



# **Mission Report**

## **Promoting Integrated Sustainable Waste Management through Public Private Partnerships (PPP-ISWM)**



**Lilliana Abarca (WASTE), Diana Brandes (UNDP),  
William Hogland (WASTE/Linnæus University)**

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## Acknowledgements

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UNDP Bureau for Development Policy (BDP), Capacity Development Group (CDG), Public-Private Partnership for Service Delivery (PPPSD) Programme, Asia & the Pacific.

UNDP Asia-Pacific Regional Centre (APRC)  
3rd Floor, UN Service Building  
Rajdamnern Nok Avenue  
Bangkok 10900, Thailand.  
Tel.: + 66 (2) 304 9100 ext 2710  
URL: <http://asia-pacific.undp.org/>  
UNDP/PPPSD: [pppsd@undp.org](mailto:pppsd@undp.org)

WASTE advisers on urban environment and development  
Nieuwehaven 201  
2801 CW Gouda  
The Netherlands  
Tel.: + 31 (0)182522625  
URL: <http://waste.nl>  
e-mail: [office@waste.nl](mailto:office@waste.nl)

Linnæus University  
SE-391 82 Kalmar or SE-351 95 Växjö  
Phone +46 772-28 80 00  
Fax +46 480 44 60 32 (Kalmar)  
+46 470 832 17 (Växjö)  
URL: <http://www.lnu.se>  
e-mail: [info@lnu.se](mailto:info@lnu.se)

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## Mission background

The Integrated Sustainable Waste Management (ISWM) and the Public Private Partnerships (PPP) initiative is a 4-year programme jointly implemented in Latin America, Africa and Asia Pacific by the UNDP Public- Private Partnerships for Service Delivery (PPPSD) facility<sup>1</sup> in partnership with the Dutch NGO WASTE, Advisers on Urban Environment and Development of the Netherlands<sup>2</sup>.

PPPSD, WASTE and an international consultant from Linnaeus University/Sweden travelled to Bhutan to meet with UNDP CO and its national partners to assess progress of project implementation.

During the mission the Country Office programme colleagues and Implementing partner were supported to design and submit a proposal on “Pro-Poor Partnerships for Municipal Local Services Delivery in Sustainable Waste Management” and several field visits (e.g. to Mamelakha landfill, Centenary Farmers Market, Composting plant, Pet bottle Facility, Chubacha and Changjiji housing complex, Greener Way, oil-water separator plant, Bajothang Town (eco-line plants for waste water treatment) as well as to Wangdue Municipality (70 km from Thimphu) were conducted. Furthermore, a training was provided by WASTE to the municipal staff on various models of tariff setting while drawing lessons from other countries/cities.

A PPP-ISWM mission report that captures results achieved to date; (sustainability) challenges to be addressed; meeting summaries and recommendations is developed. Also, a 2 page note on the visit that the private sector partner organisation called Greener Way conducted with the Bhutanese Prime Minister to the UN High Level Meeting on “Well Being & Happiness: Defining a New Economic Paradigm” held in New York a few weeks ago was drafted<sup>3</sup>. This note highlights the story of Greener Way, a partner in the PPP-ISWM project, that was established in 2010 at a time when no private sector organization was yet involved in waste management and when nobody really understood how to design and implement PPP arrangements. Today, Greener Way is a respected partner of the Thimphu Thromde and well recognized by the Royal Government of Bhutan.

## Main conclusions and recommendations

Below are the main conclusions and recommendations of the mission:

- The Annual Work Plan doesn't need adjustments. That said, key priorities agreed for Q2/Q3 are activities related to:
  1. Tariff setting design, policy making and implementation;
  2. Expanding of PPP contracting models by designing new contracts and incorporating lessons from current contractual arrangements (e.g. clearer service standards, maintenance responsibilities);
  3. Further institutionalizing of the Municipal Public Private Dialogue with project stakeholders and potential (new) partners as well as with CSOs and citizens;

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<sup>1</sup> See: [www.undp.org/pppsd](http://www.undp.org/pppsd)

<sup>2</sup> [www.waste.nl](http://www.waste.nl) and <http://www.wasteportal.net>

<sup>3</sup> See a short brief: [http://www.snap-undp.org/WeeklyHighlights/Lists/Posts/Post.aspx?ID=20&utm\\_campaign=WeeklyHighlights20120503&utm\\_medium=email&utm\\_source=primary](http://www.snap-undp.org/WeeklyHighlights/Lists/Posts/Post.aspx?ID=20&utm_campaign=WeeklyHighlights20120503&utm_medium=email&utm_source=primary)

4. Expanding current PPPs (e.g between Greener Way and informal sector; partnership for managing composting plant; identifying partners to enter into PPPs to expanding waste collection routes);
  5. Strengthen coordination with Ministry of Works, Municipal representatives and UNDP to facilitate a scaling up process within the Eleventh Five Year Plan (2013-2018) Framework to Mainstream Environment, Climate Change and Poverty, and to develop a concept note feeding into the new UNDAF.
- Current partnerships and achievements made allow to expanding the SWM services delivery of the Thimphu Thromde (TT) and both UNDP and WASTE are well recognized and credited as reliable partners.  
Based on discussions held, TT/CO will follow up with the Ministry of Works and Human Settlement and 7-8 Municipalities to discuss how to operationalize a nationwide scaling up for ISWM.
  - TT management requested UNDP for Capacity Development support to also embed PPP approaches in WASH and energy programming and to enhance managerial and implementation capacities.
  - Since mid-2010 the Municipality increased its human resources (incl. three women at middle management positions) nevertheless there is still too few experienced staff to design and lead programmes that includes PPP approaches. As TT now became a model for other municipalities, TT's municipal staff cannot fulfil the many demands received from other municipalities' ref. designing and implementing (similar) ISWM and PPP LSD programmes.
  - The TT and Environmental division head/staff take pro-active leadership to sharing lessons learned at the National level through frequent media interactions (newspaper, radio, tv) and by directly interacting with the public, youth and schools (amongst others) – communication and outreach budgets are all borne by TT. Although a national wide campaign to enhance citizens awareness on the new waste prevention and management regulations (April, 2012) is ongoing the municipality could explore additional (and more participatory) avenues to engage with citizens/business, for example by explaining why recycling and segregation is important and focussing less on enforcement and fine systems; how and why a tariff setting will be put in place (note: as of now the municipality doesn't charge for its waste collection services but the private sector Greener Way has put a system in place (ranging from NU 150 up to 400).
  - PPP dialogue mechanisms are not fully institutionalized and there are opportunities to increase private sector/NGOs representation for knowledge brokering and sharing of innovative ideas as well as to seeking engagement with potential (new) partners interested in scaling up initiatives beyond ISWM.
  - The role of particularly CSOs in the success of Pro-Poor PPPs in ISWM services delivery is critical and cannot be emphasized enough. Given that the CSO Act has been passed in 2010 the discussions about its possible role in the country's development process seems still at a very early stage, and the likelihood of CSOs' capacity in Bhutan being very low is hampering scaling up of pro-poor and small scale (community) PPPs as observed in both Thimphu and Wangdue.
  - Although competitive salaries are offered, it is very difficult to attract NGO's and local youth/employees to support ISWM efforts including for initiatives that "only" aim to create community-business awareness. This result in high in-efficiencies as the municipality's highly qualified staff is continuously occupied with visits to communities to explain about sustainable waste management and about people's rights and duties.
  - Wangdue municipality faces vast difficulties to implement an ISWM programme funded by the Bhutan Trust Fund for Environmental Conservation (BTFEC). UNDP provided advisory service and will assist, upon receipt of a formal request, to redesigning the AWP for 2012/2013.

The mission also met with potential documentary makers to develop a knowledge product; the Ministry of Works and Human Settlement to discuss about UNDP broader service offerings and mandate with a view towards the upcoming UNDAF process as well as with SNV, the Netherlands Development Organisation, to discuss complementary approaches in local service delivery (energy, WASH and ISWM) to maximize synergies while providing advisory services to similar partners.

## Specific recommendations

Specific recommendations are as following:

Improvement of the **disposal site** because of:

- a) Lack of zoning at the disposal site (all waste HH-commercial-hospital is mixed).
- b) Weak enforcement of safety/health guidelines of staff working at the disposal site.
- c) No leachate treatment though small amount is produced.

Recommendations are:

- a) Defining zoning system at the disposal site; ensure mapping of specific waste flows.
- b) Explore opportunities to capture leachate and wetland construction for leachate treatment.
- c) Compaction system layers when height is 30-40 cm.
- d) Engage with Ministry of Health and the hospitals to 1) improve disposals of sharps/hazardous waste, 2) explore capacity-functioning of incinerator.
- e) Improve compliance with safety measures (e.g. staff wearing masks-gloves).
- f) Removal of cows from disposal site.

Enhancement to the **composting plant**:

- a) Ensure road infrastructure maintaining good access to the site in order to minimise damage of transportation equipment.
- b) Development of composting guidelines advised. In the absence of guidelines, some definition is required of different compost classes
- c) Explore viability for marketing compost; to develop a strategy to collaborate with retailers and to explore collaboration with advisors at the Ministry of Agriculture.
- d) Control on the regular basis the quality of the compost

**Wastewater treatment:**

- a) There are no (quality) criteria in place in Bhutan to discharge waste water: experiences could be shared from Asian countries.
- b) There is no baseline information in place ref. quality of water in TT treatment system. Common physical parameters such as: pH, conductivity, temperature and turbidity and Chemical parameters such as: DO, COD, TOC, hardness, alkalinity, chlorides, Ntot, nitrates, Ptot, phosphates, heavy metals and persistent organics as well as microbiological parameters such as Coliform Count and E.coli could be measured.
- c) The present system is managed by local staff at a low cost but the facilities can be improved (e.g. areas can be used as a biotope for particular birds and a citizen park). Aeration is done on the water; the oxygen level is reduced with depth and anaerobic conditions are reached in the bottom sediment zone. An alternative could be aeration from bottom in one of the lagoons. Such a treatment can be extended with a wetland area as a polishing treatment step that can also be more attractive to birds, animals and also used for citizens recreation activities.

d) Trekking sites/hotels don't have safe waste disposal systems in place and sanitation facilities are limited: TT-UNDP to liaise with Tourism Industry to start up dialogue to address the challenges and to develop guidelines for the private sector.

e) TT requested UNDP specific support to develop a waste water management treatment strategy; support for design and implementation of initiatives that solve problems of septic tanks; to develop a master plan for drainage (particularly during rainy season); to support the implementation of the urban master plan<sup>4</sup>.

Other:

a) Current waste bins are purchased in Thailand and it is possible to produce these in Bhutan (though upgrading of products are needed to allow for the same quality). Domestic entrepreneurship should be encouraged and supported, especially for scaling up purposes.

b) Tariff setting-fee setting: current citizens data is sufficient to outline options for linking service users payments with electricity bill/or a hybrid construction. A strategy will be developed by TT; it is advised to discuss this also with the Ministry of Works and Human Settlement to ensure national synergies.

c) The RGoB announced that nomads are to be settled in the valley. It is also likely that a high concentration of their animals will settle near the rivers; this provides opportunities to collect manure. On the other hand it may cause negative effects such as eutrophication.

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<sup>4</sup> With reference to the Thimphu City Development Strategy, 2008, Ministry of Works and Human Settlement and the Bhutan National Urban Strategy, 2008, Ministry of Works and Human Settlement.

# Annexes

## Annex I: Meeting summaries

### Visit to disposal site visit

The disposal site, opened in 1994, is constructed in a V shape and well fenced. The municipality developed the site with vision of a lifespan of 6 years. The site is situated 12 km away from the city centre and covers 6 acres. 60 MT of waste from approx. 110 000 inhabitants from Thimphu city arrive every day. At the site there are an excavator and a bulldozer. There are eight (8) personnel working on the site: road cleaners (2) and the other 6 move, turn and mix the waste and collect dry recyclable goods. Main observations:

- Four staff were observed walking on sandals while one was busy with Hospital Hazardous Waste bags to collect recyclables goods.
- On Thursdays, Fridays and Saturdays scrap dealers visit the site and auction collected materials.
- Cows were walking and eating randomly from the mixed HH and HCW. The TT personnel present at the disposal site didn't know who the owner(s) of the animals were.
- The disposal site receives mixed waste coming from HH's, the hospital, institutions and commercial sector. HCW arrives in two types of bags red (hazardous) and green (biohazards), but TT officials are uncertain if the sorting of HCW is done in the proper way as no analysis has been done yet. By law, TT bears the responsibility of collecting, transporting and disposing only HH, institutional and commercial waste, but they are managing HCW.
- Except for the HCW, the disposal site receives mainly soft plastics, paper, cardboard, textiles and glass. Small amounts of PET bottles, batteries, tires and some organic are also at the site. and most of the organic (biodegradable) waste from vegetable markets and door to door wet collection are diverted to the composting site.
- At the disposal site, the waste is not placed in working cells, instead, it is moved by the excavator and the bulldozer, covered and compacted when the height of it is 70 cm. Available site soil and construction waste materials are used for this purpose.
- The hard wind present at the site spreads the soft plastics up into the air to 50 m or higher. It was also observed that the production of leachate was small, not treated and running down to the main road through the drainage system.
- TT is planning to construct a sanitary landfill at the same spot but at a higher level. They are receiving support of Japan to conduct soon a feasibility study, environmental impact assessment study, the financial study and the landfill design.

### Visit to composting site

The improvement of waste management of the city of Thimphu includes the production of compost as a mechanism to decrease the amount of waste arriving to the disposal site and to collect dry clean recyclable goods. Key findings:

- A composting plant has been constructed in concrete, with passive and forced aeration and leachate collection and storage. It has a capacity for 30 – 40 MT/day of raw biodegradable materials but it receives only 1.5 MT/per week from the vegetable market as well as from 80 HHs from the Chubachu pilot programme. The reasons for this sub-utilisation of the plant are due to the scale of the pilot and the lack of awareness of the residents to provide the organic waste properly sorted.
- There are 10 workers engage in the composting activity. Two men and two women are sorting the waste at the Sunday Market and from the green bins of the door to door collection. Six are based at the composting site (2 men and 4 women). Up to April 2012 only women were collecting



and sorting the waste at the source of generation but due to the heavy loads of the bins and also to the increasing areas to be served, 2 men were hired to support those tasks.

- The quality of the compost has been analysed once by the Soil Centre of Ministry of Agriculture and the results were: N (4.11%), P (0.58%), Ca (6.68%), Mg (0.32%), K (3.41%), Na (0.18%), Zn (97.60ppm), Fe (110.64ppm), Mg (311.92ppm). The produced compost is transported by TT and sold in 10-12 kg packages at a cost of 110Nu to a Compost Agent (Ms. Tshering Yanki) who sells it in Sunday Market at the “Gardener Shop”.
- Bhutan does not have compost standards & guideline yet. Testing of the quality of compost is not done on regular bases, there is no market strategy for revenue generation and agricultural linkages to increase compost is not sought for yet.
- TT is analysing the possibility to mix composting materials with sludge from the waste water treatment plant. No study has been done yet related to the composition of the sludge and its impact in the composting process. TT has also the idea of giving the composting activity to organised “women’s groups” under a PPP modality, but it is unlikely that will happen in the very near future.

### **Meeting on Master Sewer Plan 2012- 2027**

A proposal for a waste water treatment plan with a vision up to 2027 was presented. It was shared that the treatment system needs to be improved due to: the increase of waste waters due to population growth; population growth up to 2027 (estimated 5%); increase of water consumption due to changes in water use habits and increase of consumption due to increase of commercial and industrial activities.

Some facts presented were as follow:

- The Kingdom of Bhutan is situated in the he Himalaya catchment area which serves 40% of the world population with fresh water. Therefore, there is a responsibility to preserve the quality of the waters that run down stream to other neighboring countries.
- The population projection for 2027 is 160000 inhabitants. The inhabitants connected to the main sewer are projected to be 114000 from Taba, Denchencholing, Hajo, Lungjaphaka. This number would be reduced to 90000 if Motitang is rerouted.
- The water consumption used as a reference point is 90 and 120 L/pee person/day
- The leakage of ground water into the system is assumed to be 20% of the inflow to the treatment plant. That figure might increase during the rainy season. During the wet season a significant amount of storm water and drainage water is produced that goes untreated directly out to the river. The storm water pollution increases with increased activities inside the city (e.g. the number of cars, littering, birds and dogs, roof cover material and others).
- The treatment system used today is a set of lagoons where the sun, wind and gravity play an important role in the treatment.
- The discharge criteria for BOD have been set to 20-30 mg/L. No physical parameters such as: pH, conductivity, temperature and turbidity. Chemical parameters such as: DO, COD, hardness, alkalinity, chlorides, nitrates, phosphates, heavy metals and persistent organics. Microbiology parameters such as: Coliform Count and E.coli.
- A jet aeration system injects air on the surface of the water surface in order to reduce the risk of spreading of aerosols and to give good aeration of the upper part of the wastewater in the lagoon.

The Mayor showed his interest and engagement in water and waste management issues. He has a clear understanding of the problems, and also of issues related to the economic growth of the society and the challenges ahead.

### **Visit to private company (Greenerway)**

Karma Yongten established his company “Greener Way” in 2010. Three years ago there was no private sector involved in waste management/recycling in Bhutan but as around 600 civil society activists, economists, prime ministers, Nobel laureates and bankers, learned from Karma’s story at the UN High Level Meeting on “Well Being & Happiness: Defining a New Economic Paradigm” held in New York in April 2012, Capacity Development interventions aiming to seek multi-level partnerships do result in win-win situations for Municipal governments and their constituents in the delivery of services

Greener Way’s vision is to maintain a clean and green Bhutan by being a part of the solution to the global climate change concerns and effects. As of now, they are involved in collection, segregation and disposal of wastes. Along their pursuit of a clean Bhutan, we are striving to promote the concept of 4 Rs (Refuse, Reduce, Reuse and Recycle). Furthermore, Greener Way engages during national disasters like forest fire and other environmental related cause and activities. Their goal is to help the Royal Government of Bhutan in combating environmental issues faced through Public-Private Partnerships arrangements (<http://www.greenerway.bt>).

With 31 full time staff Greener Way now collects and segregates waste of approx. 5,500 commercial buildings and 370 households. Every day, between 70-80 informal scrap dealers supply recyclables that are now processed in Bhutan instead of in India, generating higher and more regular incomes for the informal sector while saving their travel time and accelerating the local economy. Many didn’t believe that a pet bottle collection/crushing facility could be set up, but within less than a year, 4 million pet bottles (equivalent to 70 tons) are now processed (instead of transporting bottles to India).

Different institutions are requesting Greener Way to engage with the collection of electric and electronic appliances such as computers, printers and printing cartridges, scanners, etc. At this stage, Greener Way doesn’t have sufficient experience and knowledge how to best handle E-wastes. Greener Way itself had submitted a request to the municipality to become a partner in managing the composting chain.

The recently Eleventh Five Year Plan (2013-2018) Framework to Mainstream Environment, Climate Change and Poverty Concerns provides many opportunities for entrepreneurship and partnership development for Greener Way. It needs to be noted that the Greener Way has made vast achievement nevertheless it is imperative; to sustain organisational growth that individual capacities as well as organisational systems and procedures will be strengthened. There are scant (around 3-4) leaders in the organisations who can develop proposal, business plans and negotiate with the government and other parties.

It is advised that within a few months’ **formal PPP arrangements between Greener Way and the informal sector and/or their associations** will be developed and in the future such **contractual conditions should be include in the PPP contracts, rules and regulations of the municipality/RGoB** to ensure that PPPs are truly pro-poor and benefit and protect the informal sector.

Such a new strategy and approach can provide a potential opportunity, for the municipality as well as for Greener Way to align, integrate and concretize with an earlier work done by UN Commission on **Legal Empowerment of the Poor** which also focused on the legal empowerment of informal businesses to make private sector sustainable. The premise is that the transformation from informality to formality is going to be slow and gradual at one end while informality is likely to increase with a huge challenge of reducing Decent Work deficits due to lack of an enabling business environment especially for the working poor. Commercial rights for informal entrepreneurs/operators should be seen as an essential part of a package of rights for the working poor in the informal economy that also includes property rights, labour rights, the right to social protection, and the right to be organized and represented in policymaking and rule-setting institutions and processes.

It is evident that Greener Way cannot address all the challenges of the informal sector as solutions also require reform in policies and institutions that UNDP and TT will need to address at the Ministerial levels too.

Government strategies and national programming in general tends to exclude small and medium enterprises (SMEs) and investments for their Capacity Development. They are however important to the local economy and support, as Greener Way shows, youth entrepreneurship and women in business who constitute a majority of small informal businesses. Hence this vulnerable group that is working hard by creating their own employment and business opportunities should be placed as a central pillar programming strategies for reducing poverty and inequality. Local Governments receive from the national governments block grants and budget for Capacity Development interventions and hence it can be explored how municipal budget can be allocated to ensure it reaches local entrepreneurs directly.

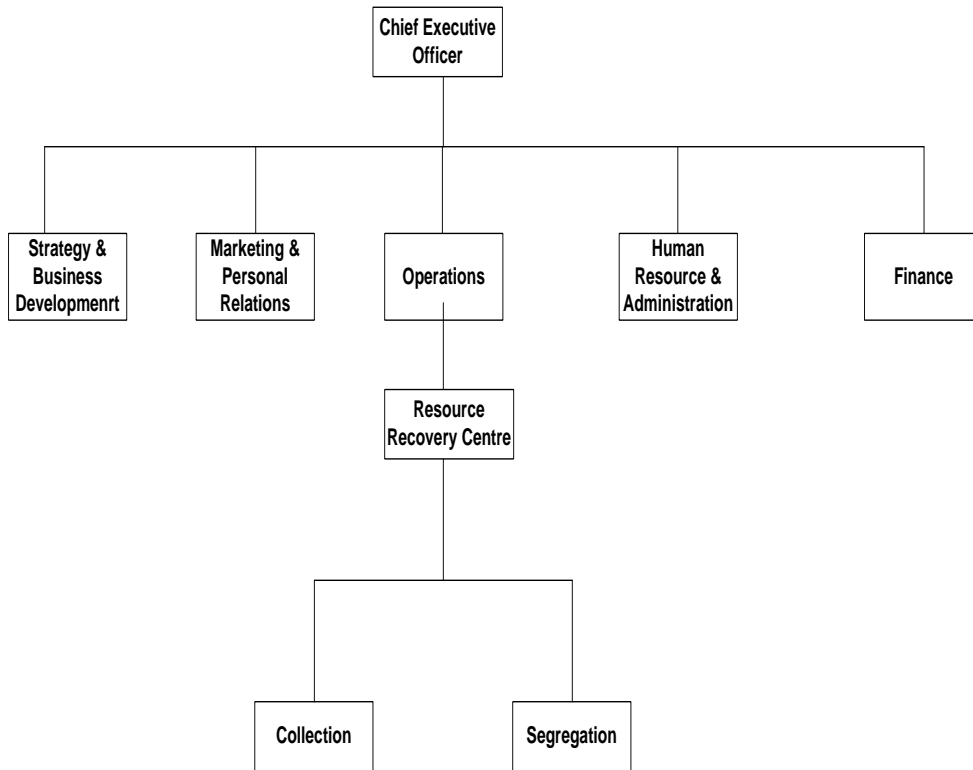
In the coming months as well as **for scaling up purposes** there is a need for more thrust on informal private sector and women (economic) empowerment, as well in youth and marginalized people in order to make the programme more pro-poor. In the same realm the UN resident representative indicated that, together with UNICEF, the UN is keen to assess the status of (informal) children to improve their situation.

One justification which all us are familiar with is that “most of the world’s poor live in the informal economy, occupying land they do not own, working in small, informal businesses, and relying on friends for loans. They often have limited access to broader economic opportunities and are especially vulnerable to the uncertainties, the corruption and even violence prevalent outside the rule of law and have few means to settle disputes apart from bribery or violence. Without legal rights or protections, they are in a continual state of legal and political vulnerability. Informality, therefore, limits the opportunity for economic and social development for individuals, families, businesses, communities, and entire nations. The thrust of an UNDP strategy on informal business should be seen from a Business Lens rather than a social or welfare initiative.

A scaling up strategy should therefore focus on localized pro-poor PPP strategies designed to improve the living conditions of disadvantaged and vulnerable people by providing greater opportunity for self-reliance and sustainable livelihoods with a focus on assets based perspectives which a community already has including social, human, financial, natural and physical assets. The strategy will be to maximize and expand the utilization of existing resources and by building local capacity in support of local development initiatives. The strategy will also ensure sustainable financial resources to support cultural identity and aspirations, foster an enabling environment for the delivery of much needed support services, and develop skills to engage in productive enterprises including green jobs.

It needs to be noted that facts, figures and other references on the informal sector are to be retrieved from the Royal Institute of Nature.

Greener Way's organogram is given below:



The following observations were made when the external consultant visited **Paro – Gunyitsawa – Shana:**

- At all the trekking trails at high altitudes plastics, batteries, glass and other litter were found.
- Campsites for trekkers do not have facilities for the safe disposal of solid waste, human feces and grey waters.
- The GoB is encouraging the nomads to settle in groups in the valley and to start agriculture activities.

#### **Visit to Hotel Druk Taj and Chubachu and Changjiji Housing complex**

The 5-star hotel Druk Taj was visited to observe the storage of the organic waste and to explain the collection system. The hotel receives a daily service but no service charge is paid. They felt that they should not be paying for waste services. Residents met expressed their high satisfaction about TT's work and about the cleanliness of the area. Many expressed their willingness to inform other residents about the positive impact of the project as well as willing to pay for the services if everyone does the same.

It is not clear whether there is a government policy in place to encourage (tourism related) business to comply with practices that can support and improve environmental sustainability such as CSR to truly comply with the RGOB vision on Sustainable Development.

Although the experience from UNDP's involvement with CSR and the Global compact initiative is uneven in different regions in many countries UNDP led the establishment and also facilitated the work of the national and local private sector networks; a national community of focal points and brokers and private sector representatives was developed and grew to accelerate CSR policies and practices.

It is evident that *connecting capacities* will be required because if the project truly wants to contribute to Sustainable Development this will involve connecting strands between disciplinary boundaries, social, economic, environmental and then, across spaces political, cultural and individuals. Connecting across actors too will be important, national governments, scientific and research communities, urban authorities, local governments, private sector and civil society, and various combinations of these. Drilling deeper, within government, connecting capacities will be of paramount importance as sectors need to talk to one another, ministries need to operate with other ministries, line departments need to work with elected officials and so on. In this context the need to have the capacity to work across sectors for both UNDP as well as for its government partners is to provide the leadership for sustainable development that is able to mobilize different stakeholder groups, to institutionalize the stakeholder consultative mechanisms were all key areas for action identified.

It is against above backdrop that it is advised that UNDP will position itself much stronger to ensure Partnerships platforms for Sustainable Development. After all PPPS are not ends in themselves; they are parts of a chain leading to development of sustained capacity to deliver **in and across sectors** or in **thematic** programmes, at local, national or international level. In the longer term perspective their success build on the engagement and strengthening of those organizations and actors in education, training, consultancy and research who have all to play a crucial role for Sustainable Development. This systemic, long term perspective ensures focus not only on strengthening the transformational capacity of today, and in one project, but incorporates actions that seek to endow a capacity to continue to adapt, grow and innovate for tomorrows challenges.

### **Visit to Wangdue Municipality**

Upon request from the Chief Government Officer from the Ministry of Works and Settlement a visit was conducted visit to Wangdue, 70 km away from Thimphu, with the objective to share ideas about the results of the programme in Thimphu and to discuss challenged faces in Wangue. Key findings:

- The 3 year project started in 2011 with a budget of 8 million Nu from Bhutan Trust Fund. The town is new, still under construction and with around 5063 inhabitants. Most of the people derive their livelihoods from the business sector.
- The project includes, amongst other activities, baseline development, collection routes design, compost production, procurement of heavy equipment and materials, plastic collection and shredding, capacity development and awareness campaigns. A baseline on household clusters is developed.
- The project is behind schedule due to an over burden of project activities at the municipal level and lack of qualified personnel.
- The Municipality wanted to purchase a contractor truck from Japan but the Ministry didn't agree. TT advised also that buying such a sophisticated truck is not handy/feasible as it will never be used optimally (costs are around 5 million NU).
- There are no activities included in the AWP that allow for PPPs, engagements with citizens in the delivery of services.
- The Pro Doc and AWP do not include specific service delivery targets, outcomes and there is no strategy in place for the longer term how to manage waste management.
- A Capacity Development response strategy could be developed on the bases of clear results to be achieved – it was proposed that UNDP could assist, upon formal request, to revise the AWP.

- 350 bins are provided to residents for the separation of dry and wet waste (175 each). Their cost is shared 50:50 between the municipality and the residents. Bins are, like TT, bought from Thailand. Collection is done with 3 vehicles on a daily basis due to the warm and humid weather conditions. This waste is taken to a disposal site situated 7 km away from the city center.
- There is a tariff setting in place based on a World Bank study and hence a tariff of 50 Nu/month for waste management is collected per household. There is 100% recovery due to an enforcement system through water cuts in case of no payment. Residents have shown their interest to pay up to 100 Nu/month and it was recommended to analyze the costs/recovery at the end of this first year and adjust the fees if necessary.
- Lessons learned and ideas about composting, development of a marketing strategy, size of the plant, quality of the compost etc.

### **Bajothang Town: visit to Eco-line Plant**

The Eco-line plant for waste water treatment is manufactured by a Danish firm and sold in Bhutan by a local dealer. There are 5 plants in Bhutan of similar type. The plant cost was 22.4 million Nu and it is designed for 6 000 people receiving today approximately 500 m<sup>3</sup>/day. The plant consists of a coarse screening unit at the inlet where coarse material and some sand is separated. There is also a smaller tank where the waste water is lead to and stored during maintenance of the plant. From the screening process the water goes to a buffer zone tank that controls the flow into the Eco-line unit. This buffer zone consists of three compartments for sedimentation. In the second one the waste water is pumped to the equalization compartment before it is lead to Eco-line. The Eco-line consists of two parallel lines with diffuser aeration and a fine sludge filter. This biological unit is located in a plastic vessel with an air diffuser and the filter. The filter has a very large surface on which the microorganisms grow. The diffuser supplies air to maintain an aerobic environment for the micro-organisms to metabolise the contaminants. The separated sludge goes back to the buffer zone tank and the treated waste water is discharged into the river. The biggest challenge for TT is the lack of staff capacities. It was informed that they have values for the quality of the water: a polishing step in the form of a wetland could be constructed at outlet on the land area before the water is discharged to the river which would improve the water quality. Examples of wetlands that could be used as an example will be shared.

### **Meeting held at TT**

The objectives of several meetings held were to analyse the results of the solid waste collection system and to determine the achievements of source separation.

The current collection system includes truck drivers, vehicles and it has defined collection areas. The distances and the areas for waste collection have been measured utilizing GPS system and a route map divided into 16 zones is developed. An analysis was recently conducted to explore new routes.

According to TT staff interviewed, the waste management system in place is reducing the waste going to the disposal site. They acknowledged it as a positive result in relation to the protection of the environment. The results of the pilots have been good so far. High quantities of biodegradable waste, paper, plastic, cardboard, aluminium cans and textiles have been recuperated from the HHs in the pilot area. Also the commercial sector has contributed to a great amount of waste that has been diverted from the disposal site and processed either as compost or materials for recycling. The total amount of recuperated dry waste up to 27-04-12 is 715 – 825 MT and of wet waste is 701 MT. These amounts do not include the dry waste that has been brought to the private sector Greener Way. The amount of wet waste varies in the winter time from 5 MT to 3MT due to losses of vegetables because of the low temperatures.

Service users also recognised that the system in place is very beneficial for them since they do not have to wait for the truck to come and wait for the collection of waste. This situation has increased the cleanliness of the city because now the HHs do not dispose the waste in illegal places. The collectors also expressed

their satisfaction since they do not have to wait for the people to come and bring their waste. During this pilot, several challenges were found by the waste collectors. One is the presence of dogs and the risks to be bitten. Another one and considered as the most important is the weight of the loaded bins, specially the biodegradable ones. In some cases the road is in bad shape for which the collectors have to walk with the heavy bins further distances. The solution they provide is to increase the collection frequency which reduces the amount of waste disposed in the bins. This should be taken into account when defining the tariff system.

Dry wet collection represents an extra income to waste collectors since they can sell the recyclables to scrap dealers. This is also the reason why they do not want to collect wet waste since it is not profitable for them. For scaling up more equipment and more personnel is needed and this may pose some challenges.

Furthermore the below contextual information was provided:

**Test separation in a pilot project:** the waste was sorted in wet and dry fraction as planned in the project. TT staff went door to door to provide information to the pilot area residents and the commercial sector about the new system. In the case of the HHs, they gathered most of the landowners and together with the mayor discussed the new system. The second step was to distribute the bins and discussed with the HHs the waste segregation process. It was found that most of the landowners do not live in the compounds where the pilot was taking place, and often live abroad. The project aims to sharing the costs of bins with the landowners; cost recovery was between 80-90 %. One advantage of the new system observed by the residents is that they do not have to wait for the truck to come and fetch the waste. The sorting or segregation of the waste was closely looked upon; in the beginning there was no monitoring.

**Two type of bins exist;** one is white/grey (350L) for dry waste and green (80L) for wet waste and each have a sticker with a picture about how to sort. Hard density poly-ethylene is used for the bins which are imported from Bangkok. Both bins cost 5500 Nu, including import expenses. TT provides two bins to the landowners at a rate of 2700 Nu. The objective cost sharing was to create ownership and responsibility for the bins.

*To note: There is a factory, in Phuentsholing which produces PVC pipes and also manufactures bins for TT. However this is not a plastic recycling company. TT likes to support to **having a plastic recycling company** in Thimphu which manufactures low grade recycled products such as plastic board etc. but at this stage there are **no entrepreneurs and no resources** to take up such initiatives.*

### **On Composting:**

Two trucks go along the route one for dry waste (3 times a week) and one for green bins (small truck goes two times a week). Dry waste goes to the landfill (Memerakha) where they don't control weight or volume. The green truck goes to the composting plant (Serbithang). At this stage, 80-90 % of the wet waste is sorted correctly. At the composting plant personnel sort out plastics and other impurities with the objective to improve compost quality. Moisture in the waste at collection site is 60-70% and at arrival after tipping and spreading on the ground is about 50%. After 2 months the compost is ready and put into the bags. It is sold in the vegetable market at a price of 110 Nu (weight 10-15 kg). The interest for gardening is increasing in the city, but tomato and chili seeds are in soil and gives problem. Challenge is how to get rid of these seeds. Compost soil could be divided in quality classes if good separation of the organic waste takes place. The qualities could be: a) compost from waste from the market, first quality b) compost from mixed household waste, second class c) compost from household waste mixed with sewage sludge, class three d) compost from oil polluted soil composted together with woodchips, class four.

**Upscaling:** Initially the project set up a pilot in the district Chubachu (80 buildings and few commercial shops). It was chosen as a learning process phase. They wanted to analyze residents'. The second phase was to pilot at the lower market (east from the main road composed of: vegetable market, grocery shops, furniture, and household equipment). The findings of these two phases were:

1. Difficulties to train participants to sort the waste in a right way. It took 3-4 months to achieve good results and
2. In the low market segregation was found even more difficult due to the presence of different types waste from commercials, residential and offices.

**Upscaling requirements and lessons learnt:** Face to face discussions with citizens remain important as well as media to ensure outreach through TV and newspapers etc. A communication strategy should include information about the convenience of the new system both at the practical level as well, when applicable linked to government policies on Sustainable Human Development.

**Routes design:** Roads must be kept accessible allowing the trucks to enter the sites and coverage requires expanding. There is a pressure from "richer" people to have the route close to them (but TT will have to ensure to provide equal services to poorer, remoter areas).



**Annex II. Total amounts of dry and wet waste recuperated from commercial sector, vegetable market and pilot HH areas in Thimphu Municipality**

Location	Started date separated collection	Number of weeks up to 27-04-12	Quantity dry waste (MT/week)	Total dry waste up to 27-04-12 (MT)	Quantity wet waste (MT/week)	Quantity wet waste up to 27-04-12 (MT)
Commercial	1st April 2011	55	10 – 12	550 – 660	4	220
Vegetable market (Winter time)	4th Oct 2010	32	0	0	3	96
Vegetable market (Winter time)	4th Oct 2010	44	0	0	5	220
HH (door to door collection)	1st April 2011	55	3	165	3	165
TOTAL			715 – 825			701

## **Annex III: People and Organizations consulted during mission Thimphu**

### **Municipal Staff:**

Pema Dorji  
Tashi Tshering  
Kunzang Choden Tshering, Revenue Section  
Tshering Yangchen, Environment Division  
Tek Nath Kararia, Environment Division  
Hastabahadur Sangpang, AFD  
Sonam Tashi, PSO Environment Division  
Kiley Dorji, Thimphu Thromde, Mayor  
Minjur Dorji, Thimphu Thromde, Executive Secretary  
Tamiki Nakashima, Thimphu Thromde  
Monu Jyothi Tamang, Compost plant

Kunzang Choden, Tshering Yangchen, Tashi Tshering, Monu Jyothi Tamang and Sonam Tashi participated in a short course on Tariff Setting.

Pema Dorji, William Hogland, Kinlay Dorjee, Tamiki Nakashima, Minjur Dorji, Shacha Dorji, Pema Khantu and Nathan Chase attended the meeting on master sewer plan.

### **Greener way:**

Karma Yonten; Kuenga Om; Dorji Wangchuk  
Informal sector and supplier to GreenerWay: Mr. Ratna Bahadur

### **Ministry of Works and Human Settlement**

Dawa Zam, Chief Government Officer; Lobzang Dorji; Ghana Shyam

### **Wangue Municipality**

Dawa Zam, Chief Government Officer from the Ministry of Works and Settlement  
Lobzang Dorji, Senior Environment Officer

### **Bajothang Town - vist to Eco-line Plant**

Ghana Shyam, City Engineer