</tr>
<tr>
<td>300</td>
<td>20,122</td>
<td>12,163</td>
<td>7,959</td>
</tr>
<tr>
<td>500</td>
<td>9,122</td>
<td>3,982</td>
<td>5,140</td>
</tr>
<tr>
<td>300</td>
<td>2,910</td>
<td>1,592</td>
<td>1,318</td>
</tr>
<tr>
<td>200</td>
<td>1,244</td>
<td>1,244</td>
<td>-</td>
</tr>
<tr>
<td>100</td>
<td>734</td>
<td>734</td>
<td>-</td>
</tr>
<tr>
<td>500</td>
<td>1,410</td>
<td>1,410</td>
<td>-</td>
</tr>
</tbody>
</table>
Present Status of Sewage Works

Wastewater Treatment Plant and Sewerage System in Siem Reap City funded by Korean

- Sanitary Sewer Concept

Existing combined sewer will be used for storm drainage. Interceptor sewer will be used for sanitary sewer, but need to be extended after year 2024 (over Q=20,000m³/d). Stop flaring through interceptor chamber after separated system.

Design Concept

- Combined Sewer System
- Separate Sewer System

- Design Basis

| Storm Date | Enterit (ha) | Enterit Area (ha) | Enterit
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SC-0W1</td>
<td>1.52</td>
<td>0.15</td>
<td>2.12</td>
</tr>
<tr>
<td>SC-0W2</td>
<td>0.62</td>
<td>0.15</td>
<td>0.91</td>
</tr>
<tr>
<td>SC-0W1</td>
<td>0.34</td>
<td>0.15</td>
<td>0.52</td>
</tr>
</tbody>
</table>

- Dimension & Length

<table>
<thead>
<tr>
<th>Storm Date</th>
<th>Width</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC-0W1</td>
<td>12.5m</td>
<td>3.14m</td>
</tr>
<tr>
<td>SC-0W2</td>
<td>12.5m</td>
<td>3.63m</td>
</tr>
<tr>
<td>SC-0W1</td>
<td>12.5m</td>
<td>3.75m</td>
</tr>
</tbody>
</table>

- Materials

Reinforced concrete
Flouro (L=0.366 m)
Present Status of Sewage Works

Wastewater Treatment Plant and Sewerage System in Siem Reap City funded by Korean

**Sanitary Sewer Concept**

Existing combined sewer will be used for storm drainage. Interceptor sewer will be used for sanitary sewer, but need to be extended after year 2024 (over 0=10,000m³/day). Stop flowing through interceptor chamber after separated system.

**Storm Drain Type**

- **TYPE-1**: In case of narrow road and right of way to houses
- **TYPE-2**: In case of narrow road and street
- **TYPE-3**: In case of narrow road and street
- **TYPE-4**: In case of narrow road and street
Present Status of Sewage Works

Wastewater Treatment Plant and Sewerage System in Siem Reap City funded by Korean

Waste Stabilization Ponds
- Treatment is essentially by aerobic methods
- Large surface area, slow flow ponds
- Simple to operate
- Low operating costs compared to other treatment processes

Effluent Standard

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Allowance Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOD</td>
<td>mg/L</td>
<td>≤ 10</td>
</tr>
<tr>
<td>COD</td>
<td>mg/L</td>
<td>≤ 10</td>
</tr>
<tr>
<td>TN</td>
<td>mg/L</td>
<td>≤ 10</td>
</tr>
<tr>
<td>NH3-N</td>
<td>mg/L</td>
<td>≤ 10</td>
</tr>
<tr>
<td>PO4-P</td>
<td>mg/L</td>
<td>≤ 5.0</td>
</tr>
</tbody>
</table>

Sub-Branch on Water Pollution Control

Present Status of Sewage Works

Wastewater Treatment Plant and Sewerage System in Siem Reap City funded by Korean

Collected Wastewater

<table>
<thead>
<tr>
<th>District</th>
<th>Jan 2013</th>
<th>Jan 2015</th>
<th>Jan 2020</th>
<th>Jan 2025</th>
<th>Jan 2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>East</td>
<td>3,562</td>
<td>3,602</td>
<td>3,919</td>
<td>3,112</td>
<td>2,618</td>
</tr>
<tr>
<td>West</td>
<td>5,073</td>
<td>5,156</td>
<td>5,965</td>
<td>12,289</td>
<td>9,398</td>
</tr>
<tr>
<td>Total</td>
<td>8,635</td>
<td>8,758</td>
<td>9,884</td>
<td>15,401</td>
<td>12,016</td>
</tr>
</tbody>
</table>

WWTP Construction Plan by Phase

[Graph showing construction progress by phase with years 2012 to 2020]
Present Status of Sewage Works

Example drainage and sewerage improvement study in Phnom Penh by JICA

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
Study on Drainage and Sewerage Improvement Project in Phnom Penh Metropolitan Area

The objective of the Study are as follows:
1. Study Approach:
   - Necessity of Comprehensive and Rational Master Plan on Sewerage and Drainage Improvement
   - Drainage Improvement considering availability of existing drainage facilities
   - Implementation of Environmental and Social Considerations based on the Concept of Strategic Environment Assessment
2. Methodology of Study:
   - Phase I: Collection and Analysis of Basic Information on Sewerage and Drainage Improvement
   - Phase II: Formulation of Master Plan of Sewerage and Drainage Improvement
   - Phase III: Pre-Feasibility Study on Priority Project

Centralized Treatment System

Advantages
- Easy for management in terms of effluent quality and operation
- Successfully applied in high density population areas in big cities like Phnom Penh

Disadvantages
- Centralized WWTP is only a part of the solution, and certainly not a sustainable solution for development countries like Cambodia
- High cost in terms of maintenance and operation
- High cost of investment
- Large area requirement
Decentralized Treatment System

Advantages
- Less investment cost.
- Effective for communities with sparse populations.
- Suitable for different site conditions.
- Allows more flexible community planning.

Disadvantages
- The selection of technology is first part and very important. At present, there are many options existing for wastewater treatment that can be applied for onsite process such as septic tank, constructed wetland, etc. Each of options has advantages and disadvantages. In order to get the best effect on treatment objective the selection must be carefully carried out by technician. The second part is management and it is a key that keeps decentralized treatment system operating effectively. The management consist of installation, operation, maintenance, monitoring.

Conceptual issues of decentralized water treatment

Will be applied in urban areas to treat wastewater before discharging into the stream or penetrate to the soil.
Policies on opportunities for decentralized wastewater treatment system (DEWATS)

1. Establish standards and regulations facilitating decentralized eco-efficient sanitation solutions.
2. Enabling institutional and management arrangements for DEWATS.
3. Developing local/municipal sanitation planning process, capacities, and instruments.
4. Guiding decision makers in DEWATS system choice, supply chain, design, and construction.
5. Increasing demand through social and economic incentives.
6. Develop system for all communes/Districts/new Urban areas.

Policies on opportunities for decentralized wastewater treatment system (DEWATS)

7. Sustainable of the system
8. Ministry Public Work and Transport will be strengthened and supported Department of Sub-national Infrastructure and Engineering to respond and manage all kind of wastewater before discharge into the streams, River, and Sea, prepare same regulation, national sewage law for local authorities especially provincial department public work for operation, because of now we have no regulation or guideline to protect water sheet for pollution of the people. To prepare this regulation, the management process of wastewater need to be understood.
Conclusion

Sewerage works management in Cambodia is still poor condition due to government budget limited, lack of human resources and sewerage law. Most of Capital and Cities -- which are business, culture, and politic center, are seriously affected by environment pollution especially wastewater. Phnom Penh capital city has no wastewater treatment plant, except for Siem Reap city and Sihanouk Ville have already implanted wastewater treatment plants but have not capability to cover all of the whole cities. At the same time, all the urban areas are also affected by wastewater pollution that needs to be considered and take seriously action such as:

- Encourage to develop the policy of decentralized wastewater treatment system in urban areas.
- Encourage to develop the policy of centralized wastewater treatment system in capital and cities.
- Strengthening the capacity building of Department of provincial public works and transport to perform regularly operation and maintenance to ensure that treat wastewater respond to meet the Effluent Standard.

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Conclusion

- The government encourage to construct and improve the sewerage and flood protection system, priority to some selected areas along Asian Highway Corridor Number 1 (Poipet, Battambang and Bavel), Coastal areas (Sihanouk Ville and Kampot), Provinces located around Tonle Sap Lake (Kampong Chhnang, Pursat, Battambang, Siem Reap and Kampong Thom).
- Extending sewerage networks in household in city and urban area.
- Ministry of Public Works and Transport is finalizing the draft of sewerage law stated below:

Content of Draft framework of Sewerage Law

Chapter 1: General Provisions
Chapter 2: Competent Authority
Chapter 3: Sewer and Drainage Development
Chapter 4: Use and Management
Chapter 5: Technical Regulation "Standard"
Chapter 6: Sewage Transportation and Pump Service
Chapter 7: Fee for Use
Chapter 8: Control and Assessment
Chapter 9: Development and Maintenance Fund
Chapter 10: Penalty
Chapter 11: Miscellaneous
Chapter 12: Final Provisions
Thank You For Your Attention!
Annex 6: Presentation on DEWATS Introduction and Wastewater Management in Cambodia

DEWATS Introduction and Wastewater Management in Cambodia

Presented by: Nuth Makara (Technical Coordinator)
27-28 October 2014

CONTENT:
1. Introduction
2. How to Manage Wastewater?
3. DEWATS Applications
4. DEWATS Constructions in Cambodia
5. ESC-BORDA Cambodia Services
ESC-BORDA CAMBODIA

1. Introduction:

Bremen Overseas Research and Development Association (BORDA)

- Founded in 1977, Bremen, Germany
- Works in 5 regions - SEA, SA, Southern Africa, Sth. America & Afghanistan
- Supported directly by the German Government (BMZ)
- Established in Cambodia in 2006
- Objective - To improve public health, hygiene and living conditions in urban/poor urban low-income areas
- Focus on promotion of Decentralized Wastewater Treatment Systems (DEWATS) for SMEs, public institutions & communities
- Cambodian Partner Organization: Environmental Sanitation Cambodia (ESC) in 2010

ESC-BORDA CAMBODIA

BORDA SEA Network

- DEWATS service packages developed since 1994
- Globally more than 2000 DEWATS implemented
- 1000 of these are in Indonesia since 2003 (SANIMAS)
- Cambodia: 31
- Laos: 31
- Vietnam: 10
- Philippines: 27
2. How To Manage Wastewater?

2.1. Sustainable Tourism & Water
- Effective in-house water management
- Use less water / save money
- Treat wastewater for release to environment / save the environment / protect local communities
- Recycle wastewater where possible
- DEWATS is one viable solution

2.2. Waste Water Management Stakeholders:
- Producer & Discharge wastewater
- Authority
- Treated wastewater
- DEWATS
- Conventional
- Sludge
- Operator, Dump site
- Public Water
2.3. Wastewater Treatment Systems

- **Cost**
  - No treatment/soak pit: Very harmful to environment/community
  - Septic tank (primary): Little/no effect to environment/community
  - DEWATS (primary to tertiary): Little/no effect to environment/community
  - Conventional, centralized treatment (primary to tertiary): Little/no effect to environment/community

- **Technical level / Convenience**
  - Very harmful to environment/community
  - Little/no effect to environment/community

2.4. What is Centralization?

DISPOSAL AFTER TREATMENT TO REQUIRED LEVEL BY PUMPING
2.4. What is Centralization?

Advantages of Centralization
- Just one treatment facility at one place, easy maintenance
- Cost and area required for the treatment infrastructure is less

Disadvantages of Centralization
- Size of sewer pipe and depth of construction is higher, hence expensive
- Maintenance of sewer system becomes difficult due to larger depth
- Pumping may required most of the time as gravity flow is not possible
- Failure of sewer system or treatment infrastructure will effect the entire area
3.2. Decentralized Wastewater Collection and Treatment

DISPOSAL AFTER TREATMENT AT REQUIRED LEVEL
BY GRAVITY

3.3. Design Approach

- Laid at shallow depth
- Minimum pipe gradient
- Not exposed to heavy loads
- Easy operation & maintenance
- Lower Diameter 100 to 200 mm
3.4. What is DEWATS?

- Compliance
- Options for integration into landscape
- Resource & cost efficiency
- Modular design
- Reliability & longevity
- Re-usability of treatment products
- Minimal maintenance

3.5. DEWATS Modules

1. Biogas settler
2. Septic tank / settler
3. Anaerobic baffled reactor
4. Anaerobic filter
5. Planted gravel filter
6. Pond system
3.6. DEWATS Advantages

- Treatment of domestic & industrial organic wastewater
- Deep sewer line construction not required
- Complies to discharge standards specified by governments
- Wastewater can be treated on site, (≠ far distances)
- Electricity not required (for treatment process)
- Reliable and durable, requires minimal maintenance
- Treat wastewater flows from 1 to 1,000m³ per day
- Allows re-use of treated wastewater and its by-products like biogas /sludge
4. DEWATS Constructions in Cambodia

4.1. DEWATS Project for community / town
Bati District, Takeo Province

- Construction Start: September, 2009
- Construction Completed: January, 2010
- Land Area: 160 m²
- Treatment Capacity: 100 m³/day
- Construction Cost: $50,200 (not including wastewater pipeline)
- Users: Up to 250 Households/Businesses
4.2. DEWATS Project for Hospital
Kampong Speu Province

- Construction Start: November, 2010
- Construction Completed: May, 2011
- Land Area: 60 m²
- Treatment Capacity: 40m³/day
- Construction Cost: $26,100 (not including wastewater pipeline)
- Users: Up to 600 users
4.3. DEWATS Project for Animal Husbandry
Kampong Thom Province

- Construction Start: February, 2011
- Construction Completed: February, 2012
- Land Area: 1,062 m²
- Treatment Capacity: 115 m³/day
- Construction Cost: $275,772 (including 426 m wastewater pipeline)
- Users: Up to 20,000 heads
4.4. DEWATS Project for Primary School
Phnom Penh City

- Construction Start: August, 2012
- Construction Completed: December, 2012
- Land Area: 22 m²
- Treatment Capacity: 3 m³/day
- Construction Cost: $6,000 (including wastewater pipeline)
- Users: 300 to 500 students/teachers
### 4.5. DEWATS Projects in Cambodia from 2010-2014

<table>
<thead>
<tr>
<th>No.</th>
<th>Type of Project</th>
<th>Total WW/day</th>
<th>Total of project sites</th>
<th>Total construction cost (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SME: Small and Medium Enterprise</td>
<td>115 m³</td>
<td>1</td>
<td>275,772.00</td>
</tr>
<tr>
<td>2</td>
<td>CBS: Communities Based Sanitation</td>
<td>171 m³</td>
<td>5</td>
<td>139,716.00</td>
</tr>
<tr>
<td>3</td>
<td>SBS: School Based Sanitation</td>
<td>66 m³</td>
<td>27</td>
<td>203,230.00</td>
</tr>
<tr>
<td>4</td>
<td>TOTAL</td>
<td>352 m³</td>
<td>33</td>
<td>618,718.00</td>
</tr>
</tbody>
</table>

Note: The cost depends on local market prices.

### DEWATS Cost per 1m³ of Wastewater production

<table>
<thead>
<tr>
<th>Waste Water Production (m³)</th>
<th>&lt;15</th>
<th>15 - 50</th>
<th>50 - 100</th>
<th>&gt;100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic (US$)</td>
<td>1000 - 1100</td>
<td>800 - 1100</td>
<td>800 - 500</td>
<td>500</td>
</tr>
<tr>
<td>Industrial / Business (US$)</td>
<td>2200 - 2500</td>
<td>1600 - 2200</td>
<td>1000 - 1600</td>
<td>1000</td>
</tr>
</tbody>
</table>

Note: The cost depends on local market prices.
4.6. Pre-Fab DEWATS Option

General DEWATS performance data (domestic wastewater)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Inflow concentration</th>
<th>Outflow concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOD (mg/L)</td>
<td>40 - 50</td>
<td>10 - 20</td>
</tr>
<tr>
<td>COD (mg/L)</td>
<td>70 - 750</td>
<td>10 - 100</td>
</tr>
<tr>
<td>TSS (mg/L)</td>
<td>120 - 160</td>
<td>20 - 35</td>
</tr>
<tr>
<td>pH</td>
<td>7.2 - 7.8</td>
<td>6.8 - 7.2</td>
</tr>
</tbody>
</table>

- Fast production and on demand
- Low investment cost (700$/1m3 ww)
- Not heavy and easy transportation
- Fast installation & low maintenance (1 to 3 days)
- Efficient biological wastewater treatment (3 to 150 m3/day & 500 to 10000mg COD/L)
- Long-lasting and sustainable (15 years)
- Factory for SEA’s partners (Jogjakarta)
5. ESC-BORDA Cambodia Services:

ESC-BORDA Cambodia provides comprehensive DEWATS services:

1. DEWATS Promotion
2. DEWATS Planning
3. DEWATS Design
4. DEWATS Construction Supervision
5. DEWATS Training & Monitoring

Thank you for your attention!

ESC-BORDA Cambodia

Thank you for your attention!
Outline

• Statistics of sanitation in Cambodia
• Costs and benefits
• How can we stimulate demand?
• How can we increase supply?
• A financial framework for the region
Cost to Achieve Sanitation Goals in Cambodia

**MDG Sanitation Target**
- Rural: $710 M
- Urban: $4 M
- TOTAL: $715 million

**Universal Sanitation Access**
- Rural: $1,023 M
- Urban: $196 M
- TOTAL: $1,128 million

Source: WHO and UNICEF (2012) and Hutton (2012)

Numeric labels refer to per cent with or without sanitation services; in parenthesis is the per cent improvement since 1990.

Access to Sanitation in Cambodia

- Urban Areas:
  - Improved: 76% (+40%)
  - Unimproved: 11% (-3%)

- National:
  - Improved: 33% (+24%)
  - Unimproved: 6% (-3%)

Source: WHO and UNICEF (2012) and Hutton (2012)
Financing Sources for Sanitation in Lao PDR, Cambodia and Vietnam

Source: Adapted from the World Bank: Average funding sources of sanitation projects studied 2012

Costs per household

Credits to World Bank, WSP, 2008
The Cost of Poor Sanitation

Loss of $448 million per year: 7.2% of GDP

- Healthcare costs related to poor hygiene: $187 million/year
- Purchase of piped water due to contaminated water sources: $11 million/year
- Value of time used to access shared latrines or open defecation sites: $38.2 million/year
- 9.5 million hygiene-related disease episodes/year (97% diarrheal)
- 10,000 premature deaths/year
- Value of lost tourist income: $73.7 million/year
- Loss of productivity due to health issues: $5.1 million/year


Benefit Cost Ratios in Cambodia - Urban

[Diagram showing benefit-cost ratios for different sanitation systems]
Benefit Cost Ratios in Cambodia - Rural

Benefit Cost Ratio Comparison

Source: ESCAP Discussion Paper, 2013, Development Financing for Tangible Results: A Paradigm Shift to Impact Investing and Outcome Models - The Case of Sanitation in Asia
Benefits of DEWATS

Economic
- Low initial investment & upkeep costs
- Modular design works in many settings
- Allows for incremental growth
- Sustainable revenue source for local contractors

Social
- Improved hygiene and reduced disease
- Opportunity for public-private partnerships
- Communities can invest in local systems directly
- Decentralised systems provide low-cost solutions for schools, hospitals, etc.

Environmental
- Immediate water quality improvement
- Reduces water needs for wastewater transport
- Adaptable to different water quality discharge standards
- Increases wastewater reuse opportunities

Photo credit: BORDA

Sustainable Business Opportunities

Job creation due to private sector
Sustainable Sanitation Services (3S)

Sales & Marketing → Materials → Transportation

Construction → Servicing → Routine Maintenance

Waste Disposal → Resource Recovery

109
How can we stimulate demand?

1. Prioritize schools to change behavior of next generation.

2. Microfinance schemes to increase affordability.

3. Regulations and legal enforcement

4. Reuse Wastewater and Waste as a resource (Example: Biogas Digester)

Viet Nam Domestic Biogas Digesters

- Investment: ~$600
- Operation and Maintenance: ~$20 – 25
- Duration: 20 years
- Require Livestock

- Annual reuse value
  - Fertilizer: $100
  - Biogas: $50

Biogas cannot be sold but can be used for cooking and lighting

How can we increase supply?

1. Expand funding
   • National government
   • Donors, Foundations, Impact Investors, Philanthropists
   • Enabling policies to attract private sector to invest

2. Increase efficiencies
   • Outcome-based Financing (or Output-based Aid)
   • A balanced top-down bottom-up approach
   • Cost Recovery – Price Water Properly

3. Promote Innovations

Sustainable Financing

• Government sources
• Donor Sources
• Cost Recovery
  • Tariffs
  • Green taxes
  • Reuse
• Private Sector (i.e. PPP)
• A growing economy due to better sanitation (see benefit cost ratio)
Outcome-based Financing

- It is also called Results-based Financing or Output-based Aid
- Input-based vs. Outcome-based financing
- A paradigm shift in development aid
  - Current paradigm focus on building infrastructure and service capacity
  - This model gives little attention to factors ensuring sustainability, efficiency and affordability of services
  - The new paradigm focus on outcomes and results

Some Foundations for Cambodia, Lao PDR and Viet Nam

<table>
<thead>
<tr>
<th>Grantmaker</th>
<th>Recipient</th>
<th>Years</th>
<th>Subject</th>
<th>Location</th>
<th>Amount($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gates Foundation, Bill &amp; Melinda</td>
<td>East Meets West Foundation</td>
<td>2012</td>
<td>Basic sanitation</td>
<td>Vietnam, Cambodia</td>
<td>10,900,000</td>
</tr>
<tr>
<td>Gates Foundation, Bill &amp; Melinda</td>
<td>East Meets West Foundation</td>
<td>2012</td>
<td>Basic drinking water supply and sanitation (and hygiene)</td>
<td>Vietnam, Cambodia</td>
<td>10,892,820</td>
</tr>
<tr>
<td>Gates Foundation, Bill &amp; Melinda</td>
<td>International Development Enterprises</td>
<td>2011</td>
<td>WASH research</td>
<td>Cambodia</td>
<td>3,987,717</td>
</tr>
<tr>
<td>Stone Family Foundation, The</td>
<td>IDE Cambodia</td>
<td>2012</td>
<td>Education and training in water supply and sanitation</td>
<td>Cambodia</td>
<td>2,132,433</td>
</tr>
<tr>
<td>Vanguard Charitable Endowment Program</td>
<td>Splash</td>
<td>2011</td>
<td>Basic drinking water supply</td>
<td>Cambodia, China, Ethiopia, ...</td>
<td>1,200,650</td>
</tr>
</tbody>
</table>
Step-By Step Approach to Implement Sustainable Financing Scheme

1. Stimulate demand through promotion campaigns
2. Update regulatory framework to create an enabling environment
3. Ensure enforcement of regulatory framework
4. Commit a budget for waste-water treatment
5. Establish a National Programme with a trust fund
6. Include donors and private sector in the National Programme for a multi-stakeholder approach
The Way Forward

1. Intensive inter-ministerial and inter-sectorial dialogue
2. In-depth market research
3. In-depth joint design of financing strategy
4. Development of a policy with an engagement of a private sector and service oriented economy
5. Development of a business case and its replication

THANK YOU!

For questions please contact larssonc@un.org
ESWRS/EDD/ESCAP
Annex 8: Directions for group discussions

Group Discussions

Cambodia, Phnom Penh
27 October, 2014
National Workshop on Wastewater Treatment Systems and Sanitation Services

• Each of the group will discuss and present:
  – Vision, Priorities on DEWATS & Sustainable Sanitation Services (3S) and short-medium-long term Targets
  – National Strategy and Implementation (policy, drivers, technological solutions, financing)
• Each group present the results of their discussion
Our National Vision:

Our Mission is:

1. Please list the challenges to achieve the vision
2. Please cluster/group them based on institutional, technical, financial
3. How to create demand from people to have access?

4. Please turn the challenges into targets (short-medium and long-term)
5. How to implement?
   – List the drivers (institutions, policy, regulation, service provider?)
   – List the source of funding (govt, donor, private, microfinance, loans, etc) and financing strategy
   – List technologies
Support Questions on Development of the Financial Framework to enable 5P for 3S

1. What legislation/policies is missing in Cambodia to create an enabling environment and 3S?
2. What enforcement measures and policies would increase demand for 3S?
3. Who should ensure enforcement of legislation?
4. How Govt (which agency) should commit a budget for waste-water treatment?
5. What can be done to increase efficiencies of services?
6. What are the components for National Programme with a Trust Fund
7. Please list donors, private sector in the National Programme to reflect a multi-stakeholder approach

THANK YOU FOR YOUR ATTENTION