



# Get CLEAN and GREEN—Solid and Plastic Waste Management in Lao PDR

Findings and Actions for Change



© 2022 International Bank for Reconstruction and Development / The World Bank

1818 H Street NW

Washington DC 20433

Telephone: 202-473-1000

Internet: [www.worldbank.org](http://www.worldbank.org)

This work is a product of the staff of The World Bank with external contributions. The findings, interpretations, and conclusions expressed in this work do not necessarily reflect the views of The World Bank, its Board of Executive Directors, or the governments they represent.

The World Bank does not guarantee the accuracy, completeness, or currency of the data included in this work and does not assume responsibility for any errors, omissions, or discrepancies in the information, or liability with respect to the use of or failure to use the information, methods, processes, or conclusions set forth. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of The World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

Nothing herein shall constitute or be construed or considered to be a limitation upon or waiver of the privileges and immunities of The World Bank, all of which are specifically reserved.

#### **Rights and Permissions**

The material in this work is subject to copyright. Because The World Bank encourages dissemination of its knowledge, this work may be reproduced, in whole or in part, for noncommercial purposes as long as full attribution to this work is given.

Any queries on rights and licenses, including subsidiary rights, should be addressed to World Bank Publications, The World Bank Group, 1818 H Street NW, Washington, DC 20433, USA; fax: 202-522-2625; e-mail: [pubrights@worldbank.org](mailto:pubrights@worldbank.org).

Attribution—Please cite the work as follows: “World Bank. 2022. Get CLEAN and Green—Solid and Plastic Waste Management in Lao PDR. ©World Bank.”

#### **Photo credits:**

**Cover photo:** World Bank 2022

**Page 9:** World Bank 2022

All images listed below used under license from Shutterstock.com

#### **Page i:**

‘A boy collects cans and water bottles at an event’ – © Yangxiong

‘A housekeeper dropping off garbage in Vientiane’ – © LANLAO

‘Pollution of the banks of the Mekong River’ – © BTWImages

#### **Page 2:**

‘Locals searching the dump in Luang Prabang’ – © Gerardo C.Lerner

#### **Page 8:**

‘Digging rubbish away from a flooded road’ – © Ekapong

‘Rubbish dumping in public places’ – © BetterMan

‘Garbage dumping site in Northern Laos’ – © FuGazi images

#### **Page 18:**

‘Plastic bottle in the ocean sea water’ – © Mr.anaked

#### **Page 38:**

Larb - Lao minced beef salad served with lettuce leaves for wraps’ – © Khamkhilai Thanet

‘A Lao woman collects recyclables on the streets of Luang Prabang’ – © bumihills

‘Garbage bamboo wicker baskets’ – © Anirut Thailand

‘Blue Lagoon, Vang Vieng, Laos’ – © Smarta





*Ducklings in the trash near Vang Vieng*



*Burning waste at the ossuary at a Buddhist monastery  
Wat Si Sou Mang, Vang Vieng*



*A boy collects cans and water bottles at an event*



*A housekeeper dropping off garbage in Vientiane*

**Reduce single-use plastics and  
achieve a major reduction in waste  
amounts and plastics pollution**



*Pollution on the banks of the Mekong River*

# CONTENTS

Acknowledgements	iv
Abbreviations	v
SOLID AND PLASTIC WASTE IN THE LAO PDR — CURRENT STATUS	vi
<b>1 BACKGROUND</b>	<b>1</b>
<b>2 SOLID WASTE MANAGEMENT</b>	<b>4</b>
How Much Waste?	4
Types of Waste	4
Waste Collection	6
Recycling and Composting	6
Plastics Recycling	7
Disposal	7
The Institutions and Stakeholders	10
Policies and Legislation	11
How is Solid Waste Management Financed?	11
Plastic Production, Import and Export	12
<b>3 ENVIRONMENT, HEALTH AND ECONOMIC IMPACTS</b>	<b>14</b>
Environment	14
Health	15
Livelihoods	15
<b>4 PLASTIC POLLUTION</b>	<b>16</b>
Key Findings	16
Top 10 Plastic Items	18
Plastic Pollution Hotspots	20
Informal Dumpsites	21
Assessment on Recyclability and Alternatives	21
<b>5 ROADMAP TOWARDS A NATIONAL PLASTIC ACTION PLAN (NPAP)</b>	<b>24</b>
Transitioning from a Linear to Circular Economy	24
Plastic Policy Roadmap	24
Policy Measures	25
Priority Stakeholders	27
Priority Plastic Policies	29
High Potential Plastic Policy Measures	30
Recommended Next Steps to Develop an NPAP	33
<b>6 ACTIONS FOR CHANGE</b>	<b>34</b>
Action on Plastic	35
Create New Legal and Institutional Frameworks	35
Invest in Solid Waste Management Operations	36
Move towards a Circular Waste Economy	37



## FIGURES

<b>Figure 1.</b> Solid Waste Generation in Six Cities in the Lao PDR Between 2000 and 2020	5
<b>Figure 2.</b> Types of Waste Collected	5
<b>Figure 3.</b> What Happens to Solid Waste and Plastic Waste in the Lao PDR	8
<b>Figure 4.</b> Import of Plastic Waste into the Lao PDR in Tons	13
<b>Figure 5.</b> Percentage of Samples from That Luang Marsh Containing Microplastic	14
<b>Figure 6.</b> How does Plastic Waste Escape into the Riverine Environment?	17
<b>Figure 7.</b> Diagnostic Assessment Sites	18
<b>Figure 8.</b> Number of Plastic Product Items	19
<b>Figure 9.</b> Number of Hotspots per 100,000	20
<b>Figure 10.</b> Hotspots in Vientiane	21
<b>Figure 11.</b> Plastic Polymer Types	22
<b>Figure 12.</b> Plastic Policy Roadmap	25
<b>Figure 13.</b> Waste Hierarchy—Moving from Disposal to Prevention	26
<b>Figure 14.</b> Four Key Changes Needed	34

## TABLES

<b>Table 1.</b> Number and Type of Plastic Waste Facilities	7
<b>Table 2.</b> Legislation and Policy Under Development	11
<b>Table 3.</b> Overview of Legislation Relevant to Solid Waste Management	12
<b>Table 4.</b> Import and Export of Plastic into the Lao PDR in Tons	13
<b>Table 5.</b> Product Types	19
<b>Table 6.</b> Numbers and Types of Plastic Pollution Hotspots	20
<b>Table 7.</b> Numbers and Size of Informal Dumpsites near Rivers and Inland	22
<b>Table 8.</b> Recyclability and Value of Plastic Product Items	23
<b>Table 9.</b> Alternative Materials to Plastic	23
<b>Table 10.</b> Proposed List of PRIORITY Single-Use Plastics	28
<b>Table 11.</b> High Potential Plastic Policy Measures	30

## Acknowledgements

The *Get CLEAN and GREEN—Solid and Plastic Waste Management in Lao PDR* is a World Bank advisory product developed for the Government of the Lao PDR (GoL) under the World Bank's Lao PDR Resilient Green Growth Program. The program aims to support the implementation of its National Green Growth Strategy 2030 (NGGS). This strategy is designed to foster economic growth whilst transitioning towards a greener economy that builds human and natural capital, protects the environment, and creates green jobs. The **management of solid waste and plastics waste** is an important component of this strategy.

This report is a deliverable under the **Resilient Green Growth Programmatic Analytical and Advisory Services (P171011)** implemented by the World Bank. Sister Advisory Services and Analytics (ASAs) address related topics important for the Lao PDR such as sustainable forest management, landscape valuation and the Lao PDR's biodiversity. It specifically aims to generate and convene knowledge that informs the implementation of the Lao PDR's green growth transition and helps the country build natural and human capital from better management of pollution, waste and renewable natural resources.

The World Bank task team for **Environment, Natural Resources, and Blue Economy in the Lao PDR** leads on the **Lao PDR Resilient Green Growth Program**. The team is led by Maurice Andres Rawlins (Senior Environmental Specialist). The task lead for this advisory product is Klaus Sattler (Environmental Specialist) and co-led by Kaysone Vongthavilay (Environmental Management Consultant for WB).

The World Bank team carried out this work in cooperation with the **Lao PDR's Ministry Of Natural Resources and Environment (MONRE)** as well as the **Ministry of Public Works and Transport (MPWT)** and **Urban Development and Administration Authorities (UDAAs)** from multiple cities in the country. **Special thanks** is given to **Excellency Bounkham Vorachit, Minister of the Ministry of Natural Resources and Environment**, and her dedicated teams for supporting the World Bank team in the development of this report.

The team also thanks **World Bank management for providing strategic guidance**. This includes: Alexander Kremer (Country Manager for the Lao PDR), Mona Sur (Practice Manager for Environment and Natural Resources and Blue Economy for East Asia and the Pacific), Christophe Crepin (previous Practice Manager for Environment and Natural Resources for East Asia and the Pacific), Mark Austin (Program Leader for Sustainable Development, South East Asia), and Stephen Danyo (former Task Team Leader) who provided strategic guidance.

The data collection and assessment feeding into this product was carried out by the **COWI consulting firm and Lao Consulting Group, as well as the National University of Lao PDR**. Special thanks go to **Dr Vatthanamixay Chansomphou, Professor at Faculty of Environmental Sciences**.

Funding for the ASA was gratefully provided by the **Korean Green Growth Trust Fund (KGGTF)** and **PROBLUE**, a multi-donor trust fund administered by the World Bank, which was complemented by World Bank operating budget.

The team thanks **Cath Croxton** for compiling and editing this report, and **Saengkeo Touttavong** for the design.

## Abbreviations

<b>ADB</b>	Asian Development Bank
<b>ASA</b>	Advisory Services and Analytics
<b>CCAC</b>	Climate and Clean Air Coalition
<b>CCS</b>	Climate Change Strategy
<b>GDP</b>	Gross Domestic Product
<b>GoL</b>	Government of the Lao PDR
<b>JICA</b>	Japanese International Cooperation Agency
<b>IEC</b>	Information, education, and communication
<b>KGGTF</b>	Korea Green Growth Trust Fund
<b>KPCOMS</b>	Kaysone Phomvihane City Office of Management and Services
<b>KPI</b>	Key performance indicators
<b>Lao PDR</b>	Lao People's Democratic Republic
<b>LPCOS</b>	Luang Prabang City Office for Services
<b>MAF</b>	Ministry of Agriculture and Forestry
<b>MOIC</b>	Ministry of Industry and Commerce
<b>MOH</b>	Ministry of Health
<b>MONRE</b>	Ministry of Natural Resources and Environment
<b>MPWT</b>	Ministry of Public Works and Transport
<b>NAPA</b>	National Adaptation Programmes of Action
<b>NIR</b>	Near infra-red
<b>NPAP</b>	National Plastic Action Plan
<b>NGGS</b>	National Green Growth Strategy 2030
<b>NSEDP</b>	National Socio-Economic Development Plan
<b>UDAA</b>	Urban Development and Administration Authority
<b>VCOMS</b>	Vientiane City Office for Management and Services
<b>WHO</b>	World Health Organization
<b>WIS</b>	Waste Information System

## Plastic Polymers

<b>SUP</b>	Single-use plastic
<b>MUP</b>	Multiple-use plastic
<b>EPS</b>	Expanded polystyrene
<b>HDPE</b>	High-density polyethylene
<b>LDPE</b>	Low-density polyethylene
<b>PET</b>	Polyethylene terephthalate
<b>PP</b>	Polypropylene
<b>PS</b>	Polystyrene
<b>PVC</b>	Polyvinyl chloride
<b>XPS</b>	Extruded polystyrene

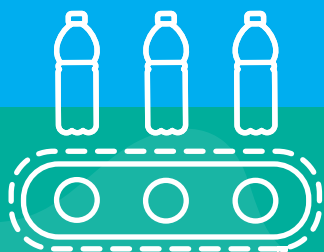
# PLASTIC

**95%** OF PLASTIC POLLUTION COMES FROM ONLY 10 SINGLE-USE PLASTIC ITEMS

**45%** OF SINGLE-USE PLASTICS WASTE COMES FROM FOOD AND DRINK



**173 KILOTONS**  
of plastic products  
imported every year!



## PLASTIC WASTE

imported for processing  
is on the rise

In 2019, rose  
from **7,800**  
to **98,500**



**1 MILLION**

tons waste per year  
and **RISING**



**Solid and  
Waste in the  
Current**



**15-25%**

of waste is  
**PLASTIC**



**50%**  
near restaurants,  
cafes, and bars

## PLASTIC HOTSPOTS



Worse in  
tourist areas

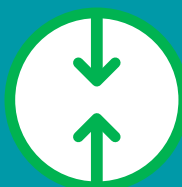
## BURNED and BURIED

Common



## ILLEGAL DUMPING

Common



## REDUCE

the use of single-use  
plastic

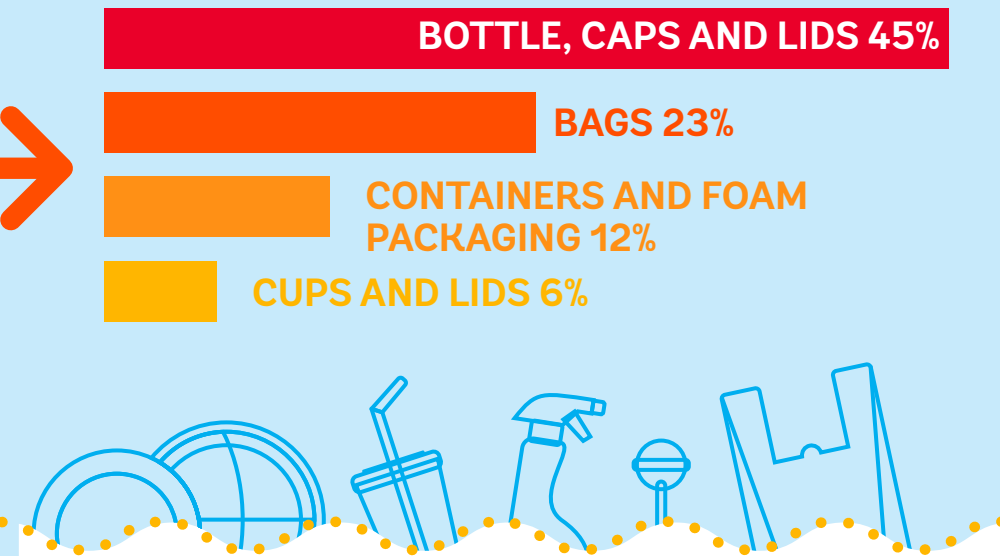


## IMPROVE

the management of solid  
and plastic waste



# LEAKAGE



## Plastic Waste in Lao PDR Status

VIENTIANE  
OVER  
**350,000**  
TONS IN 2020

**50%**  
of urban waste  
is **ORGANICS**



HOUSEHOLDS



INDUSTRY



BUSINESSES

a **NEW** plastic  
waste challenge



**RECYCLING**  
Informal



**LANDFILL SITES**

Open dumpsites  
and old



**CHANGE**  
Stakeholder  
behaviour



**INTRODUCE**  
A circular waste  
economy

# 1 Background

**The Lao People's Democratic Republic (the Lao PDR) economy has been growing fast in recent decades. Between 1990 and 2019 gross domestic product (GDP) increased by an average annual rate of 6.8 percent and the tourism industry has been a big contributor.**<sup>1</sup> This good news story has brought many benefits including a noticeable reduction in poverty, and improvements to health and education outcomes.<sup>2</sup> However, it has also led to rapid urbanization and the accompanying environmental impacts this brings.

**Waste pollution, especially plastic waste, is a particular issue causing serious environmental, economic and health hazards in the Lao PDR.** It is crucial that the country addresses this issue to protect the benefits already achieved and to make sure that future growth drives a greener economy that benefits both the people and the environment.

**Recognizing the challenges caused by urbanization, in 2019 the Government of the Lao PDR (GoL) approved a National Green Growth Strategy 2030 (NGGS).**<sup>3</sup> This strategy is designed to foster economic growth whilst transitioning towards a greener economy that builds human and natural capital, protects the environment, and creates green jobs. It also builds on the country's 9th Five-Year National Socio-Economic Development Plan 2021-2025 (9th NSEDP). The **management of solid and plastic waste** is an important component of this strategy.

**The World Bank and the GoL have a strong working relationship going back many years and, amongst other things, are working together on promoting Green Growth in the country.**<sup>4</sup> The Bank is supporting the GoL to generate and convene knowledge that informs the implementation of the Lao PDR's green growth transition and helping the country build natural and human capital from better management of pollution, waste, and natural resources. The GoL, through the Ministry of Natural Resources and Environment (MONRE), has requested support from the World Bank for addressing its solid and plastic waste problems, including the development of a **National Plastic Action Plan (NPAP)** and other potential solid waste management investments.

**Plastics and solid waste diagnostics were carried out by the Bank in 2020 to increase the understanding of plastics pollution and the status of solid and plastic waste management in the Lao PDR and the challenges faced by the sector to identify opportunities for reducing plastics pollution and priority investments and measures in the sector.**<sup>5</sup> This work was specifically designed to feed into the development of a **National Plastic Action Plan (NPAP)**, as well as the preparation of a World Bank financed Lao Environmental and Waste Management Project.

1 World Bank Data: <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?end=2019&locations=LA&start=1990&view=chart>

2 See: <https://www.worldbank.org/en/country/lao/overview#1>

3 See: [https://data.opendevelopmentmekong.net/dataset/e7db2aa8-c294-47dc-a2da-aa6e41493a12/resource/861b9f4c-cf6c-413b-aeff-e4f6b9346fd7/download/final\\_version\\_of\\_national\\_green\\_growth\\_strategy\\_english\\_feb\\_2019\\_.pdf](https://data.opendevelopmentmekong.net/dataset/e7db2aa8-c294-47dc-a2da-aa6e41493a12/resource/861b9f4c-cf6c-413b-aeff-e4f6b9346fd7/download/final_version_of_national_green_growth_strategy_english_feb_2019_.pdf)

4 See: <https://www.worldbank.org/en/news/press-release/2017/05/31/lao-pdr-to-adopt-green-growth-with-world-bank-support>

5 The three reports which provide the basis for this synthesis report are:

- 1 World Bank. 2021. *Supporting Lao PDR in Development to Improve Solid Waste and Plastic Management—Solid Waste Assessments*
- 2 World Bank. 2021. *Supporting Lao PDR in Development of a Plastic Action Plan—Plastic Diagnostics*
- 3 World Bank. 2021. *Supporting Lao PDR in Development of a Plastic Action Plan—Plastic Policy Report*



## COVID-19

The impacts of COVID-19 on solid waste management in the Lao PDR have yet to be fully evaluated. However:

- > Already economic growth is reduced, the recycling market has dropped away, and currently there is no international tourism market.
- > Single-use plastic consumption is on the rise particularly due to an increase in medical products, personal protective equipment (PPE), and a surge in the use of food takeaways.

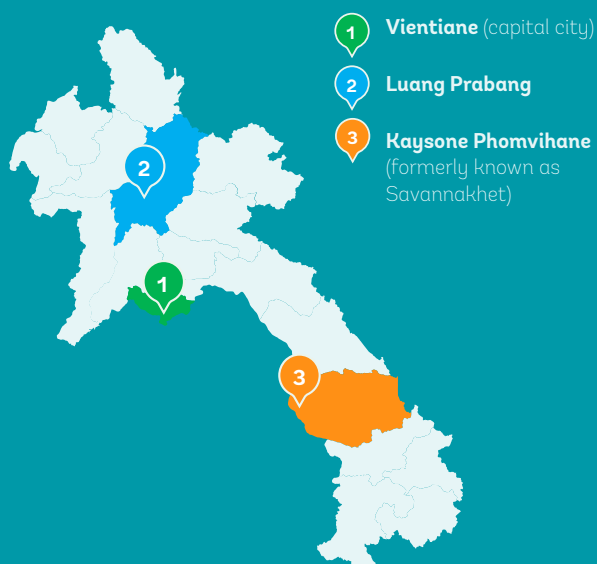
Source: <https://www.dw.com/en/coronavirus-aggravates-thailands-plastic-waste-crisis/a-53586789>



This synthesis document summarizes the findings of this extensive analytical work and provides recommendations for change to support the outcomes of the NGGS, and the 9<sup>th</sup> NSED. The document has been designed as a tool for stakeholders and implementing partners to use for planning and decision-making purposes to reduce plastics pollution and to provide the basis for improving solid waste and plastics management in the country.

## The report provides:

### 1 The key messages from the assessment of solid waste management at national level with a focus on three cities:



### 2 A summary of the findings from a diagnostic analysis of plastic pollution in six cities:



### 3 A roadmap to guide the development of the National Plastic Action Plan and to adopt suitable plastic policy measures.



### 4 A description of the investment opportunities and priority actions needed to improve the management of plastic and solid waste.



# 2 Solid Waste Management

## How Much Waste?

**The rate of waste generation in the Lao PDR has been increasing steadily since 2000 and 2015 data show a sharp increase in waste particularly in Vientiane (see Figure 1).** In addition, urban populations create significantly more waste than those in rural areas. Reported waste generation rates vary in cities between 0.7 and 1.4 kilograms per person per day. In rural areas waste generation rates are assumed to be close to the World Bank's estimate of 0.7 kilograms per person per day.

**It is estimated that in 2020 the national rate of waste generation was around 910,000 tons per year.<sup>6</sup>** In addition, annual waste generation is forecast to increase to 1.4 million tons by 2035. However, monitoring and reporting on waste generation is weak in the Lao PDR and this limits the accuracy of any available data.<sup>7 8 9</sup>

**All the cities assessed showed a rise in waste generation.** In 2000, Vientiane generated approximately 141,876 tons of waste and by 2015 this had risen to 214,905 tons. According to GGGI (2020), in 2019 Vientiane was producing approximately 1,004 tons of waste per day (366,460 tons per year)—a rise of over 150,000 tons of waste per year.<sup>10</sup> Pakse generated 16,967 tons of waste in 2000 and by 2015 it was generating 23,974 tons of waste, a rise of over 7,000 tons per year (see Figure 1).

## Types of Waste

**The two largest types of waste in the Lao PDR urban areas are organic materials and plastics.** Over 50 percent of the waste generated in the Lao PDR comes from organic materials and the next largest type of waste is plastic (which varies between 16 percent and 24 percent depending on location).

**Figure 2 presents the results of waste collection surveys collected across three cities.<sup>11</sup>** The data show varying levels of plastic and organic waste. Vientiane and Kaysone Phomvihane have higher levels of plastic waste at 24 percent and slightly less organic waste at 42 percent. Luang Prabang has much lower levels of plastic waste at eight percent but nearly 70 percent of its waste is organics.

6 World Bank. 2021. *Supporting Lao PDR in Development to Improve Solid Waste and Plastic Management—Solid Waste Assessments*

7 See: <https://datatopics.worldbank.org/what-a-waste/>

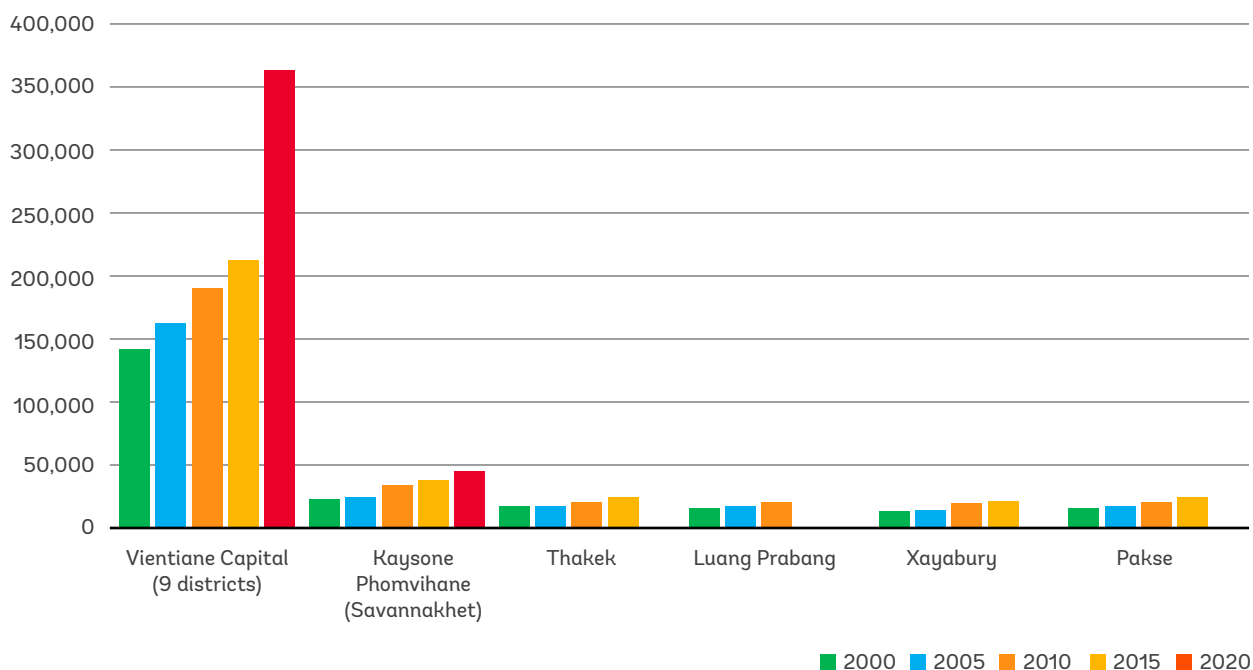
8 See: <https://enb.iisd.org/events/meeting-climate-and-clean-air-coalition-reduce-short-lived-climate-pollutants-ccac-working>; <https://report.gggi.org/2018/>; <http://sdg.iisd.org/events/fourth-regional-3r-forum-in-asia/>

9 GGGI. 2018. *Solid Waste Management in Vientiane, Laos, PDR.*

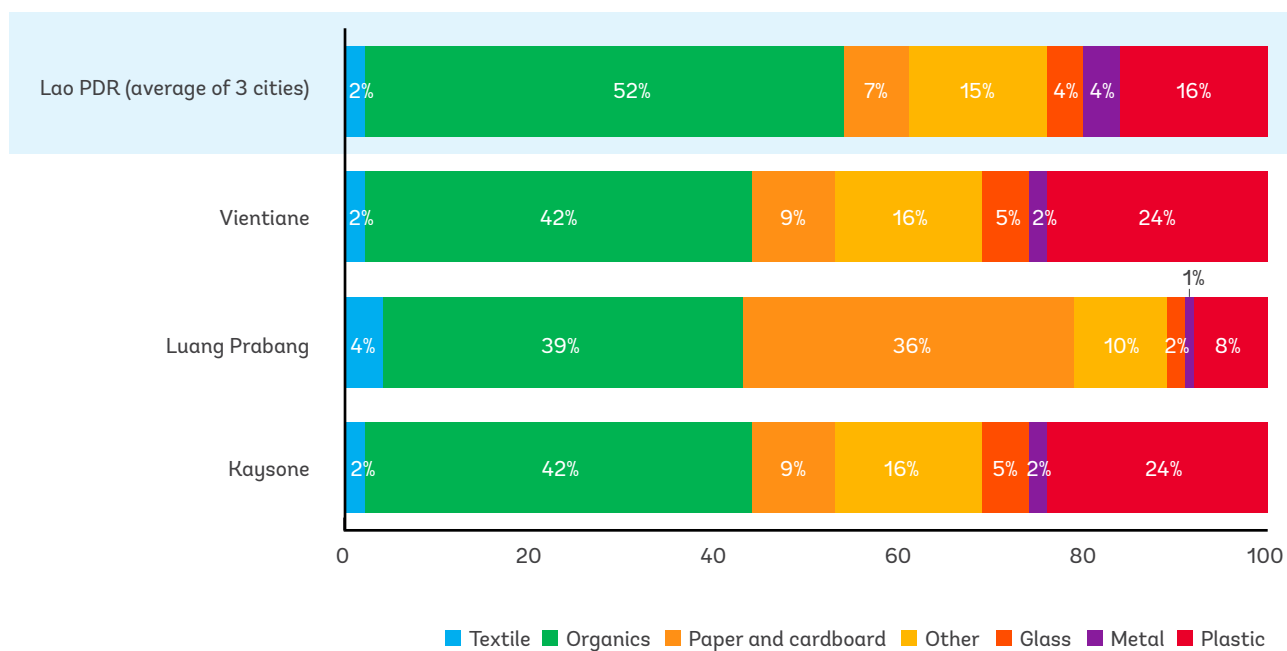
See: <https://www.greengrowthknowledge.org/case-studies/solid-waste-management-vientiane-lao-pdr-situation-assessment-and-opportunities-waste>

10 GGGI. 2020. *Presentation on Sustainable Solid Waste Management Lao PDR*

11 Vientiane (capital city), Luang Prabang, and Kaysone Phomvihane (formerly known as Savannakhet).

**FIGURE 1. SOLID WASTE GENERATION IN SIX CITIES IN THE LAO PDR BETWEEN 2000 AND 2020**


**Note:** 2020 data is only available for Vientiane and Kaysone Phomvihane; COWI. 2021; GGGI. 2020.

**FIGURE 2. TYPES OF WASTE COLLECTED**


**Source:** CCAC. 2015<sup>12</sup>; JICA. 2014<sup>13</sup>

12 See: [https://www.waste.ccacoalition.org/sites/default/files/files/vientiane-city\\_profile\\_vientiane\\_capital\\_lao.pdf](https://www.waste.ccacoalition.org/sites/default/files/files/vientiane-city_profile_vientiane_capital_lao.pdf)

13 See: <https://openjicareport.jica.go.jp/pdf/12245338.pdf>



## Waste Collection

**Waste collection in the Lao PDR tends to be limited to towns and cities.** In 2015, Vientiane produced 214,905 tons of waste but only 40 to 60 percent of this waste found its way into the landfill. In Luang Prabang, 23,927 tons of waste was generated in 2015 and around 80 percent of this waste ended up in the landfill. In Kaysone Phomivane, 39,575 tons of waste was produced in 2015 but less than half of this waste went to the landfill. Waste collection is often limited to urban centers while areas that are far away from city centers or have poor roads are usually not serviced. Waste is collected from restaurants, hotels, and markets more frequently, and some industry entities have their own waste collection and disposal services.

**Household collection services are often limited by a lack of accessibility, no service contracts, and poor equipment.** Households must be contracted in to receive a service, and many do not sign up due to lack of regulation, enforcement capacities or because the service cannot reach them. In Vientiane municipality, only 27 percent of households have a contract with a service provider and in Kaysone Phomvihane city, only 30 percent have a contract. In addition, a lack of equipment or poor equipment maintenance get in the way of providing a reliable service.

## Recycling and Composting

**No formal government-organized recycling program exists in the Lao PDR but there is an active recycling industry in some of the cities.** This recycling industry tends to focus on the most valuable recyclables such as plastic, steel, copper, aluminum, and glass. No processing of materials takes place except in Vientiane. Collected materials are sorted, separated, and then exported to neighboring countries for treatment and processing. In Vientiane there are more advanced plastic recycling waste facilities that include some type of pre-treatment (such as crushing and the production of pellets).

**While organic waste makes up approximately half of waste generated, there is no large-scale, centralized composting of municipal solid waste.** However, it is commonly known that in rural areas, food waste is frequently used as food for animals and companies are even reported to collect (and, in some cases, even pay) for the collection of such waste.

## Informal Recycling Sector

**The informal recycling sector is extremely important to the Lao PDR's solid waste management system.** There are two groups of people involved in the informal waste sector. Those who:

### 1. Collect from the waste generators

This first group run door-to-door collection services of recyclable materials that are usually already clean and separated. They sell these onto buying centers.

### 2. Waste picking from disposal sites

This second group separate out recyclable materials from landfills. These materials are usually soiled and, as such, are sold at much lower rates.

**This sector is unregulated and highly vulnerable.** Prices are completely dependent on market fluctuations and recently, due to the COVID-19 pandemic, the recycle market has weakened and it is difficult to sell on many recycled materials. This sector needs special attention and planning should consider the vulnerability of those involved in this sector to make sure their livelihoods are protected.

## Plastics Recycling

**Plastic recycling is a complex process which involves several steps including crushing or compacting, sorting (manual or automatic), extrusion and manufacture of new products.** Plastics can be recycled as:

- > **Flakes**—crushed plastic that has not gone through extrusion
- > **Pellets or granules**—extruded and enhanced by adding additives or mixing with virgin plastics.

**The number and type of plastic waste facilities that currently exist in the six surveyed cities in the Lao PDR are presented in Table 1.** The table shows:

- > There are **15 retailers and compacting centers** and **six of them are in Pakse** and **four of them in Vang Vieng**.
- > There are **nine crushing sites** and all of them are in **Vientiane**.
- > There are **five recycling centers** producing pellets and granules and **four of them are in Vientiane**.
- > There are only two compacting and crushing sites and both are in Vientiane.

**TABLE 1. NUMBER AND TYPE OF PLASTIC WASTE FACILITIES**

	Vientiane	Pakse	Luang Prabang	Thakhek	Kaysone Phomvihane	Vang Vieng	Total
Retailer/compacting	2	6	1	1	1	4	<b>15</b>
Crushing	9	0	0	0	0	0	<b>9</b>
Compacting and crushing	2	0	0	0	0	0	<b>2</b>
Recycling (producing pellets/granule)	4	1	0	0	0	0	<b>5</b>
Sources	A	B	C	D	E	F	

**Source:** A Department of Industry and Commerce of Vientiane Capital and interviews with the factories; B-F Interviews at landfills and with traders.

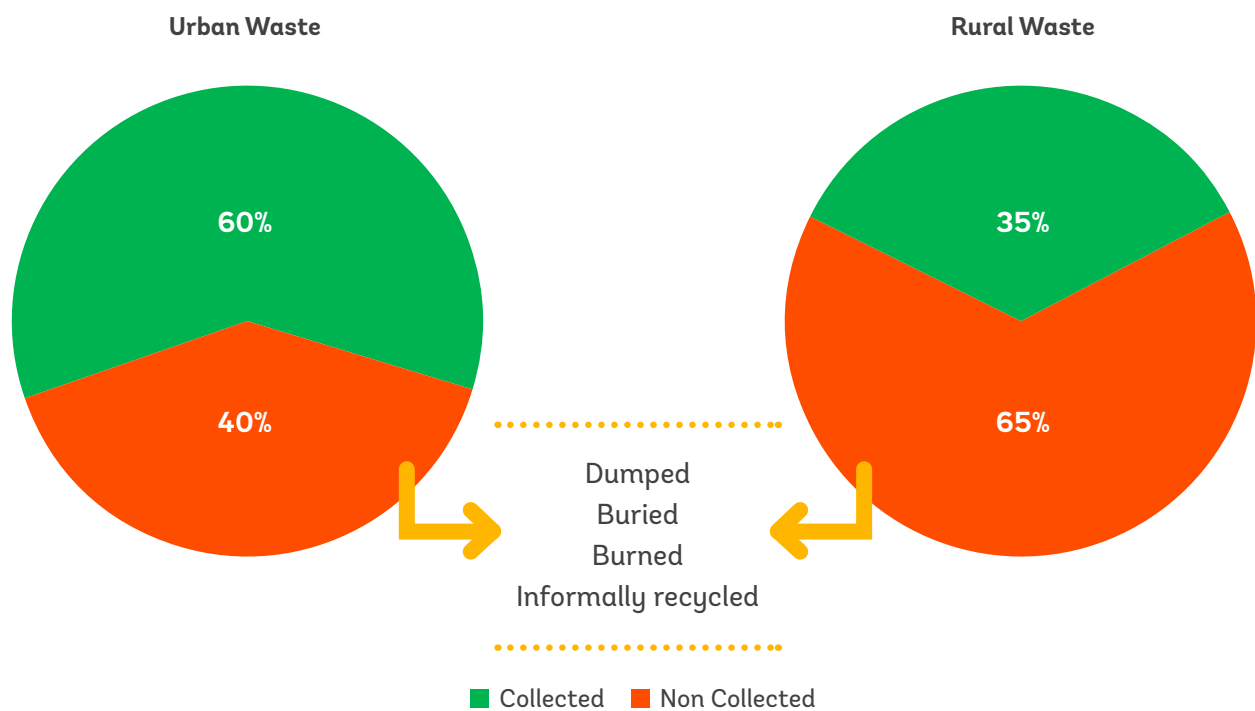
## Disposal

### What Happens to Waste?

**Nationwide, between 35 percent (rural) and 60 percent (urban) of waste generated is collected and disposed of at registered landfills.** The remaining waste that is not collected or recycled ends up being burned, buried, or dumped on open land or into waterways (see Figure 3).



**FIGURE 3. WHAT HAPPENS TO SOLID AND PLASTIC WASTE IN THE LAO PDR?**





## Landfills and Transfer Stations

**Major cities have access to a registered landfill, but usually these landfills are old, unsanitary, operated as open dumpsites, contaminate the environment, and come with severe environmental, health and safety risks.**<sup>14</sup> Many of them are reaching the end of their lifetime and urgently need to be rehabilitated, extended, or closed and replaced. As a result, they are unable to cope with existing levels of waste disposal let alone future waste disposal demands and increased waste collection rates. Major investment is needed urgently to upgrade or replace these sites and improve the management.

**Vientiane, Luang Prabang, Thakhek, Kaysone Phomvihane, and Vang Vieng only have one landfill site in each.** Vientiane also has a transfer station and Pakse has two landfill sites.

**The largest landfill is in Vientiane.** It is just 32 kilometers outside the city. This landfill and those at Pakse, Luang Prabang and Kaysone Phomvihane, were all designed as sanitary landfills but are now poorly managed and no longer safe. Incoming waste is incorrectly placed and there is no daily covering of waste. In Vang Vieng the landfill is practically an open dump although there are plans to upgrade it with support from the Asian Development Bank (ADB).

**However, there are some new landfills already in operation and plans for new landfills and upgrades to existing ones.**

- > In **Pakse** a new landfill has been established and has started operations.
- > In **Luang Prabang** there is land available to extend the capacity of the existing landfill. While it is mountainous, there are plans to develop this with ADB investment.
- > A new landfill is in the process of being constructed in **Thakhek** under the Fourth Greater Mekong Subregion Corridor Town Development Project. The new landfill will have three cells, with a capacity of 294,295 cubic meters.
- > The landfill in **Kaysone Phomvihane** has been upgraded and is now in operation, including better management and leachate treatment.



*Some landfill sites are old, insanitary and operated as open dumpsites*

<sup>14</sup> World Bank. 2021. *Supporting Lao PDR in Development to Improve Solid Waste and Plastic Management—Solid Waste Assessments*; Field assessments.

## The Institutions and Stakeholders

### Government

At national level, the **two key bodies responsible for solid waste management** are:

1. the Ministry of Natural Resources and Environment (MONRE)
2. the Ministry of Public Works and Transport (MPWT)

**The MONRE was set up in 2011 and its role is to govern and manage issues related to natural resources and the environment.**<sup>15 16</sup> The Ministry develops and implements laws, resolutions, and decrees, develops guidelines, policies, strategies and plans and raises awareness on environmental protection, including on solid waste. Within MONRE, the Department of Natural Resources and Environmental Inspection (formerly Department of Pollution Control and Monitoring) is the key body that coordinates solid waste management.

**The MPWT is responsible for the construction and inspection of water and sanitation across the country.** It also provides technical guidance and advice on the installation of waste disposal sites such as landfills and transfer stations.

**Other key government stakeholders in the solid waste sector include:**

3. Ministry of Health (MOH)
4. Ministry of Agriculture and Forestry (MAF)
5. Ministry of Industry and Commerce (MOIC).

**Operations of solid waste collection services and management of infrastructure such as landfills and transfer stations are the responsibility of Urban Development and Administration Authorities (UDAAs) in provincial and city administrator offices.** The names of these UDAA's vary from province to province. In the three cities reviewed here, they are called:

- > **Vientiane** City Office for Management and Services (VCOMS)
- > **Luang Prabang** City Office for Services (LPCOS)
- > **Kaysone Phomvihane** City Office of Management and Service (KPCOMS).

**Private collection companies also play an important role in collecting and managing waste.** For example, in Vientiane there are 10 private collection companies and two public organizations working under supervision and contract of VCOMS. However, they are not all the same size. VCOMS' own unit is the largest collector. It has 65 vehicles and provides services to 187 villages in seven districts.

15 GGGI. 2018. *Solid Waste Management in Vientiane, Laos, PDR*. See: <https://www.greengrowthknowledge.org/case-studies/solid-waste-management-vientiane-lao-pdr-situation-assessment-and-opportunities-waste>

16 See: <http://www.monre.gov.la/home/index.php/2018-07-09-15-05-58>

## Policies and Legislation

Few specific policies and strategies exist for solid waste management either at national or local level. However, there are policy documents that focus on managing the environment—and solid waste management is an important component of this. The most recent strategic document that guides the overall development policy in the Lao PDR is the 9<sup>th</sup> Five-Year NSEDP 2021-2025. It emphasizes the need for integrating sustainable development into national planning processes. Other key documents are the *National Green Growth Strategy (2019)*, the *National Pollution Control Strategy and Action Plan (2017)* and the *National Environmental Strategy (2020)*.

In addition to these strategy documents, there are further legislation and policy documents under development (see Table 2 for details).

**TABLE 2. LEGISLATION AND POLICY UNDER DEVELOPMENT**

Name	Responsible Government Department	Further Information
<i>Decree on Solid Waste Management</i>	MONRE	Drafting has not yet started <sup>17</sup>
<i>Decree on Municipal Solid Waste Management</i>	MPWT	Sets out the principles, regulations, and measures for urban waste management activities. Its aim is to promote storage services and organize waste in a systematic and hygienic manner across the country. The draft decree applies to general urban solid waste management nationwide
<i>Technical Guidelines on Solid Waste Management in the Lao PDR 2020</i>	MONRE	
<i>10-year Roadmap for Solid Waste Management Vision and Strategy 2030</i>	VCOMS	This document presents a vision, six strategic outcomes, medium and long-term targets, and associated workplans.
<i>Sustainable Solid Waste Management Strategy and Action plan for Vientiane</i>	VCOMS	

The waste sector is controlled by a variety of regulations. These include the *Decree on National Environmental Standards* (2017), the *Environmental Protection Law* (2012), the *Regulation on Landfill Site Management* (2007), and the *Law on Industrial Waste Discharge* (1994). However, it is the responsibility of local administration offices to implement this legislation, including UDAAAs. Table 3 provides an overview of the relevant legislation.

## How is Solid Waste Management Financed?

In general, collection services are provided to businesses and households who sign up to a contract with a service provider. In most cities, the largest (sometimes only) service provider is a public company under UDAAAs, and in some cities private companies are given licenses by UDAAAs for waste collection in designated areas. Services fees are collected by city authorities or private operators directly from the waste generator upon waste collection. Household fees typically vary between US\$ 2-4 per month. Gate fees at landfills are between US\$ 4-6 per ton and are collected by UDAAAs from waste service providers.

17 Direct information from MONRE, March 2021



However, due to a lack of capacity to enforce payments, many households do not enter contracts with waste service providers. In Vientiane municipality, only 27 percent of households have a contract with a service provider and in Kaysone Phomvihane city, only 30 percent have a contract. This results in collections being limited to areas with higher payment rates and some households being served without payment. It also results in waste collection being primarily financed by fee collections from businesses and institutions. Subsidies and budgets for solid waste management are very limited and operations are mostly funded by fees paid by customers. Infrastructure construction is often financed by the donor community.

**TABLE 3. OVERVIEW OF LEGISLATION RELEVANT TO SOLID WASTE MANAGEMENT**

Year	Law/Regulation	Purpose
2021	Ministerial Decision on Pollution Control	Includes direction on the management of solid waste.
2017	Decree for National Env. Standards (81/GOV)	Determines parameters and levels of pollutant concentrations emitted to air, or discharge to soil and water.
2015	Ministerial Instructions on Hazardous Waste (0744/MONRE)	Hazardous waste classification and requirements for the import, export, transfer, storage, use, recycling, and disposal of hazardous waste.
2012	Law on Environment Protection (EPL)	Defines principles, regulations and measures related to environmental protection.
2010	Decree on Environment Impact Assessment (112/PM)	Lays down principles, rules and measures on the establishment, functions, management and monitoring of environmental impacts.
2007	Decree on Disposal Site Management (520/TCPC)	Regulates site selection and design of disposal sites.
2004	Decree on Waste Management from Health Care Facilities (1706/MOH)	Prescribes collection and handling healthcare waste, including separation into three fractions (infectious, sharps and general) and requirements on storage.
2001	Law on National Hygiene, Healthcare and Protection	Defines responsibilities of the MOH for hygiene, incl. waste management in buildings and public spaces.
1999	Urban Planning Law (UPL)	Determines principles, regulations, and measures regarding the management and use of land, construction, and building.
1997-1999	Decrees on the Organization and Activities of UDAs (177/PM and 141/PM)	Defines org. structure and operational responsibilities of UDAs. City officials mainly refer to the PM Decrees 177 and 141 regarding their responsibilities in waste management.
1994	Industrial Waste Discharge Regulation (180/MOIC)	Manages hazards caused by the discharge of wastewater and waste that may harm water quality and the citizens' health.

## Plastics Production, Import and Export

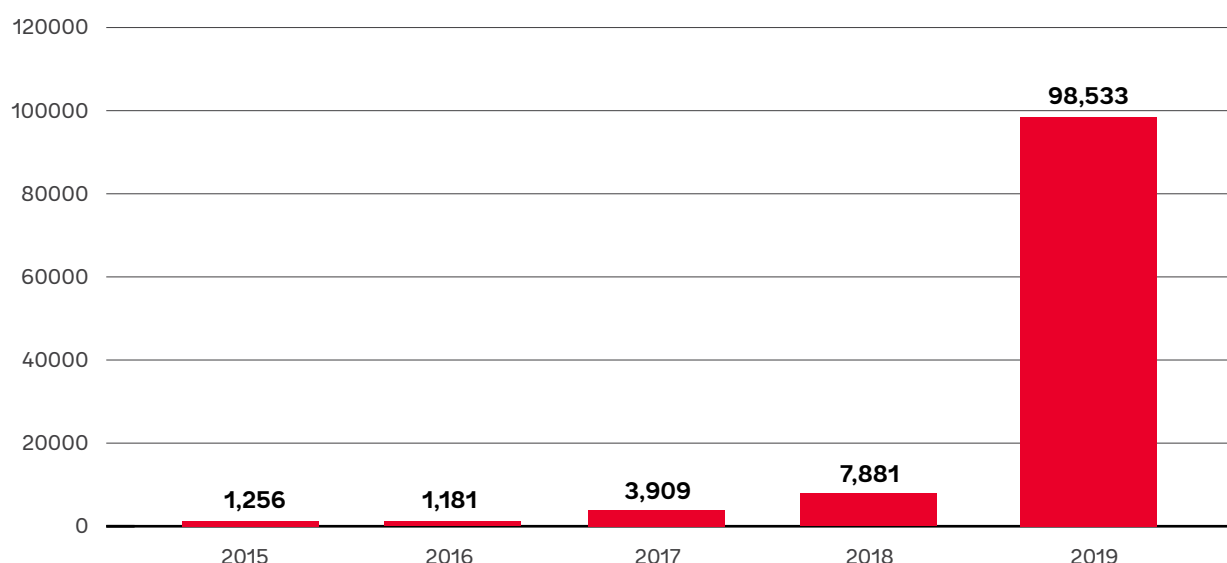
Plastic waste in the Lao PDR is generated by consumption of imported plastic products and locally manufactured plastic products.

Since China banned the import of plastic waste for processing in 2018<sup>18</sup>, the amount of plastic waste imported into the Lao PDR for processing has substantially increased. In 2019 alone, the amount of imported plastic waste rose from 7,800 to 100,000 tons (see Figure 4). Yet, the country does not have the capacity to process this waste and there is a major concern this will intensify the already existing waste pollution problem. The GoL has responded to this challenge by banning the creation of new plastic waste processing plants.<sup>19</sup> However, they acknowledge that the amount of plastic waste imported into the Lao PDR for processing is likely to continue increasing.<sup>20</sup>

18 See: [https://en.wikipedia.org/wiki/China%27s\\_waste\\_import\\_ban](https://en.wikipedia.org/wiki/China%27s_waste_import_ban)

19 GoL. July 2019. *Order-Suspension of Plastic Waste Recycling Plants*. Order Ref: 0930/MOIC.DoI/H

20 See: [https://www.env.go.jp/en/recycle/asian\\_net/Annual\\_Workshops/2020\\_PDF/Presentations/8\\_Lao%20PDR\\_ANWS2020.pdf](https://www.env.go.jp/en/recycle/asian_net/Annual_Workshops/2020_PDF/Presentations/8_Lao%20PDR_ANWS2020.pdf)

**FIGURE 4. IMPORT OF PLASTIC WASTE INTO THE LAO PDR IN TONS**

In 2018 at least 173 kilotons of plastic products and products with plastic packaging were imported to the Lao PDR. These imports mostly came from China, Thailand, and Vietnam but increasingly plastic products are being imported from Japan and European markets. Secondary materials to produce plastic products are also imported into the Lao PDR for the local plastic production industry.

In the Lao PDR, there are at least 17 plastic production facilities with an annual production capacity of approximately 51,000 tons. They produce a range of products for both national consumption and for export. Some local plastic waste is collected and processed in the Lao PDR and exported to Thailand and China for recycling. It is mostly exported as plastic bags or plastic pellets to be used for plastic production in that country. Table 4 shows the import and export figures for plastic between 2015 and 2019.

**TABLE 4. IMPORT AND EXPORT OF PLASTIC INTO THE LAO PDR IN TONS**

	2015	2016	2017	2018	2019	Source
Import of plastic waste	1,256	1,181	3,909	7,881	98,533	UN Comtrade
Export of plastic waste	862	1,919	1,353	822	1,833	
Import of secondary raw plastic materials	5,092	452	1,064	143	1,543	Raw data from Department of Custom at Ministry of Finance. Data summarised by department of import and export at Ministry of Industry and Commerce
Export of secondary raw plastic materials	4,537	657	4,585	1,557	4,903	

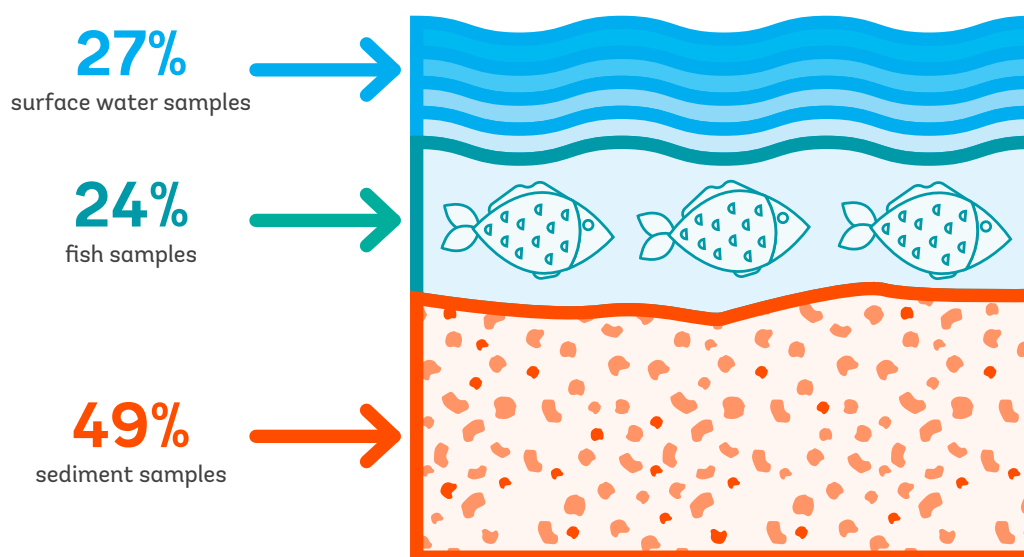
# 3 Environmental, Health and Economic Impacts

## Environment

**Plastic waste is found everywhere including in soil, rivers, and the sea.** Birds, fish, and mammals get entangled in it and animals ingest it. There is a risk from chemical toxicity from additives in the plastic that is ingested. In addition, species such as microorganisms, weed, or invertebrates can grow or adhere to larger pieces of plastic waste which are then transported longer distances, thus introducing new species into different environments.<sup>21 22</sup>

**A recent study in the That Luang marsh showed high levels of microplastic in fish, surface water, and sediment.**<sup>23</sup> The freshwater wetland in Vientiane functions as a natural biological wastewater treatment connecting water channels of Vientiane to the Mekong River via Huay Mark Hiao water canal. Nearly 50 percent of sediment samples contained microplastic. Twenty four percent of fish samples and 27 percent of surface water samples also contained microplastic. The plastic polymer found in these samples was polyamide—a plastic that is found in cloth, tires, fishing gear and other plastic wearables (see Figure 5).

**FIGURE 5. PERCENTAGE OF SAMPLES FROM THAT LUANG MARSH CONTAINING MICROPLASTIC**



Source: InsideLaos. 2020<sup>24</sup>

21 Werner et al. 2016. *Harm Caused by Marine Litter*. [https://www.researchgate.net/publication/315386479\\_Harm\\_caused\\_by\\_Marine\\_Litter](https://www.researchgate.net/publication/315386479_Harm_caused_by_Marine_Litter)

22 González et al. 2016. *Riverine Litter Monitoring*. <https://op.europa.eu/s/syhB>

23 See: <https://insidelaos.com/2020/09/11/30399/>

24 See: <https://insidelaos.com/2020/09/11/30399/>

## Health

### Poor management of solid and plastic waste is a potential health hazard:

- > Open burning of plastic waste sends toxic smoke into the air.
- > Poorly managed landfills often catch fire and send toxic smoke into the air.<sup>25</sup>
- > Poorly managed landfills can result in harmful leachate that can contaminate groundwater.
- > Informal waste pickers who have no protection are at risk of being exposed to toxic chemicals.

**Vongdala et al. (2018) found that the pollution in landfill soils and their vicinity had reached eco-toxicological risk levels.**<sup>26</sup> They also found that samples of *Ipomoea aquatica* (a vegetable consumed by the nearby villagers, was seriously contaminated by chromium (Cr), lead (Pb), copper (Cu), and zinc (Zn). The levels of these toxic heavy metals were much higher than the World Health Organization (WHO) standards. It recommended the landfill should be urgently rehabilitated through phytoremediation technologies.

## Livelihoods

- > **Fishery**—Most of the fisherfolk interviewed claimed that they always caught plastic waste debris in their nets and that dealing with this gave them less time to catch fish.
- > **Reduced tourism**—Plastic and solid waste on streets and on riverbanks gives a negative impression. This could impact on the Lao PDR's reputation and potentially reduce the numbers of visitors, which, in turn, would negatively impact on the economy both locally and nationally.
- > **Increased costs in waste management**—Higher waste amounts to collect; increased street sweeping and landfills filling up more quickly.
- > **Flooding**—Plastic pollution blocks drains and sewers in urban areas which damages the economy and can threaten health.<sup>27</sup>

25 In recent years, landfill fires caused respiratory problems for people living nearby.

26 Vongdala. 2018. *Heavy Metal Accumulation in Water, Soil, and Plants of Municipal Solid Waste Landfill in Vientiane, Lao PDR*. See: <https://www.mdpi.com/1660-4601/16/1/22>

27 See: <https://www.who.int/laos/news/detail/23-08-2019-who-and-partners-helping-lao-pdr-build-a-climate-resilient-health-system>



# 4 Plastic Pollution

## Key Findings

### Quick win

**Only 10 single-use plastic items cause 95 percent of plastic pollution in the country. Reduce single-use plastics and achieve a major reduction in waste amounts and plastics pollution!**

### Findings

- > Consumption of single-use plastics is rapidly increasing in the Lao PDR and particularly in urban areas.
- > Large amounts of single-use plastics are uncollected and are either burned or openly dumped or end up in waterways.
- > 95 percent of plastic pollution in the Lao PDR is caused by **10 plastic items—all of which are single-use plastics**.
- > The most common items are drinking bottles, bottle caps and rings, plastic bags including shopping bags, cups and their lids, food containers, foam packaging and straws.
- > Food and drink packaging is the biggest type of plastic pollution.
- > Most plastic bottles can be recycled.
- > Restaurants, cafes and bars, and tourist activity are linked to plastic pollution hotspots.
- > Polyethylene terephthalate (PET), high-density polyethylene (HDPE) and low-density polyethylene (LDPE) are the top three types of plastic polymers of leaked plastics.
- > In 2018, at least 173 kilotons of plastic products and products with plastic packaging were imported into the Lao PDR. This is 40 kilograms of plastic per person per year.



Plastic bottle in the ocean sea water

**Less single-use plastic results in less plastic pollution**

**Reliable statistics on the amount and types of plastic in the Lao PDR and its rivers are lacking.** In addition, it is known that plastic pollution creates a less favorable environment for business, tourism, and human health. A sound understanding of the problem is essential to develop effective plastic policies, measures, and investments needed to tackle this issue. Following a request by the GoL and the MONRE to support the development of an NPAP, an assessment of the current state of plastic pollution in the Lao PDR was commissioned. The analysis determined the extent of plastic pollution, what drives it and what were the key items that caused the pollution.

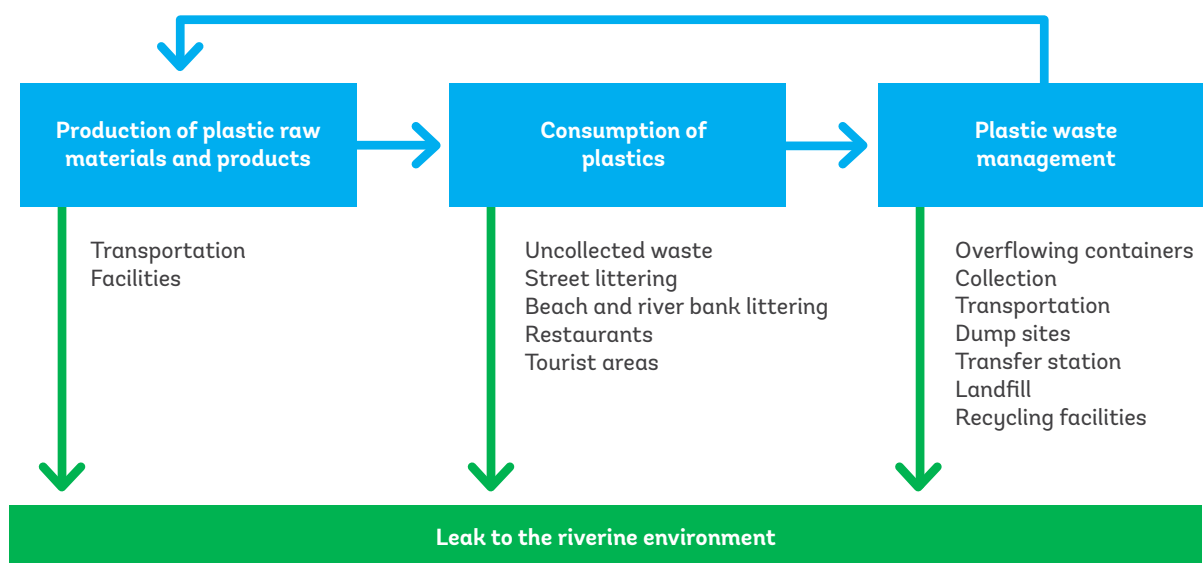
**The plastic diagnostic was carried out in six cities<sup>28</sup> in the Lao PDR (although some activities focused on the whole country).** Activities included:

- > Identifying the major types of plastic waste that leak into the environment
- > Identifying the locations of plastic pollution hotspots along Mekong River and tributaries
- > Reporting on plastic and plastic waste imports and exports
- > Identifying the impacts of plastic pollution
- > Reporting on the status of the recycling industry.

**There are many sources of plastic waste, especially at sites where plastic is consumed and throughout the solid waste management chain.** Figure 6 presents a material flow analysis of plastic waste and how it escapes into the environment. The sources of plastic leaks come from three main routes:

1. the **production** of plastic
2. the **consumption** of plastic
3. the **management** of plastic waste.

**FIGURE 6. HOW DOES PLASTIC WASTE ESCAPE INTO THE RIVERINE ENVIRONMENT?**



28 Vientiane (capital city), Kaysone Phomvihane (formerly known as Savannakhet), Pakse, Luang Prabang, Thakhek, and Vang Vieng.

## Top 10 Plastic Items

**Most plastic pollution is caused by just a few types of plastic.** Decision makers need to know what these types of plastic are so they can focus their interventions on removing these items. This will have the biggest impact on plastic pollution by significantly reducing plastic waste.

**To identify these types of plastic, a diagnostic assessment was done across the country and in six cities <sup>29</sup>** (see Figure 7). It used a variety of land- and riverine-based studies and tools, including analyzing the plastic waste collected in net traps on rivers, from boats, at artificial barriers, and from visual observations. It also involved data analysis and stakeholder interviews on multiple aspects of plastics pollution, collection, and management.

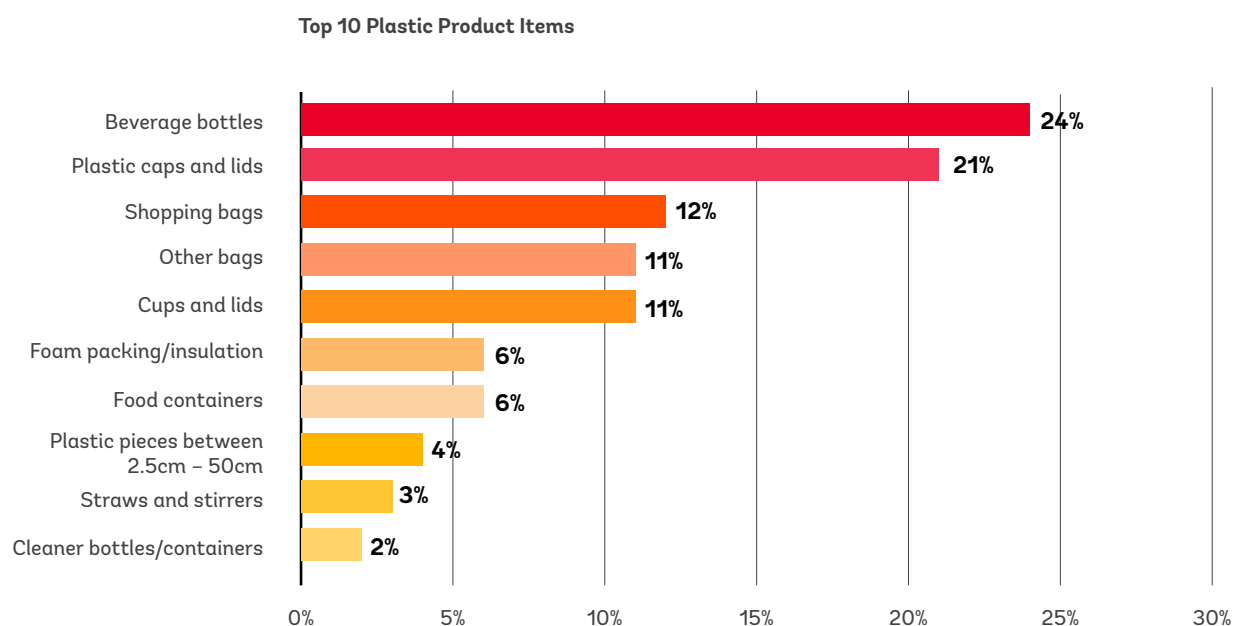
**FIGURE 7. DIAGNOSTIC ASSESSMENT SITES**



<sup>29</sup> Vientiane (capital city), Kaysone Phomvihane (formerly known as Savannakhet), Pakse including Pathoumphone, Luang Prabang, Thakhek, and Vang Vieng.

**The Top 10 items are all single-use plastics and were responsible for 95% of plastic pollution in the surveyed locations.** Plastic bottles and their caps and lids accounted for most plastic leakage in the Lao PDR (45 percent of plastic waste).<sup>30</sup> Plastic bags were the next most common type of waste (23 percent), and cups and lids followed next (11 percent). [Figure 8](#) shows the Top 10 plastic product items.

**FIGURE 8. NUMBER OF PLASTIC PRODUCT ITEMS**



**Single-use food and drink packaging is the top plastic product category.** Nearly 50 percent of plastic items by number relate to the food and drink industry and household products are next. By weight, both food and drink packaging and household products were very similar (see [Table 5](#)).

**TABLE 5. PRODUCT TYPES**

Product Type	No. of items	Kg	%
Food and drink packaging	3,892	45.3	45
Household products	1,541	41.2	41
Other packaging	539	8.3	8
Personal care products	116	2.8	3
Fishing gear	37	3.8	4
Smoking materials	1	0.0	0
<b>Total</b>	<b>6,126</b>	<b>101.4</b>	<b>100</b>

**The percentage of the top 10 plastic items were similar at all the six sites.** Across the cities, plastic bottles accounted for between 12 to 24 percent of plastic waste and the top five products items accounted for at least 80 percent of plastic waste. However, in Vang Vieng, there was a much higher number of plastic bottles found accounting for nearly 40 percent of its plastic pollution. This might be explained by the city's high number of tourists.

30 It should be noted that 39 percent of the bottles are small—less than 500 millilitres.



## Plastic Pollution Hotspots

**All six cities<sup>31</sup> had a high number of plastic pollution hotspots.** These included open dumps on the street and on riversides, and uncontrolled landfills. The inadequate disposal of waste is one of the main causes of plastic pollution hotspots.

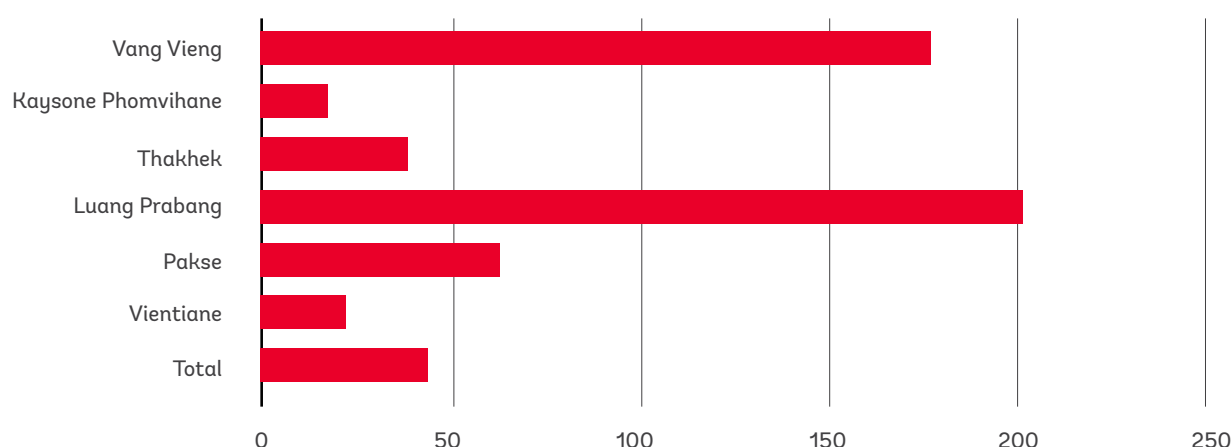
**The two key contributors to plastic hotspots are:**

1. **Restaurants, bars, and cafés**—Over 50 percent of hotspots were near these outlets (see [Table 6](#)).
2. **Tourists**—Vang Vieng and Luang Prabang had much higher numbers of hotspots per 100,000 inhabitants than the other cities. This may be due to the **higher numbers of tourists** who visit these cities (see [Figure 9](#)).

**TABLE 6. NUMBERS AND TYPES OF PLASTIC POLLUTION HOTSPOTS**

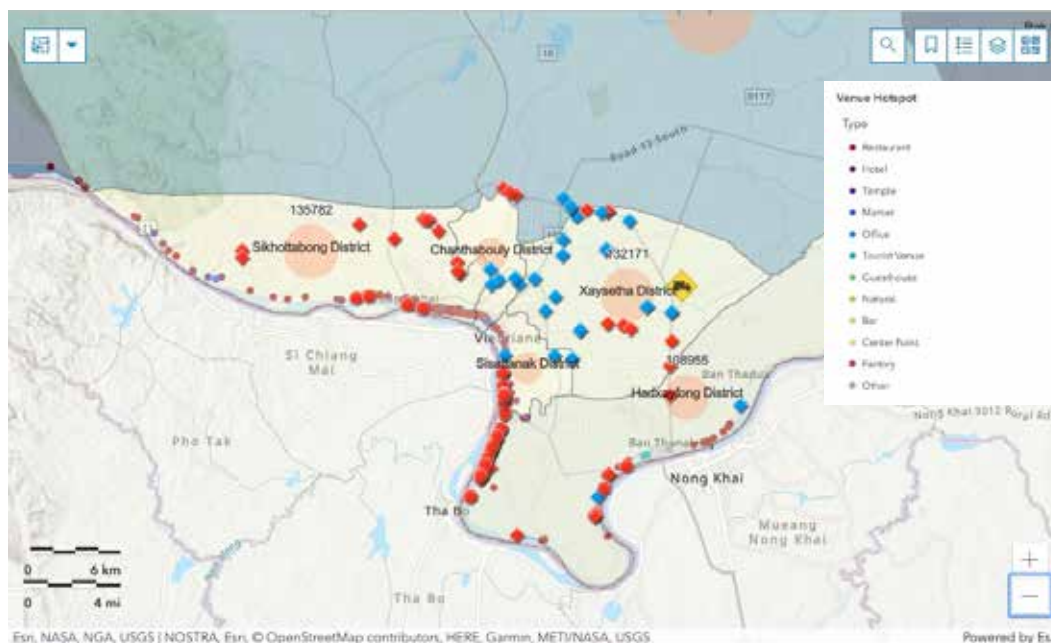
Area type of plastic pollution hotspot	Nr of hotspots (informal dumpsites)
Restaurants, bars, and cafés	304
Hostels, hotels, and similar	143
Markets, shops, and offices	19
Religious and tourist venues such as temple and monuments	73
Nature, parks, caves, and other recreation sites	34
Hospital, schools, universities, and bus stations	16
Industry such as factories and fish farms	8
<b>Total</b>	<b>597</b>


**FIGURE 9. NUMBER OF HOTSPOTS PER 100,000**



**The results of the riverine survey are described on an ArcGIS database.** [Figure 10](#) shows the locations of plastic hotspots in Vientiane. The figure clearly demonstrates the high frequency of informal dumpsites and hotspots caused by restaurants and hotels all along the Mekong River.

31 Vientiane (capital city), Kaysone Phomvihane (formerly known as Savannakhet), Pakse, Luang Prabang, Thakhek, and Vang Vieng.

**FIGURE 10. HOTSPOTS IN VIENTIANE**

To explore this map in further detail and for six other surveyed cities, go to: <https://bit.ly/3iokodu>  
 Click on the top right-hand side of the map on this symbol  to see the different data layers.

## Informal Dumpsites

**Open and informal dumping occur on land and on riverbanks.** Across the six surveyed cities there were 149 dumpsites observed. The size of dumpsites varied but on average they were seven cubic meters. More than 50 percent of dumpsites were located inland, and these tended to be much bigger in size (see [Table 7](#)).

**People living near these informal dumpsites were interviewed during the surveys.** They stated that waste from informal dumpsites was not collected and that it was occasionally burned. They also stated that waste on dumpsites near rivers was either burned or simply left to be washed away into the river during rainy season.

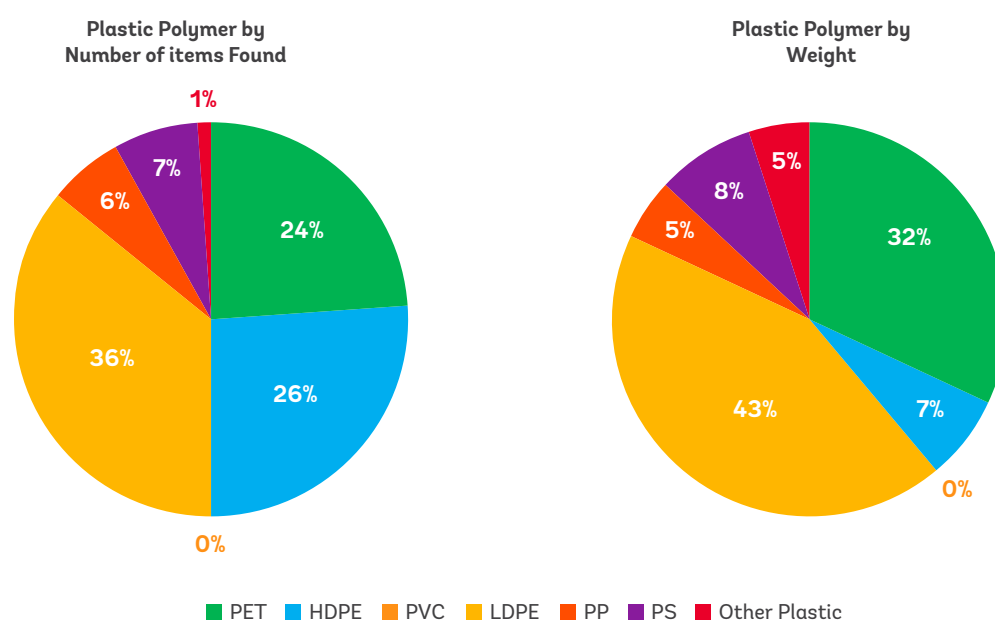
## Assessment on Recyclability and Alternatives

### Polymer Types

Polyethylene terephthalate (PET), high-density polyethylene (HDPE) and low-density polyethylene (LDPE) are the most common plastic polymer types (see [Figure 11](#)).

**TABLE 7. NUMBERS AND SIZE OF INFORMAL DUMPSITES NEAR RIVERS AND INLAND**

		Dumpsites near Rivers	Dumpsites Inland	Total, all Dumpsites
<b>Total no. of sites</b>		<b>61</b>	<b>88</b>	<b>149</b>
<b>Vientiane</b>	No. of sites	7	30	37
	Approximate m <sup>3</sup>	32	286	318
	Estimated tons	2	20	22
<b>Pakse</b>	No. of sites	6	11	17
	Approximate m <sup>3</sup>	107	198	305
	Estimated tons	7	14	21
<b>Luang Prabang</b>	No. of sites	16	10	26
	Approximate m <sup>3</sup>	20	24	44
	Estimated tons	1	2	3
<b>Thakhek</b>	No. of sites	13	23	36
	Approximate m <sup>3</sup>	34	146	180
	Estimated tons	2	10	13
<b>Kaysone Phomvihane</b>	No. of sites	7	11	18
	Approximate m <sup>3</sup>	12	177	189
	Estimated tons	1	12	13
<b>Vang Vieng</b>	No. of sites	12	3	15
	Approximate m <sup>3</sup>	19	12	31
	Estimated tons	1	1	2
<b>Total m<sup>3</sup></b>		<b>224</b>	<b>843</b>	<b>1,067</b>
<b>Total tons</b>		<b>16</b>	<b>59</b>	<b>75</b>

**FIGURE 11. PLASTIC POLYMER TYPES**

## What are the Alternatives?

**When developing plastic policies, it is key to consider the availability of suitable alternative materials.** Single-use plastics can only be phased out if good alternatives are widely available on the market. A market survey on alternative products in the Lao PDR was carried out. Table 9 shows the alternative materials that can be used instead of plastic, whether they are reusable, and their current availability in the Lao PDR. While for some single-use plastics other single-use alternatives exist, in line with the Government's Green Growth strategy and promotion of circular economy, the overall focus should be on reducing waste amounts by promoting reusable products.

**PET is easy to recycle, has a high value, and drinking bottles are made from PET.** In addition, there is a well-developed international recycling market for PET. In the Lao PDR, traders will give around 700-1,400 Kip per kilogram of water bottles and can sell them again for 1,000-1,600 Kip per kilogram. However, other key products have much lower recycling values. It also must be noted that despite their relatively high value, PET bottles is the number one item leaking into the environment. Table 8 shows an assessment of the common plastic product types, how easy they are to recycle and how valuable they are as a recycled product.

**TABLE 8. RECYCLABILITY AND VALUE OF PLASTIC PRODUCT ITEMS**

Polymer	Typical Product Items	Recyclability	Value
PET	Drinking bottles	High	High
HDPE	Caps, lids, cleaning bottles	Medium	Medium
LDPE	Bags, wrapping, packaging	Low	Low
PS (incl. EPS/XPS)	Food containers, insulation	Very low	No value
PP	Cups, cutlery, straws, shoes, toys	Medium	Medium
Other plastic	Other products	Very low	Possible value as refuse derived fuel

**TABLE 9. ALTERNATIVE MATERIALS TO PLASTIC**

Typical Product Items	Alternatives	Functionality	Current Availability in the Lao PDR
Drinking bottles and caps, lids, and rings	Glass	Reusable	Readily available (imported)
	Aluminum	Reusable	Readily available (imported)
Bags, wrapping, packaging	Paper	Single use	Unknown
	Textile	Reusable	Readily available (local)
	Rattan	Reusable	Readily available (local)
Food containers, insulation	Paper	Single use	Readily available (local)
	Paper box	Single use	Readily available (local)
	Aluminum	Single use	Readily available (imported)
	Stainless steel	Reusable	Readily available
Cups and lids	Paper	Single use	Readily available (local)
Straws	Aluminum	Reusable	Niche product available (imported)
	Bamboo	Reusable	Niche product—not widely available
	Rice	Single use	Low availability (imported)



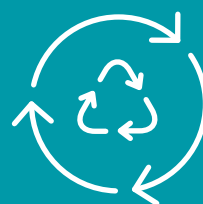
# 5 Roadmap towards a National Plastics Action Plan (NPAP)

In line with its commitment to act on plastic pollution in the Lao PDR, the MONRE asked the World Bank to support the development of an NPAP. In addition to building an analysis of plastic pollution, an assessment was done on the potential plastic policy measures needed to clean up the Lao PDR and how to implement a new approach to managing waste that is climate- and environmentally friendly and encourages sustainable growth—that is moving from a linear to a circular economy.<sup>32</sup>

## Transitioning from a Linear to Circular Economy

The development of an NPAP should consider how integrating a circular economy approach will feed into the objectives of the NGGS 2030. This strategy supports the transition from a linear to circular economy which in turn will encourage sustainable growth, build a low carbon and climate resilient economy, create decent jobs, while also making the environment safer, healthier, and cleaner.<sup>33</sup>

The transition requires that all actors along the value chain of a product change their behavior and practice. This change needs to happen at every stage of the chain including research and development, design and material selection, manufacturing, transport and distribution, and usage and end-of-life management. Reducing consumption for the priority plastic products is one of the most crucial and most effective measures in this transition.



### The Circular Economy

The circular economy is a sustainable alternative to the traditional linear (take-make-dispose) economic model. It reduces waste to a minimum by reusing, repairing, refurbishing, and recycling existing materials and products.

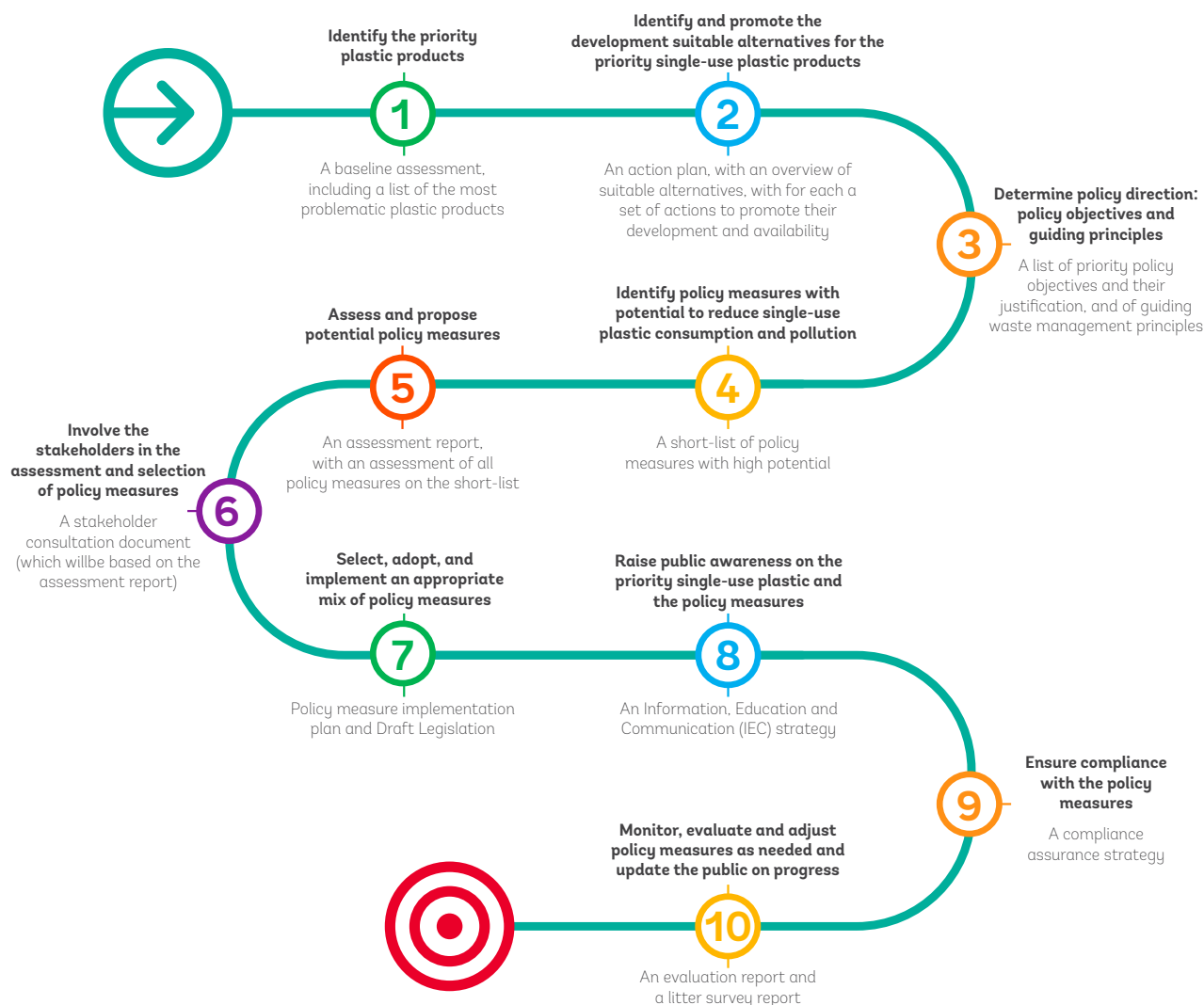
As a result, less waste is created, aspects of environmental degradation are addressed while also building new economic opportunities and resilience.

## Plastic Policy Roadmap

The GoL and the World Bank are working together on a 10-step roadmap to guide the development of the NPAP and to adopt suitable plastic policy measures. Some of the activities have now been completed through the research and development of this report. See Figure 12 for the key outputs of the roadmap.

<sup>32</sup> See: <https://www.switchtogreen.eu/switch-value-chains/>

<sup>33</sup> See: <https://www.switchtogreen.eu/switch-value-chains/>

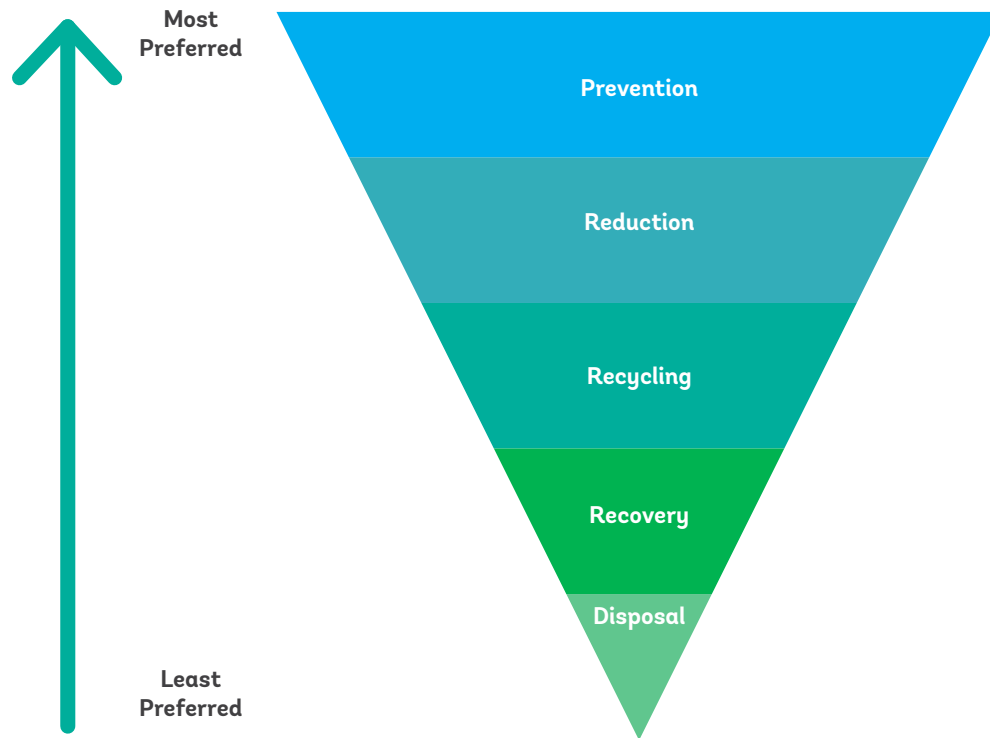
**FIGURE 12. PLASTIC POLICY ROADMAP**

## Policy Measures

**Policy measures drive change.** The right measures can drive the behavior changes needed to reduce plastic pollution by limiting the consumption of priority single-use plastics. These plastics are responsible for most plastic pollution. There are four types of measures that reduce plastics pollution and consumption:

1. Regulatory change supported by enforcement
2. Economic incentives
3. Information and awareness building
4. Voluntary approaches and agreements.

**Policy measures need to consider:** (1) the waste hierarchy (see [Figure 13](#)); (2) strategies on promoting a more circular economy; (3) the **Polluter Pays Principle**—those responsible for the waste pollution must pay; and (3) the **Extended Producer Responsibility**—those responsible for creating the products that cause the waste must pay. Measures must also specify which plastic item, type, and polymer it is targeting.

**FIGURE 13. WASTE HIERARCHY—MOVING FROM DISPOSAL TO PREVENTION**

Source: See: <https://techrecycle.london/the-waste-hierarchy/>

## Regulation and Enforcement

**Regulation and enforcement are often referred to as the “command and control” approach.** It is the most efficient way to implement change. Examples include product bans, mandatory use of alternatives, and product design standards. They involve direct regulation and credible enforcement.

## Economic

**Economic instruments provide incentives for change.** Examples include taxes on specific product types, subsidies and ‘polluter must pay’ schemes.

## Information and Awareness Building

**Understanding what the problem is and how to solve it can change the behavior of those involved including consumers and industry.** Information, education, and communication campaigns will support this as will providing technical assistance to build the capacity of business to comply with new regulations and enforcement measures.

## Voluntary

**Stakeholders need to be committed to making the changes needed to address the problem.** Voluntary instruments include public-private sector partnerships and collaborations, deposit refund systems, and environmental labelling.

## Priority Plastic Items

**Policy decision making also needs to know which type of single-use plastics to prioritize.** The survey identified the most common type of single-use plastic and sorted them into four categories based on how they are used (see Table 10):

1. Serving, consuming, or transporting drinks
2. Transporting shopping and products
3. Servicing, consuming, or transporting prepared or raw food
4. Single portion packs for food.

**These plastic items:**

- > Are responsible for a majority of plastics pollution in the Lao PDR<sup>34</sup>
- > Are non-essential and there are good alternatives available on the market
- > Are already being regulated against internationally and results are positive.

## Priority Stakeholders

**The food and drink sector creates the most plastic pollution and should be a priority target group.** Changing behavior in how this sector uses single-use plastic will have the biggest impact on plastic waste.

## Consumers

**Consumers play a key role as their choices drive the design of the products on offer.** In addition, their behavior has an impact on littering. Building consumer awareness will reduce littering, reduce consumption, and support the circular economy.

## Vendors



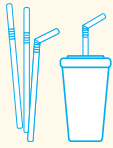
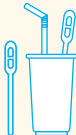
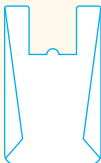
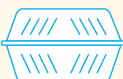
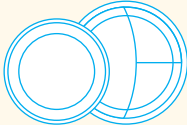
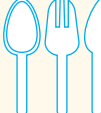

**Retailers, the hospitality industry, and food delivery companies are the three key types of vendors that need to be targeted.** Retailers are the consumer-facing part of the supply chain. The hospitality industry plays a big role in the tourism industry.<sup>35</sup>

34 See Figure 28. World Bank. 2021. *Supporting Lao PDR in Development of a Plastic Action Plan—Plastic Diagnostics*

35 Food delivery companies are an industry that has exponentially expanded over recent years introducing an immense of single-use plastic into the market, especially in the Asian Pacific region. See: <https://blog.euromonitor.com/food-delivery-race-heats-up-in-asia-pacific/>



**TABLE 10. PROPOSED LIST OF PRIORITY SINGLE-USE PLASTICS**

Single-Use Plastic	Description of Single-Use Plastic	Typical Polymer
<b>Serving, Consuming, or Transporting Drinks (Beverage Service Disposables)</b>		
Beverage bottles		PET
Cups		Plastic lined paper, EPS, PET, PS
Drinking straws		PP
Stirrers		PP
<b>Transporting Goods</b>		
Lightweight carrier bags <sup>36</sup>		PP
<b>Serving, Consuming, or Transporting Prepared and Raw Food (Food Service Disposables)</b>		
Food containers		EPS/XPS
Dinnerware <sup>37</sup>		PS
Cutlery		PS
<b>Portion Control Packaging for Food and Toiletries</b>		
Single portion packs (such as food, soaps, toothpaste)		PE, PP

<sup>36</sup> Plastic bags for hygiene purposes and multiple-reuse plastic bags are excluded.

<sup>37</sup> Food trays used in non-take-away situations are excluded (such as food trays in supermarkets that display and contain meat or fish).

## Priority Plastic Policies

The types of policy measures above were assessed in detail to ensure they would work in practice as part of supporting the MONRE’s development of an effective NPAP. This included looking at: (1) potential target products; (2) the roles and responsibilities of government and stakeholders; (3) the target groups; (4) the timeframes for implementation; (5) the potential social, economic, and environmental impacts; (6) international experience; (7) enabling conditions; and (8) local capacity.

In consultation with the MONRE, this assessment was used to develop a set of high potential policy measures.<sup>38</sup> The following factors were considered when developing this list. These included focusing on:

- > A few selected priority plastic items that cause the majority of pollution
- > Non-essential items or items where good alternatives exist
- > The feasibility of implementation
- > The least disruptive measures
- > Short-term policy options such as bans, usage restrictions, fees, and public awareness
- > Priority sectors such as tourism and hospitality, in which many policy instruments are considered most feasible and effective in the short-term
- > Short-term measures that are simple, low-cost, and need minimal capacity
- > A phased introduction of measures, starting with ‘quick wins’ and expand policy measures over time building on previous success.

Each high potential policy measure was then aligned against three criteria:

1. Target products
2. Target stakeholders (that is the stakeholders that need to take action to implement or to comply with the measure)
3. Timeframe.

The resulting set of high potential plastic policy measures is intended to provide orientation and guidance in identifying the most suitable policy instruments and is designed as an iterative working document to support the development of an NPAP (see Table 11).

## High Potential Plastic Policy Measures

**TABLE 11. HIGH POTENTIAL PLASTIC POLICY MEASURES**

Policy Measures	Target Products	Target Stakeholders	Timeframe
<b>Regulatory Measures</b>			
<b>Product bans</b>	Lightweight plastic bags	1 <sup>st</sup> phase: chain retailers	Short-term
		2 <sup>nd</sup> phase: all retailers	Medium-term
	<ul style="list-style-type: none"> <li>&gt; Drinking straws</li> <li>&gt; Beverage stirrers</li> </ul>	All vendors of the SUPs <ul style="list-style-type: none"> <li>&gt; All retailers</li> <li>&gt; All accommodation establishments</li> <li>&gt; All food &amp; beverage establishments</li> <li>&gt; All food delivery companies</li> </ul>	Short-term
	Priority SUPs made of EPS/XPS: <ul style="list-style-type: none"> <li>&gt; Food containers</li> <li>&gt; Dinnerware</li> <li>&gt; Cutlery</li> </ul>	All vendors of the priority SUPs	Short-term
	Single-portion packs <ul style="list-style-type: none"> <li>&gt; Pre-portioned, single-portion packs for toiletries (soaps, gels, oils, toothpaste etc.), in single-use packaging.</li> <li>&gt; <i>Selected</i> pre-portioned, single-portion packs for food in single-use packaging.</li> </ul>	1 <sup>st</sup> phase: all chain hotels and all-inclusive resorts 2 <sup>nd</sup> phase: Independent accommodation establishments.	Short-term Medium term
	<ul style="list-style-type: none"> <li>&gt; Food containers</li> <li>&gt; Dinnerware</li> <li>&gt; Cutlery</li> <li>&gt; Beverage bottles</li> <li>&gt; Beverage cups</li> </ul>	All vendors of the priority SUPs	Short-term
<b>A ban on on-site consumption (meaning that the SUPs can only be given out for off-the-premises consumption).</b>	<ul style="list-style-type: none"> <li>&gt; Food containers</li> <li>&gt; Dinnerware</li> <li>&gt; Cutlery</li> <li>&gt; Beverage bottles</li> <li>&gt; Beverage cups</li> </ul>	All vendors of the priority SUPs	Short-term
<b>A ban in selected tourism destinations and hotspots</b>	In addition to the priority SUPs banned nationwide (and except beverage bottles, which will be covered by a voluntary agreement): <ul style="list-style-type: none"> <li>&gt; Food containers</li> <li>&gt; Dinnerware</li> <li>&gt; Cutlery</li> <li>&gt; Beverage cups</li> </ul>	All vendors of the priority SUPs	Short-term
<b>A ban for selected natural, cultural and heritage sites.</b>	All priority SUPs (Lightweight carrier bags; Food containers; Dinnerware; Cutlery; Beverage bottles; Cups; Drinking straws; Stirrers; Single-portion packs)	All vendors of the priority SUPs, established on the sites All visitors to the sites	Short-term
<b>Mandatory availability of alternatives: SUNPP or MUPs</b>	For all priority SUPs which are subjected to either a ban or a levy. ( <i>single-use products, plastic or otherwise, should be avoided as much as possible</i> )	All vendors of the priority SUPs	Short-term
<b>Mandatory reduction plans</b>	All priority SUPs, including those that are banned, as the plans should outline which alternatives are being promoted and used.	1 <sup>st</sup> phase: <ul style="list-style-type: none"> <li>&gt; All chain retailers</li> <li>&gt; All chain hotels &amp; all-inclusive resorts</li> </ul>	Short-term

Policy Measures	Target Products	Target Stakeholders	Timeframe
<b>Mandatory reduction plans</b>		2 <sup>nd</sup> phase: > All chain food & beverage establishments > All institutional catering facilities, with over 50 daily customers (Government canteens, Hospitals, Prisons, Schools etc.) > Industrial catering facilities for businesses with over 25 full-time employees.	Medium-term
<b>Product design standards</b> (to improve potential for litter reduction, reuse and recycling)	All priority SUPs (e.g. minimum recycled content; polymer combinations; labels; colors; additives; product design requirements)	All producers (manufacturers, importers, brand owners) of the priority SUPs	Requires regional standards
<b>Consumption targets</b>	All priority SUPs, except those that are banned	All SUP vendors and consumers	Short-term
<b>Economic Instruments</b>			
<b>Consumer levy</b>	Very lightweight plastic bags	1 <sup>st</sup> phase: chain retailers	Short-term
		2 <sup>nd</sup> phase: all retailers	Medium-term
<b>Consumer charge</b> (different from a levy, as the revenues are retained by the vendor)	All priority SUPs, except for those for which either a ban or a levy is imposed. <i>Note: either bans OR consumer charges for specific products can be applied. Bans may often be more effective, but for some products consumer charges may be preferred (in the interim)</i>	Vendors of the priority SUPs: chain establishments	Short-term
		Vendors of the priority SUPs: independent establishments	Medium-term
<b>Import/producer/retail levy</b>	All SUPs. A tax placed on manufacturers/importers/retailers for specific products. <i>Note: Double taxation (combination of consumer levy or charge with import/producer/retail levy) should be avoided. Consumer charges are generally considered as more effective, as producer/import levies may only marginally be passed on to the consumer and are less visible.</i>	Manufacturers/importers/retailers	
<b>Subsidies (grants, incentives in direct and indirect taxation e.g. tax deductions; tax credits; VAT)</b>	All priority SUPs for which suitable alternatives are not yet widely available in the Lao PDR, for which alternatives are available elsewhere or could be realistically developed in the short-term.	All businesses that develop and distribute suitable alternatives, meeting the selection requirements that may be defined by the GoL.	Short to medium-term
<b>Green Public Procurement</b>	All priority SUPs	1 <sup>st</sup> phase: all national government administrations	Short-term
		2 <sup>nd</sup> phase: all local government administrations.	Medium-term

Policy Measures	Target Products	Target Stakeholders	Timeframe
<b>EPR-related measures</b> (e.g. product-take back obligation; importer/producer levy; financial or organizational responsibility for collection, sorting, recycling, disposal)	All priority plastics, which are not covered by a ban	All producers (manufacturers, importers, brand owners) of the priority SUPs	
<b>Information Instruments</b>			
<b>IEC campaigns</b> (supporting the other measures); not as a stand-alone measure.	All priority SUPs	All the vendors and users of the SUPs	Short-term, but should continue on an ongoing basis
<b>Technical Assistance</b>			
<b>Guidance manuals</b>	All priority SUPs	All accommodation establishments	Short-term, and periodically updated
		> All food & beverage establishments > All food delivery companies	Medium-term
<b>Research and development</b>	All priority SUPs for which suitable alternatives are not yet widely available in the Lao PDR, but for which they could be realistically developed in the short-term.	Government administrations, responsible for research, development, and innovation.	Short- to medium-term, and periodically updated
<b>Pilot projects</b>	All priority SUPs, except those which are subjected to either a ban or a levy.	Public and private organizations, including businesses and community-based organizations	Short-term
<b>Training on producing alternatives to SUPs</b>	Lightweight carrier bags	Community-based organizations	Short-term
<b>Voluntary Approaches</b>			
<b>Voluntary agreements</b>	> All priority SUPs, with a particular focus on single-use portion packs. > Would preferably cover all types of waste, including SUPs and other plastic products which are not being included in the list of priority SUPs, food waste and other common types of waste in the hospitality sector.	1st phase: > Associations of accommodation establishments (tourism) > Chain hotels and all-inclusive resorts	Short-term
		2nd phase: Independent accommodation establishments.	Medium-term
<b>Deposit Refund System (DRS) for Reuse</b>	> Beverage cups > Food containers > Dinnerware & cutlery	Food and beverage establishments that wish to develop a communal DRS for reuse	
<b>Environmental labelling</b>	All priority SUPs; would preferably cover all types of waste, including SUPs and other plastic products which are not being included in the list of priority SUPs, food waste and other common types of waste in the hospitality sector.	1 <sup>st</sup> phase: > Associations of accommodation establishments (tourism) > Individual chain hotels and all-inclusive resorts	Short-term



Policy Measures	Target Products	Target Stakeholders	Timeframe
Environmental labelling	All priority SUPs; would preferably cover all types of waste, including SUPs and other plastic products which are not being included in the list of priority SUPs, food waste and other common types of waste in the hospitality sector.	2 <sup>nd</sup> phase: Independent accommodation establishments.	Medium-term
		1 <sup>st</sup> phase: > Associations of food & beverage establishments > Chain establishments	Short-term
		2 <sup>nd</sup> phase: Independent food & beverage establishments.	Medium-term
Unilateral commitments	All priority SUPs, selected by business.	Any business	Continued basis

## Recommended Next Steps to Develop an NPAP

### Involve the Stakeholders

**It is crucial that all stakeholders are involved in planning the NPAP as policy success is dependent upon them changing their behavior.** They should be involved at all the stages of the process and involvement can include providing information, opportunities for consultation and participation, and negotiation. In addition, stakeholder involvement should be inclusive, open and transparent, timely, relevant, responsive, and credible.

### Select, Adopt and Implement Policy Measures

**An implementation plan needs to be made that:** (1) accommodates the preferred measures and the practicalities of formalizing them; (2) estimates the resources (skills and finance) needed to ensure they are implemented; (3) the purpose of any revenues; and (4) how long it will take for this process to happen.

### Raise Public Awareness

**An IEC strategy needs to be developed** to raise awareness about the negative impacts caused by single-use plastics and to effectively inform all targeted stakeholders about the policy measures that are being taken to reduce these impacts.

### Ensure Compliance

**A compliance strategy is also needed** as there are so many stakeholders it will be challenging to ensure compliance. Monitoring and effective enforcement of policy measures will be key to making sure that the policy changes are successful.

### Monitor, Evaluate and Adjust Policy Measures

**Key performance indicators need to be identified** as they will guide the monitoring and evaluating process, demonstrate progress and opportunities for review and adaptation.

# 6 Actions for Change

The solid and plastic waste situation in the Lao PDR is a crisis that needs to be immediately addressed for the sake of the environment, the economy, and the health of its population. Urgent action is needed to change the solid waste management landscape and head towards a greener and more eco-friendly economy (see [Figure 14](#)). The Lao PDR needs to:

**FIGURE 14. FOUR KEY CHANGES NEEDED**



These changes are possible, but the following actions are needed to ensure success.

1. Action on Plastic
2. Create New Legal and Institutional Frameworks
3. Invest in Solid Waste Management Operations
4. Move Towards a Circular Waste Economy

## 1. Action on Plastic

### National Plastic Action Plan (NPAP)

#### Actions needed:

1. Select and agree on PRIORITY plastic items and policy measures (see [Table 11](#))
2. Initiate stakeholder consultations on selected priority plastic measures
3. Implement the subsequent steps on the plastic policy road map (see [Figure 12](#))
4. Develop and implement the NPAP.

### Measures

#### Action needed:

Implement four key measures to limit the use of single-use plastics and to reduce plastic waste while focusing on target products, stakeholders and within short-term to medium-term timeframes.

1. Regulatory change supported by enforcement
2. Economic incentives
3. Information and awareness building
4. Voluntary approaches and agreements.

In addition to developing an NPAP and the measures needed to ensure the policy measures are successful in reducing plastic pollution in the Lao PDR, a broader set of solid waste management measures are needed.

## 2. Create New Legal and Institutional Frameworks

#### Actions needed:

New legal frameworks are needed to set the legislative landscape to guide policy and decision-making including:

1. Develop a national and integrated vision for solid waste management.
2. Develop a new Legal Framework on Waste Management and other specific legislation to prioritize how waste is managed in the Lao PDR.

### 3. Invest in Solid Waste Management Operations

#### Collection and Disposal

##### Actions needed:

1. Conduct feasibility studies to determine equipment and workforce needs to inform future investments
2. Make sure that heavy-cost infrastructure investments are supported by capacity building, technical assistance and operational and management back up
3. Replace, or rehabilitate and upgrade existing disposal sites
4. Make sure changes to disposal sites are based on international best practice
5. Upgrade vehicle fleets and collection equipment
6. Expand collection points beyond urban areas by establishing community collection points, sorting facilities and transfer stations
7. Pay specific attention to informal sector to protect livelihoods.

#### Reduce, Reuse, and Recycle

##### Actions needed:

1. Implement an IEC campaign to build stakeholder and public awareness of the issues to encourage willingness to participate and reduce the use of single-use plastics
2. Prioritize the diversion of waste away from final disposal by establishing formal segregation of waste and building the capacity of recycling and pre-treatment
3. Make sure disposal sites and recycling centers can cater for the projected import of plastic waste for processing
4. In addition, to reducing, reusing, and recycling plastic, projects that process organic waste should also be prioritized.

#### Finance

##### Actions needed:

1. Review fee collection system and consider adding waste fees to other municipal collection fees (such as electricity and property taxes)
2. Extend service areas to increase household waste collection fee rates
3. Review and revise charges for household waste
4. Link the cost of waste collection to waste fees
5. Run affordability and willingness to pay surveys to determine acceptable fee structures
6. Introduce a polluter pays system.

#### Contracts

##### Actions needed:

1. Make sure solid waste collection contracts include key performance indicators (KPIs) to help monitor progress against agreed objectives
2. Make sure solid waste collection contracts and concessions run for at least two to three years to encourage investments in equipment and quality of service provided

## Data Collection

**Create a more rigorous data collection system for more accurate data on solid and plastic waste.**

**Actions needed:**

- > Set up systems for data collection, analysis, reporting and monitoring are required to provide a more comprehensive overview of waste management, help determine areas for improvement, and enhance sector monitoring and planning.
- > Begin the process of developing a comprehensive Waste Information System (WIS). A simple way to start would be to install of weighbridges at all landfills and create an automated registration and reporting system. Once this is set up, the WIS could become more comprehensive by adding other key indicators.

## Capacity and Awareness Building

**Actions needed:**

- > Support capacity building, technical assistance and operations and maintenance support
- > Build institutional capacity at national and local level

## 4. Move towards a Circular Waste Economy

**Develop an innovative climate-neutral, resource efficient, circular economy for solid and plastic waste and in compliance with the waste hierarchy (moving from disposal to prevention).** This will contribute to sustainable growth, low carbon and climate resilient development, decent job creation, and a safer, healthier and pollution-free environment.

**Actions needed:**

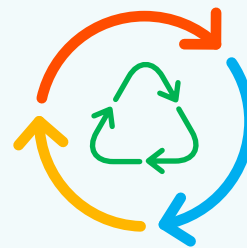
- 1** Design out waste and pollution



- 2** Keep products and materials in use



- 3** Protect natural systems from pollution







*Larb - Lao minced beef salad served with lettuce leaves for wraps*



*Garbage bamboo wicker baskets*



*A Lao woman collects recyclables on the streets of Luang Prabang*



*Blue lagoon, Vang Vieng, Laos*



**The World Bank Group Lao PDR Country Office,  
East Asia and Pacific Region**

Xieng Ngeun Village, Chao Fa Ngum Road,  
Chantabouly District, Vientiane Capital, Lao PDR

**[worldbank.org/lao](http://worldbank.org/lao)**