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# Bylaw to facilitate the land acquisition and encourage the private sector participation in Fecal Sludge Management (FSM) in Mahalaxmi Municipality - Nepal

## Summary of proposed intervention

September 17, 2021

## 1. Context and Rationale:

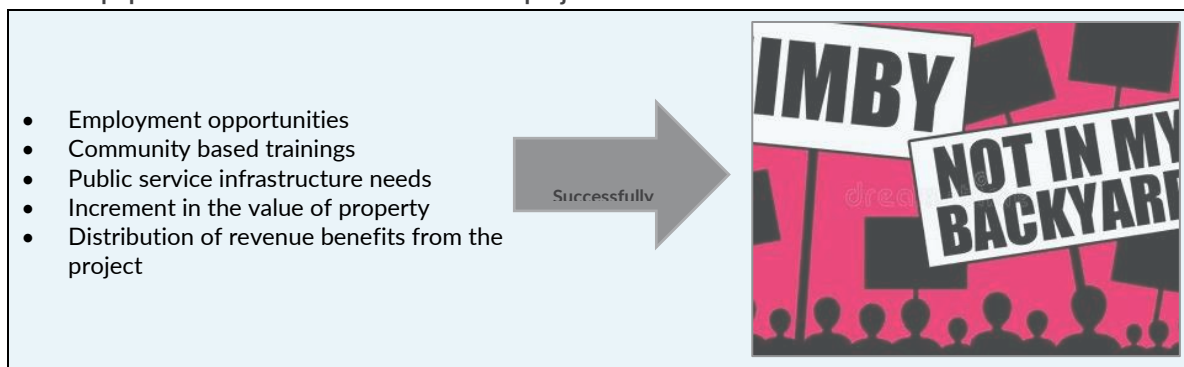
The attainment of land has always been one of the major challenges and a determining factor in waste management and sanitation sector. As such, waste and sanitation projects are often affected by the Not-in-My-Backyard syndrome where community opposition towards the development project in their neighborhood.

A similar incident was observed in Mahalaxmi Municipality (MM). The establishment of a fecal sludge treatment plant, which has all the needed studies finalized and financing is available is at standstill due to the strong objection of the community to provide the land. A solution in the form of by-laws was developed for Mahalaxmi that can be adapted and used more generally in Nepal.

## 2. Proposed Policy Intervention: bylaw

The introduction of bylaws by the municipality, guarantying the socio-economic benefits to the residents of the Mahalaxmi, can help to address the problem of availability of land for waste and sanitation management business. Residents include temporary and permanent citizens of the municipality.<sup>1</sup> Following a review of case studies that addressed similar challenges, some proposals were discussed in consultations with the local and federal government, key stakeholders active in waste management and community representations. Box 1 below presents some significant benefits for populations from similar service infrastructure projects.

Box 1: Benefits to populations from service infrastructure projects



The main objective of the proposed bylaw in Mahalaxmi is to ease the availability of land for private entrepreneurs willing to establish a waste and sanitation management business, which can include those related to fecal sludge management. This bylaw will guarantee several socio-economic benefits including employment opportunities and subsidized sales of by-products. For Mahalaxmi the two potential by-products were determined to be biogas and fertilizers. The savings from the consumption of biogas, increment in profit due to use of organic fertilizer, health cost benefit, etc. to the local residents (see section 3).

## 3. Summary of cost benefit assessment:

The Cost Benefit Assessment was conducted to evaluate all the costs involved and possible profits to the municipality populations assumed to be 62,000 inhabitants and 17,681 households. Benefit to MM includes collection of tax to the MM, increase in income due to employment generation, increase in profit to the farmers, and increase in savings of the consumer. It is to be noted that, the case of tomato cultivation is taken for the calculation. Broadly such economic benefits have been divided into 2 categories – direct benefit to the MM and direct benefit to community and indirect to MM (table 1 and 2 of the report). Likewise, disbursement of the subsidy amount has been identified as a major cost the MM. Such subsidies will be disbursed through the key provisions of bylaws as presented in section below.

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<sup>1</sup> Permanent residents will need to show the citizenship card whereas temporary needs to get identification approval from the municipality.

The following are the key potential provisions of the bylaw and the basis for the cost benefit assessment carried out for the government (see table 1) and the municipality (table 2):

- Subsidy of by-products from the treatment system including bottled biogas and fertilizer.
- 100% waiver on land tax to the households of wards agreeing to provide land for the operation of waste management business.
- 50% waiver on waste collection fee to the households of wards agreeing to provide land for the operation of waste management business.
- Creation of green jobs in the waste/sanitation treatment plants.

Table 1: Calculation of the key economic benefits and the cost to the government with the interventions

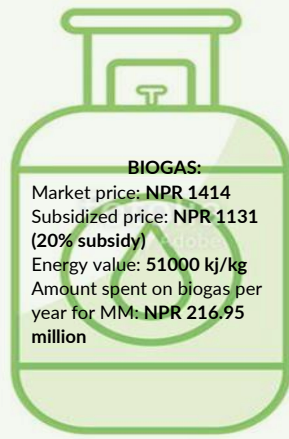
<b>Benefits to the Government</b>		<b>Cost to the local government</b>	
Direct economic benefit to the local government in this case is just the revenue from the annual renewal and registration fee of the business. However, there are other indirect benefits to MM as discussed in table 2.		Cost to the government involves disbursement of the subsidy amount	
Annual renewal and registration fee of the waste management business	<b>NPR 1,500</b>	Subsidy on fertilizer to all the residents of MM	<b>NPR 29 million</b>
		Subsidy on biogas to all the residents of MM	<b>NPR 54 million</b>
		50% waiver on waste collection fee to the households of wards allowing the construction of WMB	<b>NPR 0.72 million</b>
		100% waiver on land tax to the households of wards allowing the construction of WMB	<b>NPR 3.2 million</b>
<b>Total benefit to the government</b>	<b>NPR 1,500</b>	<b>Total cost to the government</b>	<b>NPR 88 million</b>

Table 2 : Summary of the benefits to the populations in the municipality

Total increment in income due to employment creation (It is to be noted that this is conservative estimation)	NPR 200,000
Savings to the consumer from low cost of fuel (due to subsidy) and high energy content of biogas compared to LPG	NPR 80.09 million
Increment in profit of the farmers with the use of subsidized fertilizer and increment in productivity	NPR 100.07 million
<b>Total benefit</b>	<b>NPR 180.36 million</b>

Box 3: Scenario assessment of usage of subsidized biogas and subsidized fertilizer from sanitation

**Scenario on usage of subsidized biogas instead of LPG**



Total energy consumption for Mahalaxmi: **138 e9 KJ** (based on 100% households using LPG)

Based on the information provided on LPG and energy consumption of Mahalaxmi municipality, with the use of biogas )NPR 80 million is saved.

*(It is to be noted that at present domestic usage of biogas is not yet used to containment technology limitations, however it is likely to change in the near future; also projections for future industrial useage carry a high amount of uncertainty and so are excluded in this assessment)*

**Scenario on usage of subsidized fertilizer from sanitation instead of chemical fertilizer (Tomato production, Mahalaxmi Municipality's key production taken as basis for benefits)**

**Current scenario (without subsidy on fertilizer)**



- Average price of tomato is **NPR 20/kg**
- Average cost of production of tomato is **NPR 15/kg**
- Total tomato production of Mahalaxmi Municipality is **9,375,000 kg/year**  
(This is as per the farmers current practice: They mix both chemical and organic conpost (made of coudung) at a ratio of 3:1)

**Prospective scenario (all organic fertilizer from sanitation by-product)**



- Consumer willingness to pay for organic tomato is **0. 25% more**
- Price of organic tomato **NPR 25/kg**
- New average cost of production with the use of subsidized organic fertilizer **NPR 14.55/kg**
- Increment in productivity after the use of quality organic fertilizer **0.5%**
- Tomato production of Mahalaxmi Municipality with use of organic fertilizer is **14,062,500 kg/year**

Assumption here is the swtich to organic farming with the compost (For this organic farming promotion program is also required through MOALD)

With the shift to organic fertilizer the productivity of tomato in MM is increased from **75 tons /hector/year** to **112 tons /hector/year** (With the use of faecal sludge based fertilizer this could be achieved in most economical manner for farmers of Mahalaxmi)

Increment in income for the farmers by switching to subsidized organic fertilizer made of faecal sludge is estimated to be **NPR 100.07 million**

- I. Environment and health benefits from the enhanced faecal sludge management assessed in terms of economic value is calculated and the summary is presented in table 3. The basis for this calculation is there are three kinds of health-related benefits resulting from the fecal sludge management – reduction in diarrheal cases, days lost from work avoided, and savings due to reduction in emission of different types of harmful chemicals. In the case of diarrheal incidences studies indicate that diarrheal cases can be reduced by 60% with the proper management of sanitation<sup>2</sup>. Likewise, as the diarrheal patients need to spend NPR 569 per episode to cure the diarrhea, this is a considerable burden for some households<sup>3</sup>. Furthermore, good health will reduce absenteeism. As estimated by WHO, a diarrheal patient will need to take 2 days of leave each time<sup>4</sup>. Finally, the treatment of fecal sludge will reduce the emission of harmful gases like carbon dioxide, methane, carbon monoxide, nitric oxide, sulfur dioxide, hydrocarbon, hydrogen chloride, hydrogen sulfide, and hydrogen fluoride. The release of such gases has its own cost to human health. As per the calculation the cost to human health of per tons of dry sludge is NPR 1000.<sup>5</sup>

Table 3: Environment and health benefits

Benefits	
Savings from reduction in diarrheal cases	NPR 221,910
Income gained due to days lost in work avoided	NPR 572,000
Savings from reduction in emission of chemical gases	NPR 274,480
<b>Total environment and health benefit</b>	<b>NPR 1.06 million</b>

- I. Based on the above assessment, the cost to benefit has been calculated to be 2.06. The summary is presented in Table 4 below.

Table 4: Computation cost to benefit ratio

Total cost to the government	NPR 88 million
Total benefit to the government	NPR 181 million (Economic plus Environment and Health)
<b>Benefit to cost ration 2.06</b>	

- II. Another key benefit which could be quantified based on specific project is allocation of additional development budget to the ward which houses such sanitation/waste treatment plants

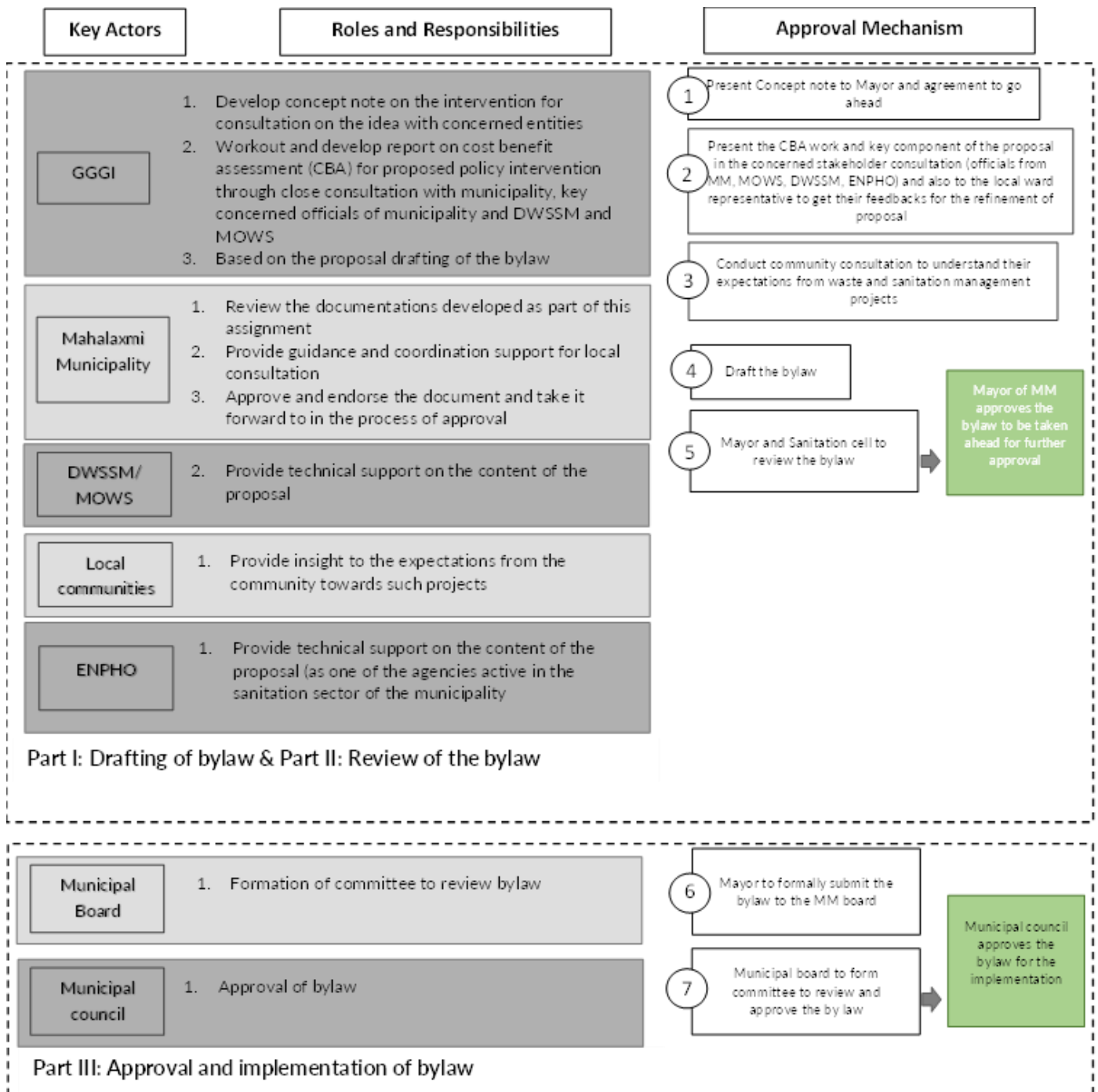
<sup>2</sup> National Library of Medicine. (2010, 08 10). Pubmed. Retrieved from Pubmed.gov: <https://pubmed.ncbi.nlm.nih.gov/20620115/>

<sup>3</sup> Marina Vaidya Shrestha, S. R. (2019). Household Expenditure on Diarrhea Treatment among Under Five Children in Godawari Municipality of Nepal. *JNHRC*.  
[https://www.jnhrc.com.np/index.php/jnhrc/article/view/2181#:~:text=The%20average%20out%2Dof%2Dpocket,NRs%20114.15%20\(US%20%241.01\)w](https://www.jnhrc.com.np/index.php/jnhrc/article/view/2181#:~:text=The%20average%20out%2Dof%2Dpocket,NRs%20114.15%20(US%20%241.01)w)

<sup>4</sup> WHO. (2004). *Evaluation of the Costs and Benefits of Water and Sanitation Improvements at the Global Level*. WHO.  
[https://www.who.int/water\\_sanitation\\_health/publications/wash-improvements-costs-benefits/en/](https://www.who.int/water_sanitation_health/publications/wash-improvements-costs-benefits/en/)

<sup>5</sup> RPA, Milieu Ltd and WRc for the European Commission. (2008). *Environmental, economic and social impacts of the use of sewage sludge on land*. [https://ec.europa.eu/environment/archives/waste/sludge/pdf/part\\_ii\\_report.pdf](https://ec.europa.eu/environment/archives/waste/sludge/pdf/part_ii_report.pdf).

## 4. Implementation plan Summary



## 5. Status of the intervention

We have already completed part I as described in the implementation plan above. At present we are at a final stage of part II. We have already developed the draft bylaw, which as been submitted for review to the municipality.

For the effective drafting and implementation of bylaws, GGGI has supported the municipality of Mahalaxmi by providing three major documents as indicated below:

- Proposal report:
  - The proposal report prepared as a supporting document to the municipality exploring the topic of potential socio-economic benefits of the bylaws.
- CBA excel sheet:
  - The excel sheet used for the calculation of CBA. It allowed the respective officials to understand and validate the process of quantitative calculations as defined in the proposal report.
- Implementation plan:
  - The plan lays out the detailed process that a proposed bylaw needs to go through before its implementation.

The remaining elements are the finalized bylaw and community consultation guidelines:

- Community consultation guidelines:
  - The community consultation guideline provides the tentative framework on community consultation strategy including the structure and nature of questions, structure of consultations like focus group discussion or key informant interviews and key relevant stakeholders.
- Bylaws.
  - GGGI will submit the draft version of bylaws to the Mayor of Mahalaxmi and his team. The draft will be revised following feedback.

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