National Policy Workshop Webinar Series
On
Countermeasures for Riverine and Marine Plastic Litter in India
12 - 22 May 2020
Session 4: Assessment of plastic pollution impact on natural capital and riverine and marine ecosystems needing policy intervention

Policy Instruments for mitigating plastic pollution
Introduction

- Plastic consumption is 18.45 MMT in 2018-19 vis-à-vis 0.9 MMT in 1990; 43% is used in packaging
- Annual per capita consumption is about 13 Kg in India vis-à-vis 108 Kg in US and global average of 30 Kg in 2018-19
- India generates about 9.4 million tons plastic waste in 2017 (CPCB); 94% thermoplastic and remaining thermoset.
- Plastic contributes about 8% of total solid waste (CPCB)
- Collection efficiency of plastic waste is about 80.3%, out of which 28.4% was treated in 2014 (CPCB)
- The seas near Mumbai, Kerala and A&N Islands are among the worst polluted in the world; land based sources are the major cause of marine plastic pollution (MPP)
- Need is to design policies that help in managing plastic pollution/MPP by discourage consumption at source and encouraging waste treatment
Plastic waste management rules 2016

- A complete ban on plastic below 50 micron
- Phasing out use of multi-layer packaging and
- Introduced extended producer responsibility (EPR) for producers, importers and brand owners
- These rules were amended in 2018

India follows broadly a Command and Control (CAC) mechanism to manage the plastic waste
IMPACT PATHWAY OF MARINE PLASTIC POLLUTION

Pre-production and manufacturing of plastic pellets
Stakeholders: plastic resin pellets suppliers, plastic associations

Consumption land-based sources
Stakeholders: industry, households, institutions (e.g. schools, hospitals, prisons), government

Consumption marine-based sources
Stakeholders: recreational and commercial fishing industry, aquacultures, offshore oil and gas exploration

Catastrophes
Natural/man-made events

Lost resin pellets
Stakeholders: plastic resin pellets suppliers and plastic processors

Waste beneficiation
e.g. Recycling
Leakages during collection and transportation

Legal disposal
Landfills
Leakages from the landfills/dumpsites

Wastewater/sewage overflow
Water treatment plant

Illegal dumping

Illegal disposal

Illegal dumping

Littering

Source: Alpizar et al. (2020)
Policy goals

Setting policy goals to reduce marine plastic pollution based on the impact pathway

Pollution from pellets in the plastic industry
- Has no regulation to restrict plastic pollution from the industry
- Predominantly has micro-enterprise manufacturing plastic products.
- A positive balance of trade for plastic.

Policy goal
- A reduction in the number of micro pellets lost in transport and production.
- Technological improvements to better match expected use with end-of-life uses and re-uses and/or decomposition.

High consumption of plastics
- Consumption rate >0.2 kilograms ppd

Policy goal
- Foster sustainable consumption patterns, starting by reducing single-use plastics

Low levels of legal disposal
- Water legally disposed but not being treated % of treated wastewater nationwide
- Waste legally disposed but leakages from landfills and dumpsites % of total waste collected through legal disposal mechanism
- Not enough waste beneficiation % of total waste that is recycled

Policy goal
- To build water treatment facilities that increase plastic recovery

Illegal disposal of plastics
- >20% of plastic inadequately managed

Policy goal
- Improve landfill technology
- Improve collection infrastructure
- Increased demand from plastic industry
- Promote recycling and waste beneficiation more broadly

Policy goal
- To move toward legal disposal of plastics

Source: Alpizar et al. (2020)
## Policy Options

<table>
<thead>
<tr>
<th>Targeting the plastic industry</th>
<th>Price-based instruments</th>
<th>Rights-based instruments</th>
<th>Regulation instruments</th>
<th>Behavioral instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>- A tax based on environmental performance of the plastic products.</td>
<td>- Extended producer responsibility (EPR).</td>
<td>- Standards for pellets spills from the industry.</td>
<td>- Information provision.</td>
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<td>- Subsidies for research and innovation.</td>
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<td>- Nudging such as setting defaults to “no plastics”.</td>
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<td></td>
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<td>- Use of social comparisons.</td>
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<table>
<thead>
<tr>
<th>Targeting consumption of plastic by households and firms</th>
<th>Price-based instruments</th>
<th>Rights-based instruments</th>
<th>Regulation instruments</th>
<th>Behavioral instruments</th>
</tr>
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<tr>
<td>- Deposit-refund schemes for plastic bottles.</td>
<td></td>
<td>- Mandatory recycling.</td>
<td>- Nudging such as setting defaults to “no plastics”.</td>
<td></td>
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<td>- Waste charge.</td>
<td></td>
<td></td>
<td>- Use of social comparisons.</td>
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<td></td>
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<td></td>
<td>- Explicit use of social norms.</td>
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<table>
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<th>Targeting disposal of plastics</th>
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<th>Behavioral instruments</th>
</tr>
</thead>
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<tr>
<td>- Subsidizing appropriate behavior.</td>
<td>- “Pay-as-you-throw” (PAYT) systems.</td>
<td>- Mandatory recycling laws.</td>
<td>- Information appealing to social and personal norms, pro-social behavior.</td>
<td></td>
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<tr>
<td></td>
<td>- Provision of waste collection that promotes separation of waste for recycling.</td>
<td></td>
<td>- Door-to-door information provision.</td>
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<td></td>
<td></td>
<td></td>
<td>- Face-to-face information facilitating the adoption of recycling.</td>
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</tr>
</tbody>
</table>

Source: Alpizar et al. (2020)
Reducing use of plastic bags: a case study
• Gupta and Somanathan (2011) analyze the effectiveness of ban on the use of plastic bags in Delhi vis-à-vis a combination of three policy instruments: (i) information provision, (ii) a cash-back scheme, and (iii) provision of substitutes for plastic bags.

• The study highlights the issues of monitoring and enforcement in context of regulation.

• The study applies an experimental approach in an actual market to test instruments that can control an environmental externality.

• The sampling frame of the study is a retail consumer market in Delhi and NCR (4 neighborhoods in Delhi and 1 in Ghaziabad).
The experimental design

**Baseline**
- Two weeks
- Visited each area once a week

**Information treatment**
- Three weeks
- Campaigning for 1 week and 2 weeks survey

**Add Cash back scheme**
- Three weeks
- Campaigning for 1 week and 2 weeks survey

**Add Cloth bag**
- Three weeks
- Campaigning for 1 week and 2 weeks survey
- at market prices of Rs15
  - Bring Your Own Bag Get 1% Cash Back.
  - Bring Your Own Bag Get 2% Cash Back.

**Follow-up**
- Two weeks
- Visited each area once a week

Source: Gupta and Somanathan (2011)
Impact of differential interventions

Source: Gupta and Somanathan (2011)
Price elasticity of demand

Source: Gupta and Somanathan (2011)
Consumers using their own bags

Source: Gupta and Somanathan (2011)
## Econometric Analysis

<table>
<thead>
<tr>
<th></th>
<th>Dependent Variable: Consumer Brings Own Bag in the Grocery Shops</th>
<th>Dependent Variable: Consumer Brings Own Bag in the Fruits and Vegetable Shops</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
</tr>
<tr>
<td>Marginal Effects (with Robust Standard Errors)</td>
<td></td>
<td></td>
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<tr>
<td>Information</td>
<td>0.06***</td>
<td>-</td>
</tr>
<tr>
<td>Negative Information</td>
<td>-</td>
<td>0.04**</td>
</tr>
<tr>
<td>Positive Information</td>
<td>-</td>
<td>0.09***</td>
</tr>
<tr>
<td>Information &amp; Cash back</td>
<td>0.12***</td>
<td>-</td>
</tr>
<tr>
<td>Information &amp; 1% Cash back</td>
<td>-</td>
<td>0.12***</td>
</tr>
<tr>
<td>Information &amp; 2% Cash back</td>
<td>-</td>
<td>0.14***</td>
</tr>
<tr>
<td>Information, Cash-back &amp; Cloth Bags¹</td>
<td>0.19***</td>
<td>0.19***</td>
</tr>
<tr>
<td>Weekend</td>
<td>-0.003</td>
<td>-0.005</td>
</tr>
<tr>
<td>Grocery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soft F&amp;V</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Wet Items</td>
<td>-0.08***</td>
<td>-0.08***</td>
</tr>
<tr>
<td>Unpacked Grocery</td>
<td>-0.13***</td>
<td>-0.13***</td>
</tr>
<tr>
<td>Female</td>
<td>-0.004</td>
<td>-0.005</td>
</tr>
<tr>
<td>Age: less than 20yrs²</td>
<td>0.14***</td>
<td>0.14***</td>
</tr>
<tr>
<td>Age: 20-40yrs</td>
<td>0.05***</td>
<td>0.06***</td>
</tr>
<tr>
<td>Age: more than 60yrs</td>
<td>0.24***</td>
<td>0.24***</td>
</tr>
</tbody>
</table>

Source: Gupta and Somanathan (2011)
Concluding remarks

- Plastic waste in general and MPP is a serious concern in India, and land based consumption of plastic is a major source of MPP.
- Effective solutions require reduction in real consumption and treatment/recycling of waste.
- Economic cost of implementation and socio-cultural, environmental, and the factors that affect behavioral changes determine the effectiveness of mitigation strategies.
- A combinations of policy instruments is more effective rather than a single instrument, i.e., policies such as deposit-refund scheme combined with behavioral instruments.
Thank you!

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