“THE SECOND STATE OF 3RS IN ASIA AND THE PACIFIC – ADVANCING CIRCULAR ECONOMY IN ASIA AND THE PACIFIC TOWARDS ACHIEVING THE SUSTAINABLE DEVELOPMENT GOALS (SDGS)”

(PRE-FINAL DRAFT REPORT)

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Supported by

Office for Promotion of Sound Material-Cycle Society, Environmental Regeneration and Material Cycles

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CHAPTER 1: BACKGROUND & SCOPE OF WORK

Introduction

Asia and the Pacific region which has 242,000 km of coastline, typically includes major parts of East Asia, South Asia, Southeast Asia, and Oceania (in or near the Western Pacific Ocean). It has geographical area above 29 million km^2 with a population of about 4 billion. The region's population is projected to rise to 5.08 billion by 2050, which is about 60% of the world's total population.

Economic Profile

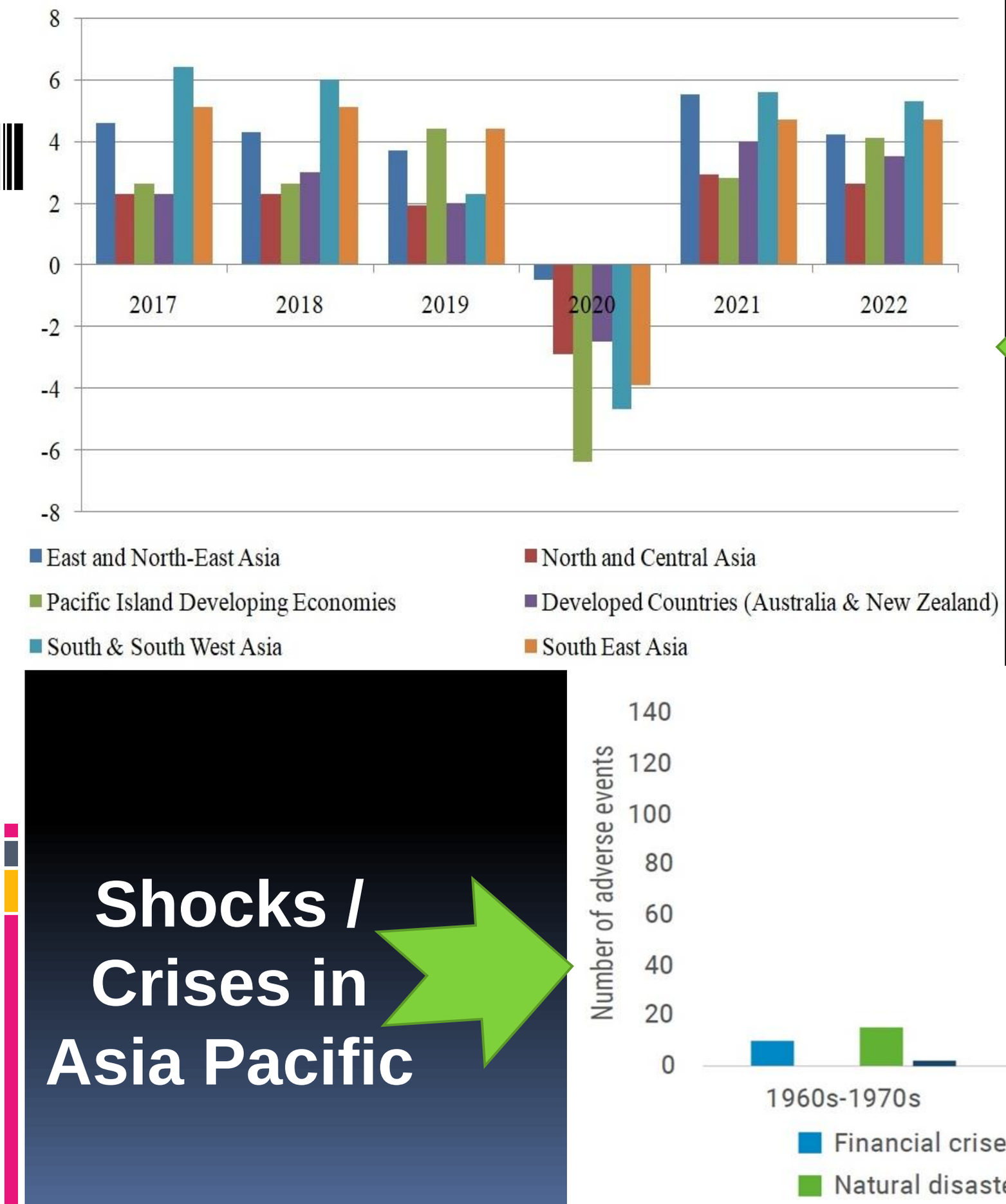
- The Asia and the Pacific region has GDP above US$ 40 trillion (nominal) with US$ 8922 per capita. During the past 50 years the region has experienced rapid economic growth, higher incomes, reduced poverty reduction emerging rapidly-expanding middle class.

- The two thirds of the regional economies, account for 80% of the region's GDP. Developing Asia-Pacific economies grew by an estimated 3 to 4% in pre pandemic period.

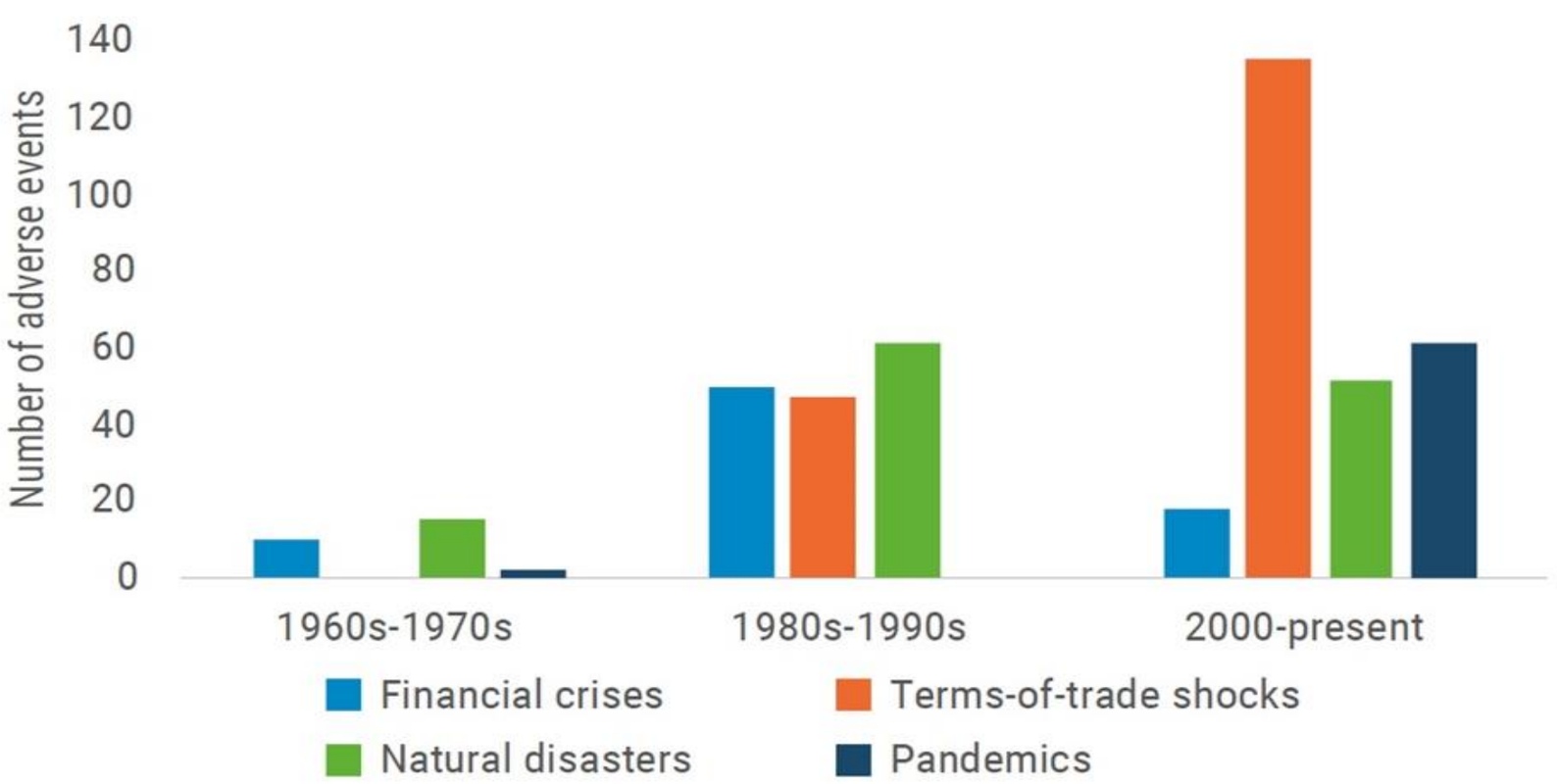
- Employment trends are significantly changing with decreasing trend in agriculture employment while increasing trend in industrial & services sector.

- The region experienced major economic disruption in 2020 with the outbreak of COVID – 19 pandemic.

Sub-Regional GDP Growth Rates



Shocks / Crises in Asia Pacific



Environmental Profile

- The region's material intensity has increased sharply since 1970s, accounting for more than 50% of world consumption.
- The region is expected to account for more than half of global production by 2050.
- The domestic material consumption per person increased from 2.9 tonnes in 1970 to 11.9 tonnes in 2015, with a high growth rate at 5.2% per annum.
- The energy generation continues to rely on fossil fuels and the share of renewable energy remains small despite very significant investment in renewable-energy infrastructure particularly solar and wind.
- The region is facing major issues of include air pollution, water pollution, grossly pollute major water resources, marine litter, inadequate waste management, deforestation, land degradation, and biodiversity loss.
- Of the 10 countries worldwide with the highest estimated disaster risk, seven are in Asia.
- **In the past the region experienced four types of shocks: financial crises; negative terms-of-trade shocks; natural disasters; and epidemics/pandemics.**

Environmental Profile Contd

- Municipal solid waste (MSW) generation in Asia and the Pacific is projected to increase until 2030, and is expected to reach 1.6 kilograms per person per day or around 1.4 billion tonnes a year.

- The waste collection rates are moderate, at 40–80% in developing countries in the region, but reach almost 100% in more developed economies such as Japan, Australia, Republic of Korea and Singapore.

- During COVID – 19 pandemic higher waste generation abruptly strained waste management chains which were weak to begin with, and nearly caused them to collapse in some cities in the region.

- Further, the increasing frequency of such diseases like COVID – 19 has been linked to unsustainable human activities and increasing pressures on ecosystems.

- As the region recovers from the pandemic, recovery measures will be an important opportunity to rethink the pathways towards development and prosperity in the region and beyond, and will give the true measure of the total impact of COVID-19 on the environment.

Relevance of (Reduce, Reuse and Recycle) 3R, Practices and connectivity to SDGs and its Targets

As a regional response to these environmental issue, UNCRD has been convening annual Regional 3R Forum in Asia and the Pacific since 2009 under the project of Promotion of 3R in Asia and the Pacific, supported by the Ministry of the Environment, Japan.

So far 10th Regional 3R Forums have been organized with major declaration as:

- 4th Regional 3R Forum in Asia (Ha Noi, Vietnam / March 18-20-, 2013) – Ha Noi 3R Declaration
- 6th Regional 3R Forum in Asia and the Pacific (Male Maldives / August 16-19, 2015) – Male Declaration
- 7th Regional 3R Forum in Asia and the Pacific (Adelaide, South Australia, Australia / Nov 2-4, 2016) – Adelaide Declaration
- 8th Regional 3R Forum in Asia and the Pacific (Brilliant Convention, Centre, Indore, Madhya Pradesh, India / April 10-12, 2018) – Indore Declaration
- 9th Regional 3R Forum in Asia and the Pacific (Bangkok, Thailand / March 4-6, 2019) – Bangkok, Declaration

Relevance of (Reduce, Reuse and Recycle) 3R, Practices and connectivity to SDGs and its Targets Contd…

- The 3R forum emerged by institutionalizing 3Rs from conceptual stage to functional stage in the fourth 3R Forum at Hanoi. In order to demonstrate their renewed commitment to realizing a promising decade (2013-2023) of sustainable actions and measures for achieving resource efficient society and a green economy in the Asia-Pacific region through the implementation of the 3Rs, the countries in Asia and the Pacific resolved to voluntarily develop, introduce and implement policy options, programmes and projects towards realizing the thirty three sustainable 3R goals in the region.

- The 3R goals while promoting circularity & self sufficiency are integrated to 2030 Agenda for Sustainable Development with 17 Sustainable Goals at its core.

- 3R Forum further evolved by mainstreaming circular economy, SDGs (sustainability) and self sufficiency in the region.

- The first report “State of the 3Rs in Asia and the Pacific” is an experts assessment on the regional 3R progress since 2013.

- The report was officially launched at the 8th Regional 3R Forum in Asia and the Pacific in Indore, India in 2018 as synthesized report and covered eleven countries.

Scope and Structure of the Report

- “The Second State of the 3Rs and Resource Circulation and Circular Economy in Asia and the Pacific – Advancing Circular Economy in Asia and the Pacific towards achieving the Sustainable Development Goals (SDGs)” is expected to be officially launched in 2nd Qtr of 2022-2023, to assess the progress made on the Ha Noi 3R Declaration (2013-2023).

- The overall objective of the report in Asia and the Pacific is to assist:

  (i) the member countries of the Regional 3R & Circular Economy Forum in Asia and the Pacific for improved decision making towards effective implementation of 3Rs and resource circulation and circular economy approaches at local and national level, including promotion of 3Rs as an economic industry, by improving data, information, and indicators availability in all waste sectors (municipal, industrial, hazardous, WEEE, agricultural and biological, etc.).

  (ii) With an objective to achieve a low carbon and resource efficiency society, it also aims to contribute towards the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs).

- As an outcome of the implementation of 3R goals, it is time to assess their status at the end of 2023. Therefore, a report on the state of 3Rs has been planned. The report is also expected to serve as a precursor to the discussions leading to the formulation of the successor of the Hanoi 3R Declaration which comes to an end in 2023

Scope and Structure of the Report Contd…

- The report is organized in five chapters.

1. Chapter 1: Background and Scope of Work
2. Chapter 2: Urgent Needs and Multiple Benefits of Implementing 3Rs and Circular Economy Approach in Asia and the Pacific
3. Chapter 3: Trends of 3Rs and Circular Economy in Asia and the Pacific
4. Chapter 4: Experts' Assessment of Policy Readiness for Related Ha Noi 3R Goals and Progress at National Level
5. Chapter 5: Major Recommendations and the Way Forward

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CHAPTER 2: URGENT NEEDS AND MULTIPLE BENEFITS OF IMPLEMENTING 3RS AND CIRCULAR ECONOMY APPROACH IN ASIA AND THE PACIFIC

3R and Resource Efficiency as the Heart of Circular Economy

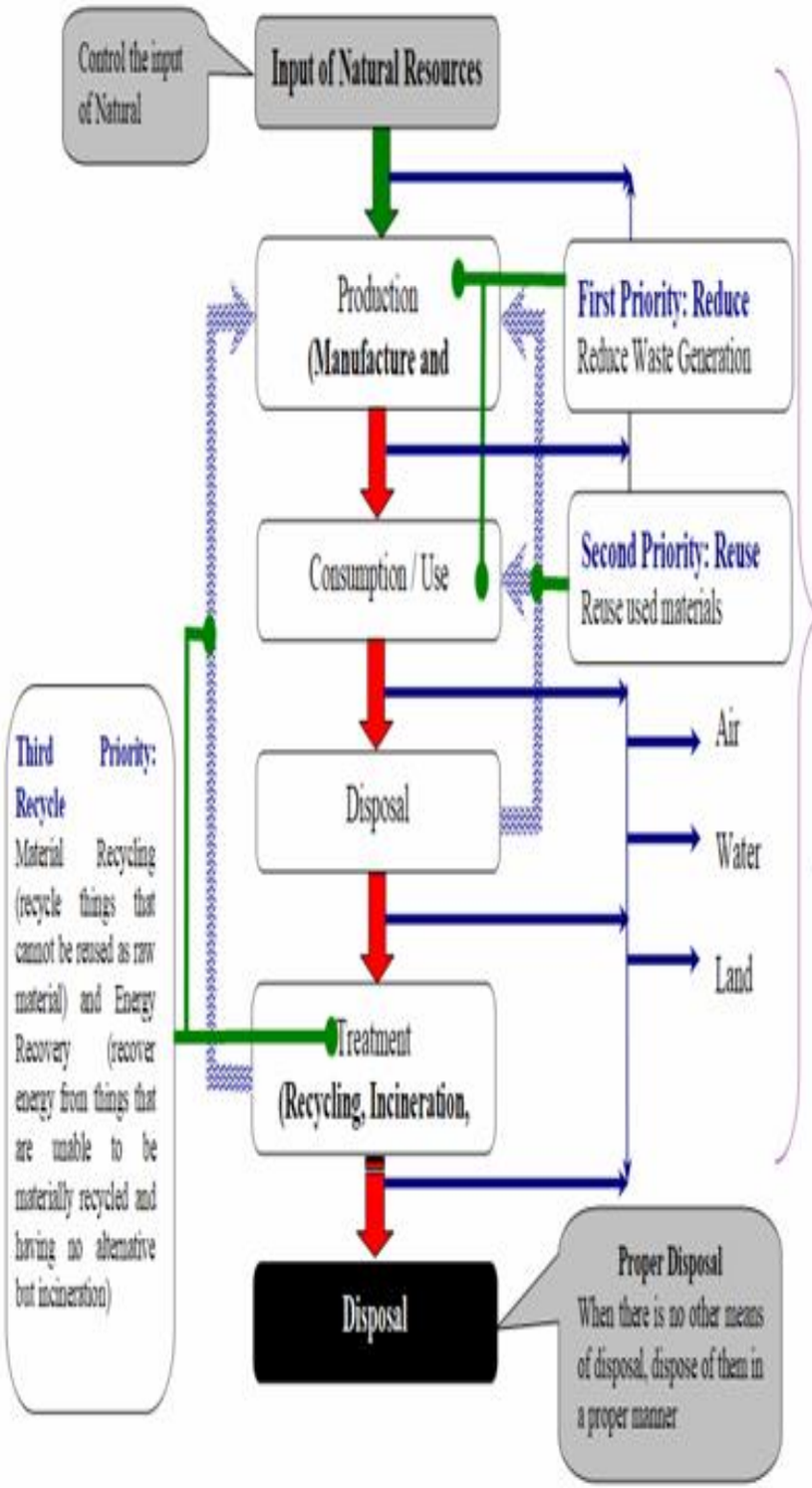
- The 3R's concept evolved into resource efficiency and circular economy to increase **competitiveness** and to **secure the supply of raw materials, energy,** and to **reduce dependence on imports** (economic interests), while **reducing pressures on the environment** (environmental concerns).

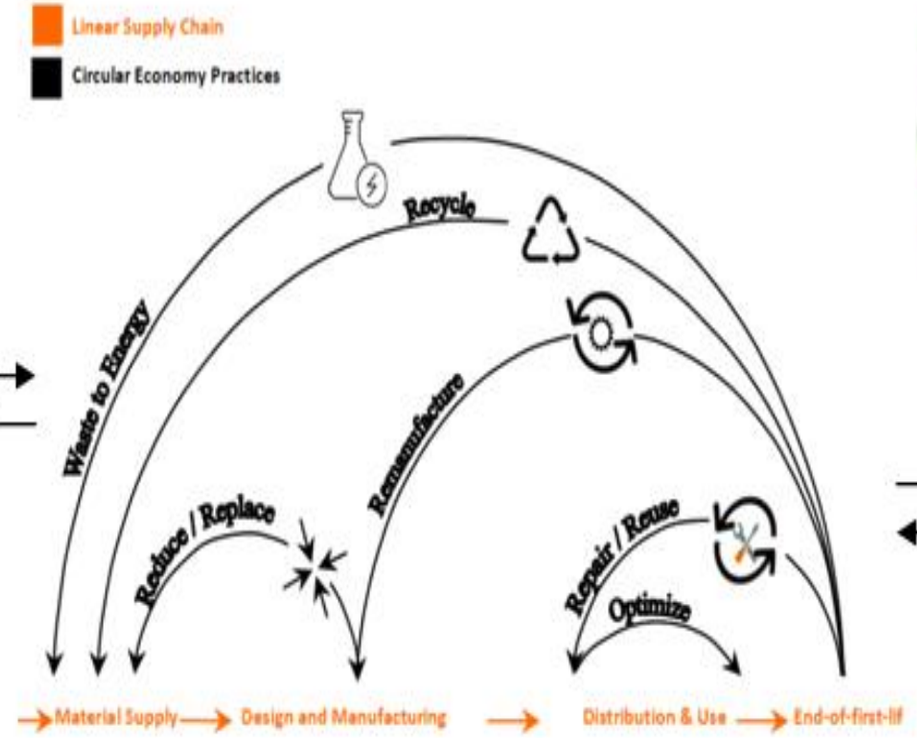
- A linkage between material resource efficiency with waste policy in order to combine environmental benefits (for example by avoiding final disposal of waste) with economic gains (by avoiding the purchase of virgin materials and reducing disposal costs) was created.

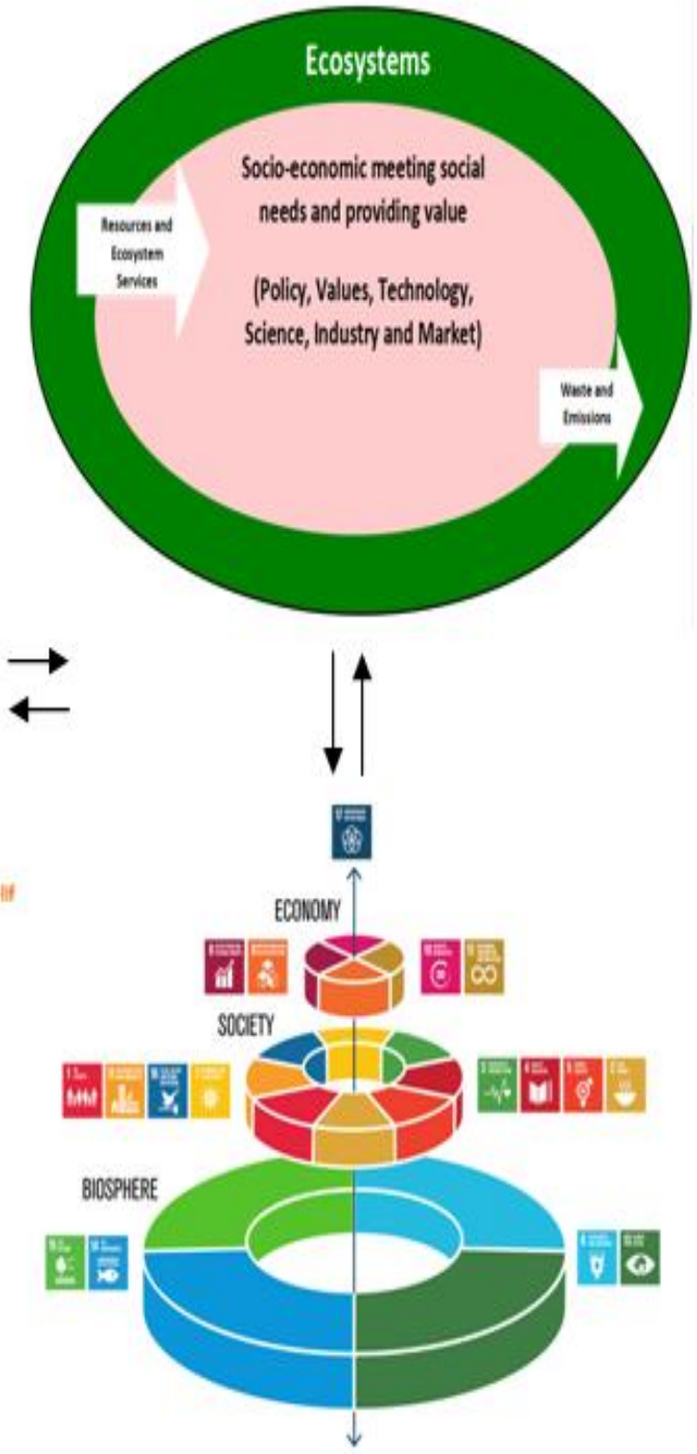
- Application of the logic of the waste hierarchy, including additional goals on waste prevention and using waste as a resource.

- Further evolution into circular economy represents a fundamental alternative to the linear take-make-consume-dispose economic model that currently predominates.

- Therefore, 3R has a central role in enhancing resource efficiency and creating a circular economy that enables society to maximise the economic return on scarce resources.







Concept of 3Rs, Resource Efficiency & Circular Economy

Key factors for promoting circular economy in Asia and the Pacific

- The region is experiencing high resource intensity particularly material intensity, increasing deforestation, higher carbon dioxide, nitrous oxide and methane emissions.

- The waste generation trend is expected to grow rapidly till 2030 and will stabilize beyond 2050. This trend also strongly correlates with material intensity trends & GHG emissions for the region.

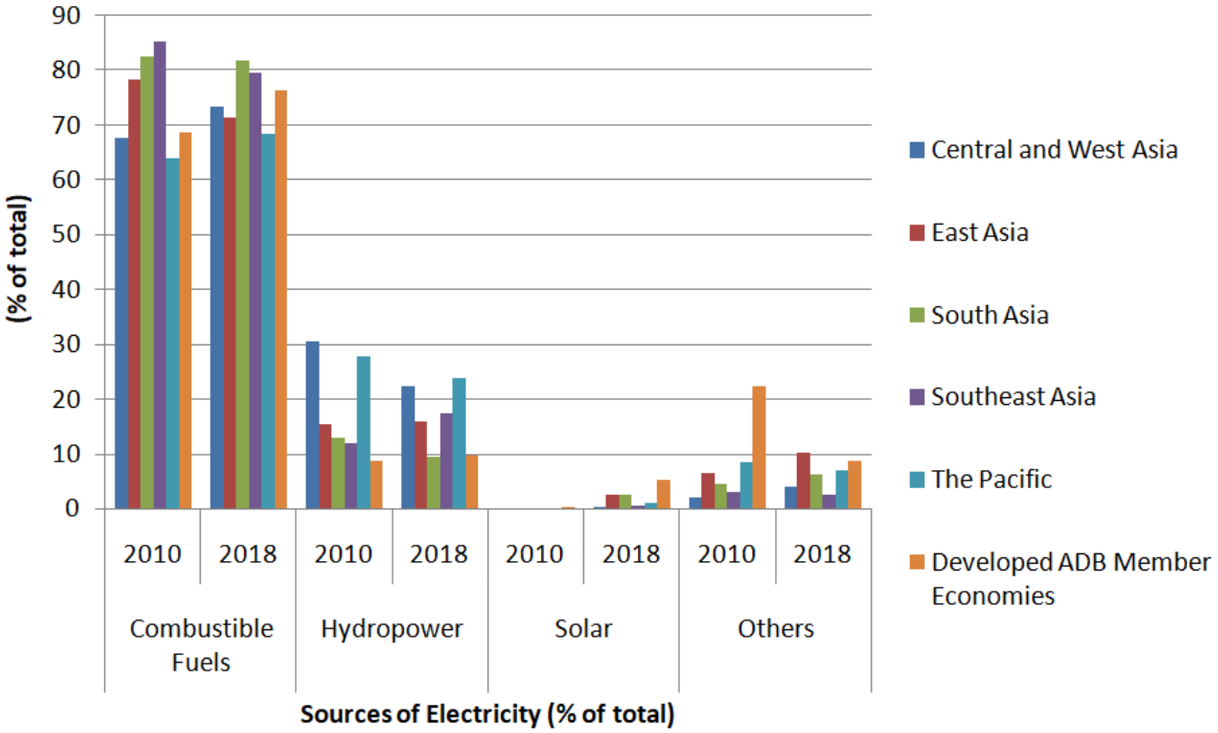
- The projected climate change in Asia and the Pacific could lead to a shortage of water resources, widespread land degradation and increased desertification. As a result, net cumulative effect can strain the finite pool of natural resources and may exceed the threshold rate at which these resources could be replenished.

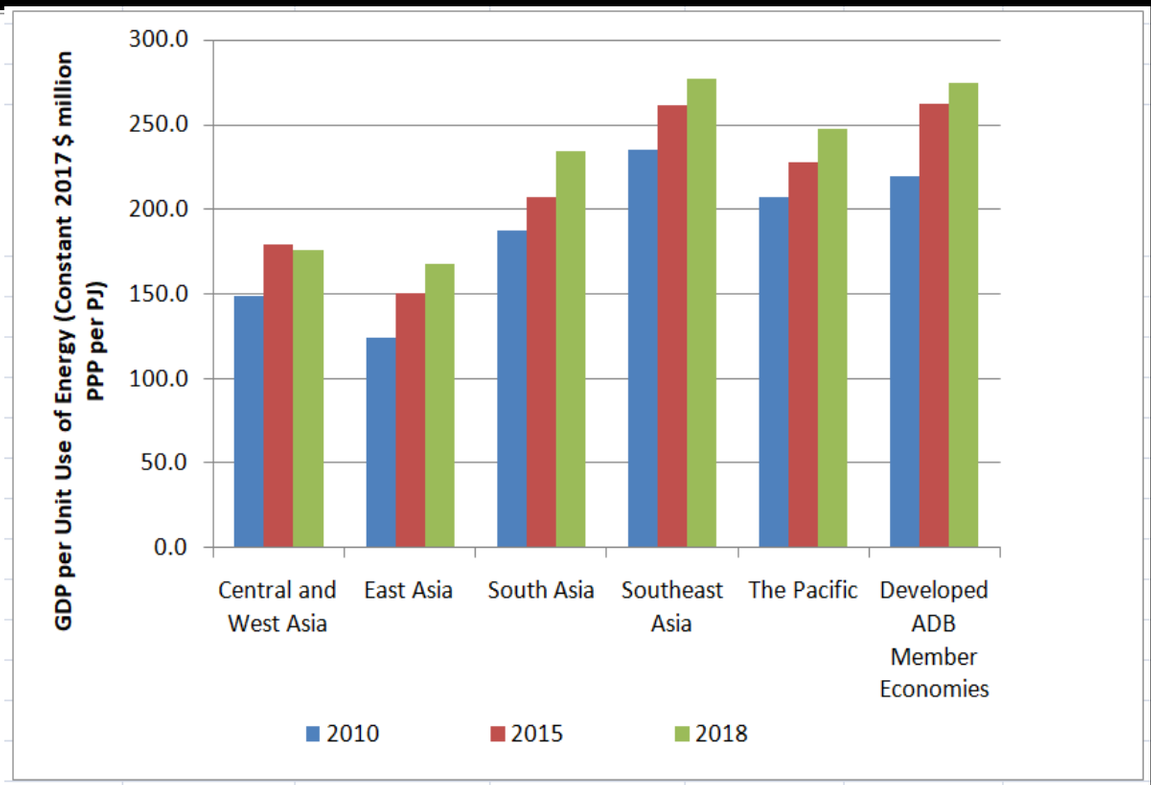
- The trends predict that recycling will gradually become more competitive than mining of minerals due to projected technological developments and changes in relative prices of production inputs. This leads to growth in the recycling sector outpacing growth in mining, lowering of emissions and carbon neutrality as well as growth in GDP.

- The demographic transition to urban dwellers and environmental links with urbanisation will largely determine the sustainable development pathways of the region during the next 25 years and beyond.

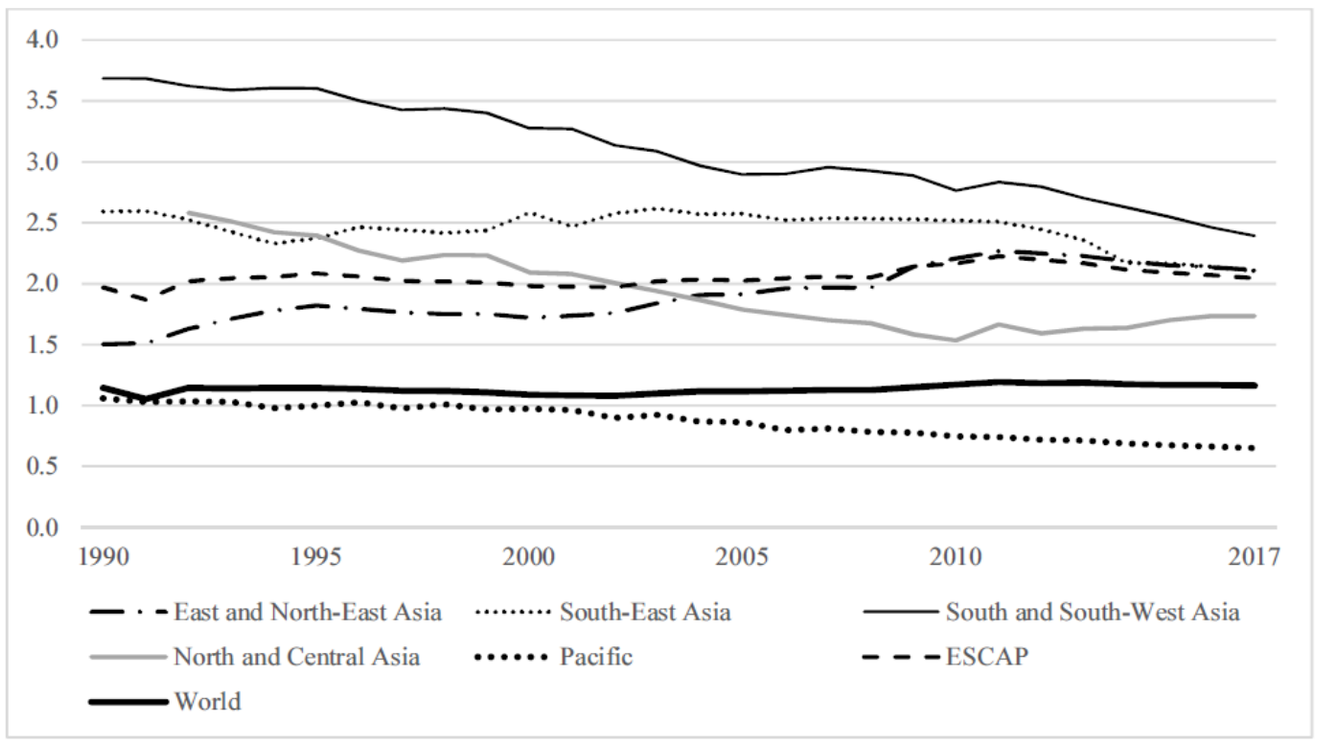
- **This calls for: Conserving resources as well as increasing resource efficiency; Greening, Improving Environmental Conditions & Carbon Neutrality; Improvement in solid waste management due to increasing public pressure for healthy living; Climate Change Mitigation; Promoting Green Jobs, Green Economy & More Prosperous Living. This can be achieved by establishing 3R and circular economy in step wise approach to achieve self sufficiency & SDG.**

Key factors for promoting circular economy in Asia and the Pacific Contd…

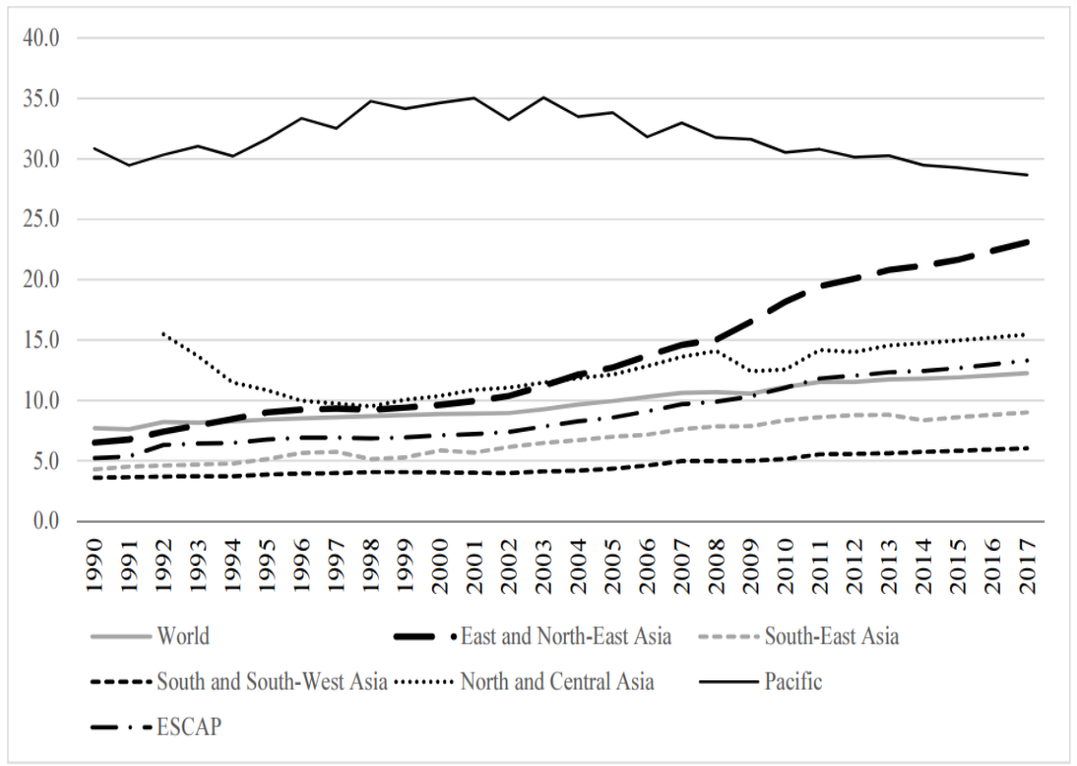




Electricity Production and Sources



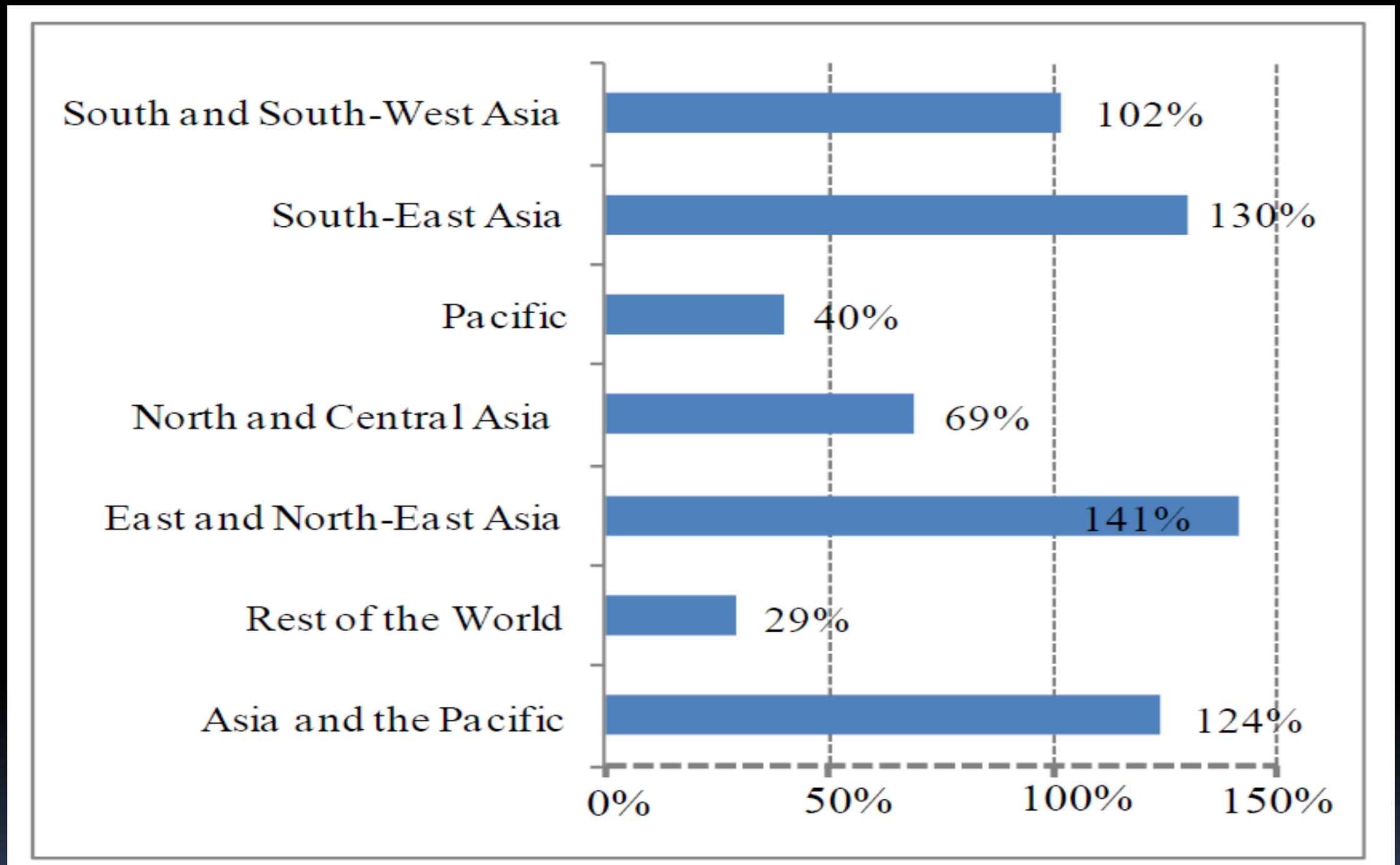
GDP Per Unit Use of Energy



Trends in resource intensity: domestic material consumption, 1990–2017 (Kilograms per United States dollar)

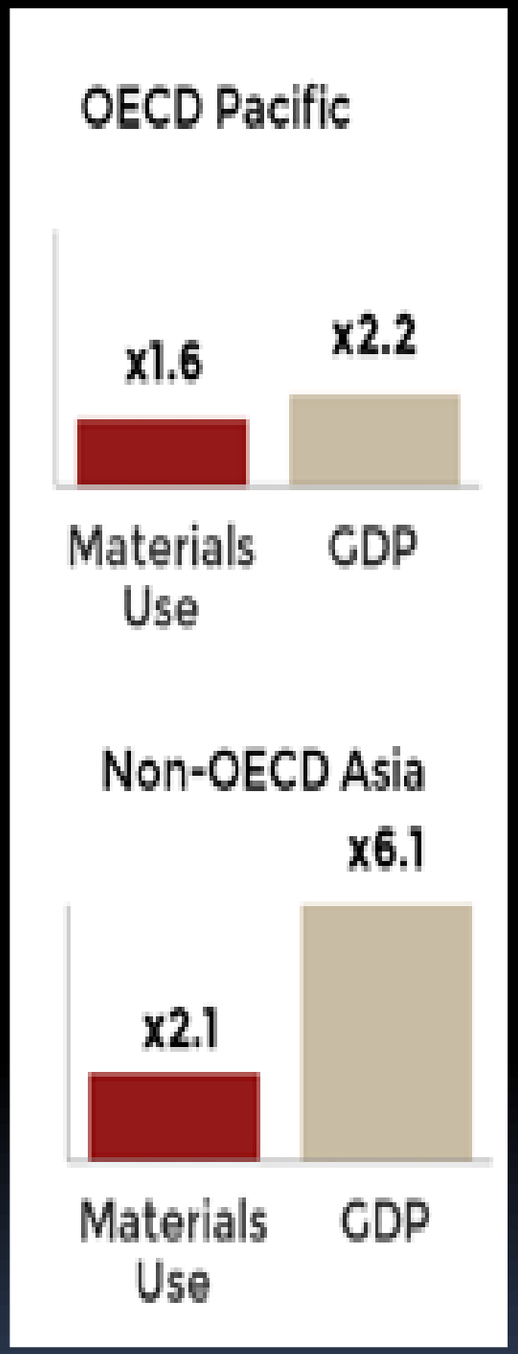
Trends in domestic material consumption, 1990–2017 (Tons per capita)

Key factors for promoting circular economy in Asia and the Pacific Contd…

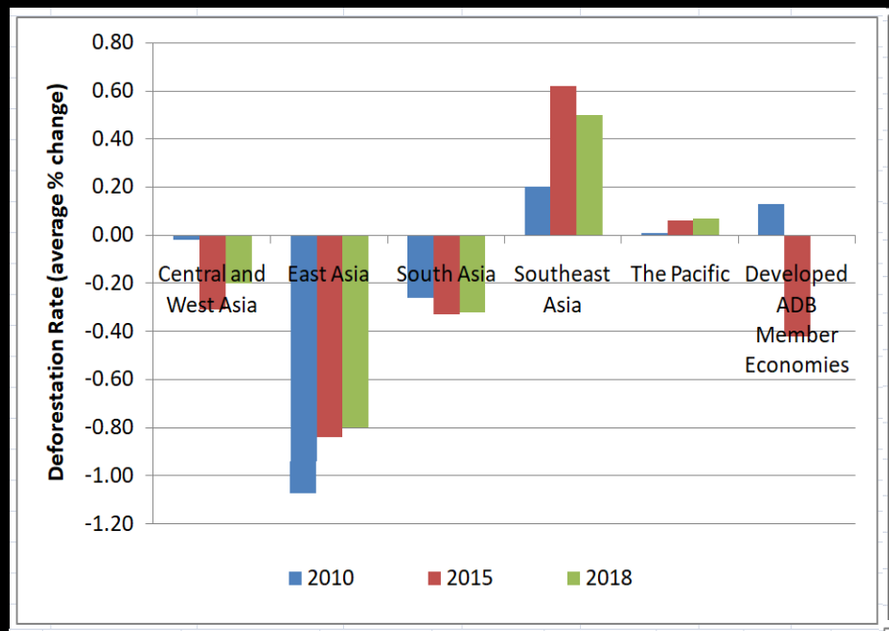


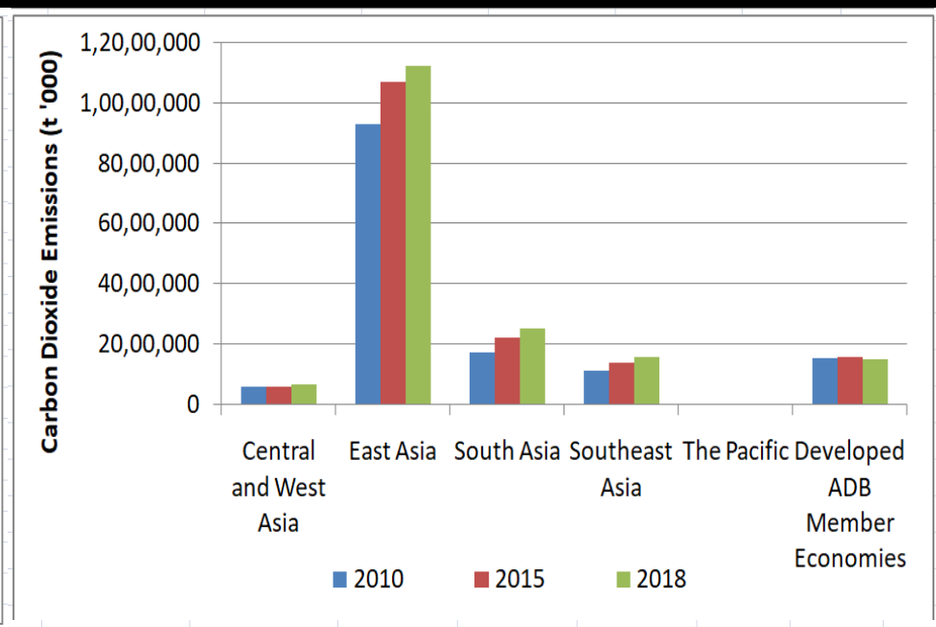
Net Change in Material Footprint, 2000-2017

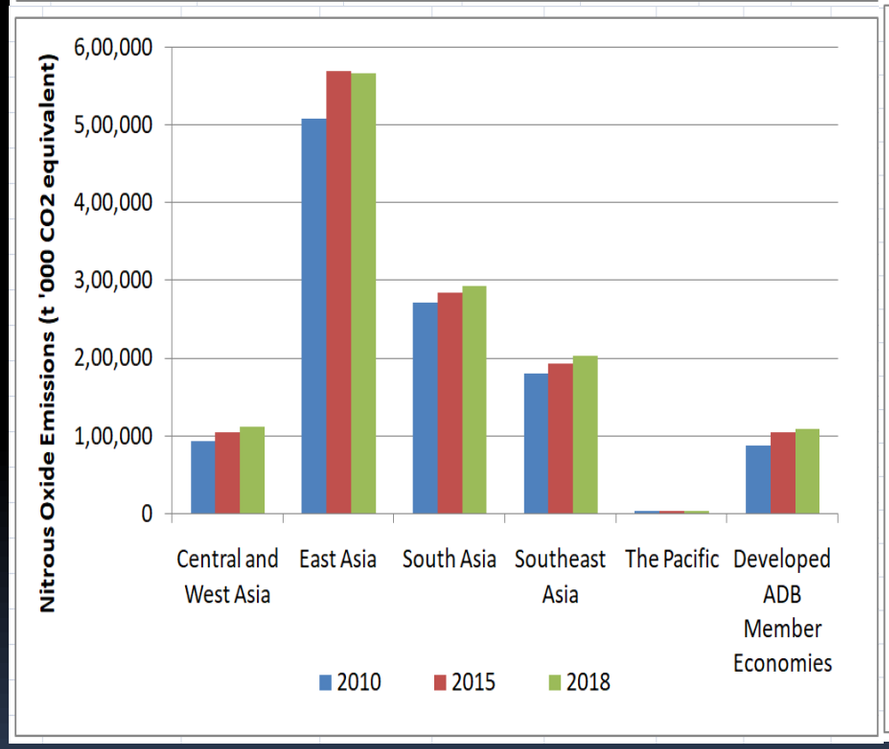
Key factors for promoting circular economy in Asia and the Pacific Contd…

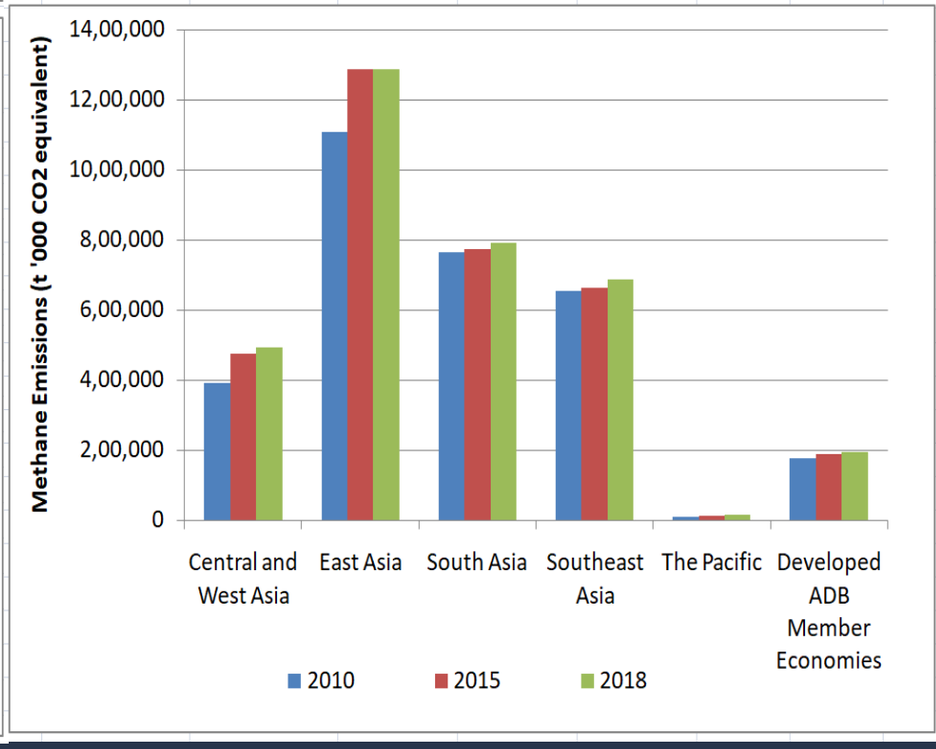


Growth of Materials Use and GDP, 2011 – 2060



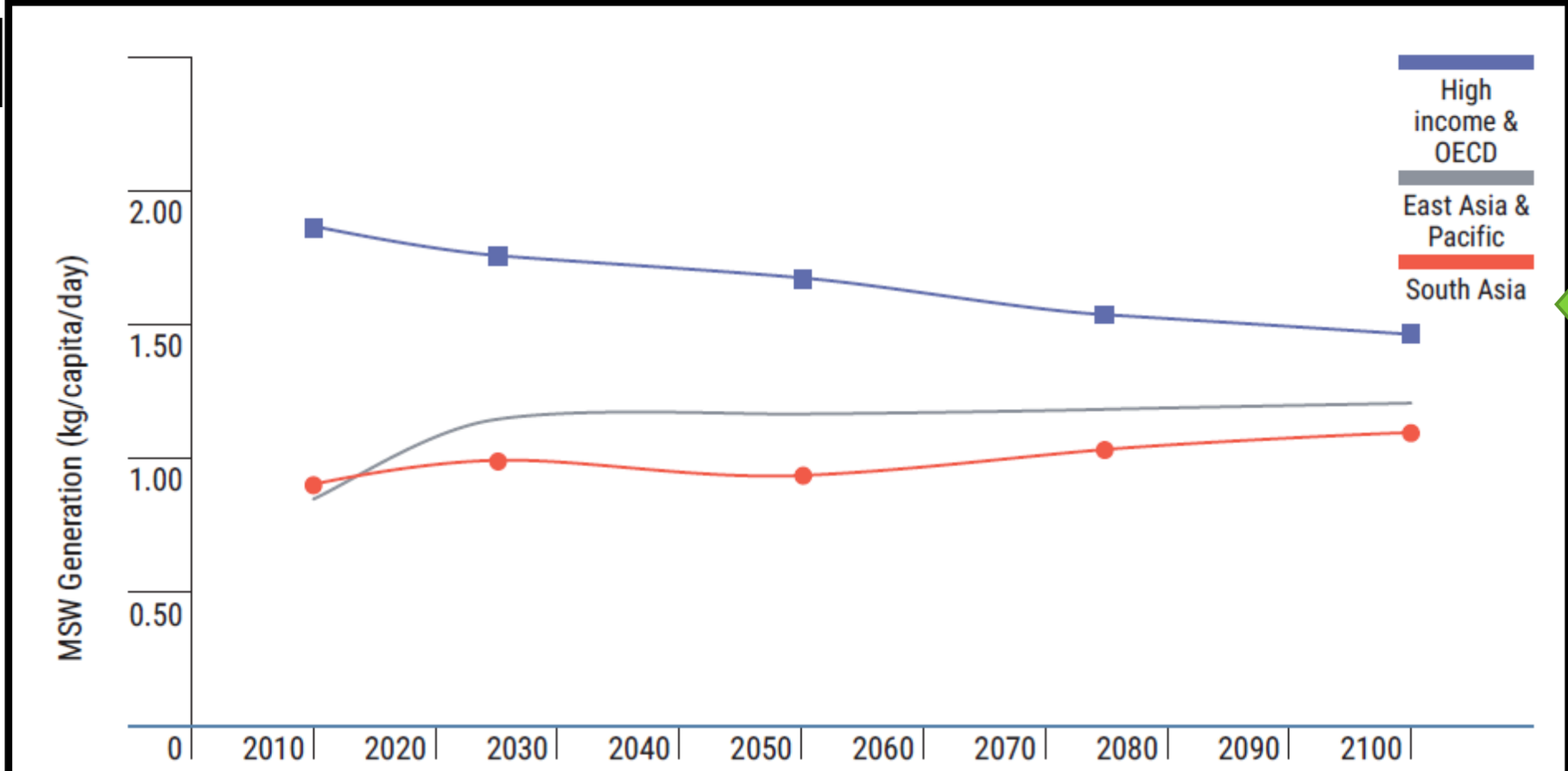






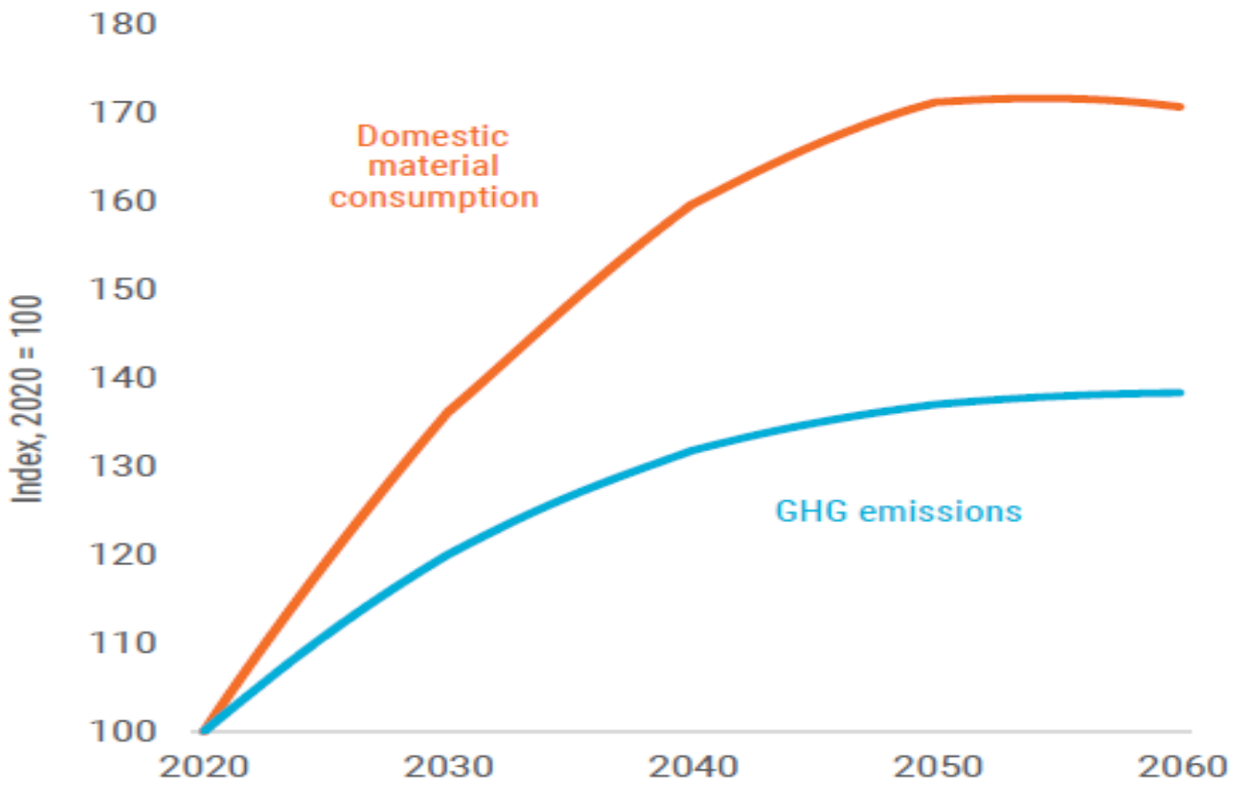
Deforestation and Pollution

Key factors for promoting circular economy in Asia and the Pacific Contd…



Forecasted MSW Generation Per Capita Across Different Regions, 2010–2100

Domestic Material Consumption and GHG Emissions in 2020-2060 with 2020 Levels



Role of 3R and Circular Economy towards Achieving the SDGs

- Processes and products are becoming more resource efficient than their earlier versions due to various economic, environmental and societal compulsions.
- Technology is a driver for clean energy and green industry towards sufficiency economy.
- Alternate materials are becoming more available & affordable.
- New recycling technologies e.g. recycling of solar panels and wind turbine blades require scale up & commercialization. Digitisation & Artifical Intelligence (AI) is going to be increasing demand for digitization and AI solutions to manage the resource efficiency & waste management.
- Sound material accounting of material flows are very crucial to determine the circularity & self sufficiency ecosystem. Further, the technology and unexpected exigencies like COVID-19 are externalities which should be factored in the emerging ecosystem. Technology is the main driver for clean Energy and Green Industry towards achieving 3R circularity & sufficiency economy. Further, cost factors are driving technology adoption & replication. Various governments are distributing their risks while developing infrastructure through innovative financing like PPP.
- During pandemic, the two major economies China and India has taken up urgent steps to increase circularity. In China, policymakers are discussing a “dual circulation” strategy that aims to foster resilience by emphasizing the “internal” circulation of the domestic economy over the “external” circulation of the global economy. The Indian government has launched a “self-reliance” movement designed to reduce perceived supply-chain vulnerabilities.

Role of 3R and Circular Economy towards Achieving the SDGs Contd…

- **Technology as a Driver for clean Energy and Green Industry towards Sufficiency Economy**

- Some emerging trends which will drive clean energy & green industry towards sufficiency economy are given below.
-
- New energy-based generation output forecasting and operation monitoring.

- Key technologies of large-scale wind power dispatch: A grid-based forecasting technology for distributed photovoltaic power generation has been developed and applied in many parts of China.

- Large-scale photovoltaic power grid integration and operation technologies

- Technologies for energy storage system operation: Technological breakthroughs have been made in promoting the application of intermittent access for energy storage systems.

- Green hydrogen is the renewable energy which technological options are crucial to accelerate decarbonisation efforts, particularly for hard-to-abate sectors where electrification is not viable – eg, for heavy industry, chemicals and transportation.[18] Fuel cells usage which are generally based on H_2 purged polymer electrolyte membrane (PME), direct methanol fuel cell (DMFC), and solid oxide electrolyte (SOFC).

CONTENTS

CHAPTER 3: TRENDS OF 3RS AND CIRCULAR ECONOMY IN ASIA AND THE PACIFIC

CONTENTS

CHAPTER 3: TRENDS OF 3RS AND CIRCULAR ECONOMY IN ASIA AND THE PACIFIC CONTD….

Trends of 3R and Circular Economy in Asia and the Pacific (Goal 1, 3, 9, 11, 12, 13, 15, 17, 18)

- This sub-section is based on updation of the First State of 3Rs in Asia and the Pacific in terms of nine indicators selected from the Ha Noi 3R Declaration (2013-2023).

- Majority of countries have specific 3R policies, programs & projects in place addressing reduction in the quantity of MSW (Ha Noi Goal 1). The policies have been translated into specific regulations of municipal solid waste, which have been institutionalized at national level to be implemented at provincial and local level. At local level, the level of participation of households in “source” segregation is low, trends indicate that more countries are approaching “average to high” level.

- The recycling rate of different items like paper, plastics, metal, construction waste, E-waste and other waste streams show marked variation from “Poor” to “Very High”. Increasing Recycling Rate of Recyclables (e.g., plastic, paper, metal, etc.) (Hanoi Goal 3)

- Paper recycling exists in majority of countries. Bhutan, India, Japan, Malaysia, Myanmar, Pakistan & Republic of Korea have reported high recycling rate of plastics. Recycling rate and resource recovery of construction waste have been reported as high to very high in Japan, The Philippines, Republic of Korea and Singapore.

- Majority of the countries have systematic classification of hazardous waste (Ha Noi Goal 9). Majority of the countries have specific rules and regulation introduced to separate, store, treat, transportation and disposal of hazardous waste. Countries in the region follow classification as per The Basel Convention though variation exists.

Trends of 3R and Circular Economy in Asia and the Pacific Contd…

- Majorly countries have not quantified the amount of agricultural biomass waste and livestock waste that was grossly generated per annum (Hanoi Goal 11). The countries have stated specific plans or master plan that were introduced for efficient utilization of agricultural biomass waste and livestock.

- The majority of countries have policies to address the issue of plastic waste in coastal and marine environment (Hanoi Goal 12). The majority of countries have addressed issue of plastic waste as part of integrated coastal zone management.

- E-waste recycling exists in majority of countries though majorly in informal sector. The consumers in the countries usually recycle their E-waste by taking to the retailer, recycling center, and landfill (Hanoi Goal 13). The countries are adopting specific policies and regulations in place to ensure health and safety aspects of those involved in E-waste management (handling / sorting / resource recover / recycling).

- The countries which have reported specific Extended Producer Responsibility (EPR) policies that were enacted or introduced (Hanoi Goal 15). These countries have provided a list of products and product groups targeted by EPR nationally for the period of 2018-2021.

- The majority of reporting countries have introduced specific policies and guidelines for product standard (towards quality / durability, environment / eco-friendliness, labour standards) (Hanoi Goal 17). The countries have introduced specific energy efficiency schemes for production, manufacturing and service sector.

- Countries in the Asia and the Pacific region have addressed climate mitigation in waste management policies, plans, programmes as part of national communication to UNFCCC (Hanoi Goal 18).

Growing Volume and Diversification of Waste Streams with Presence of New Emerging Waste Streams

Plastic Waste

- Plastic consumption in Asia and the Pacific region is increasing every year. The plastic consumption ranges from 0.13% to 0.75% of the material consumption in Asia and the Pacific region, an indicator of variation in resource usage.

- The region is importer of fossil fuel, the feedstock for manufacturing plastics. There is a positive correlation between GDP growth rate and plastic consumption in the region.

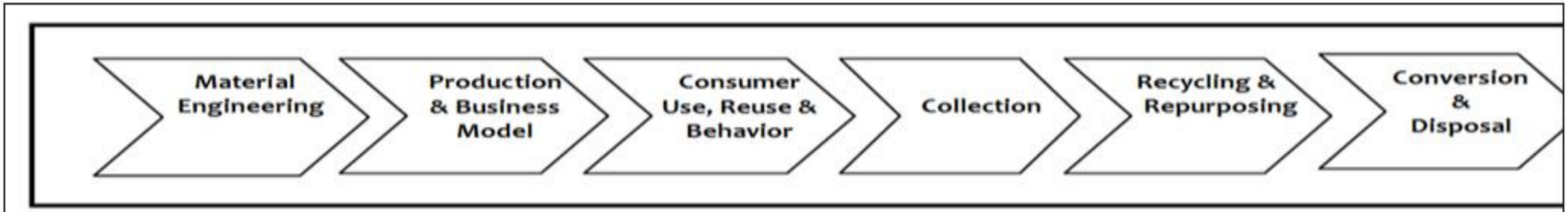
- The plastic waste generation in the region is expected to reach 140 million tonnes by 2030. It is estimated that plastic waste generation is expected to range from 0.027 to 0.06 tonnes / capita / year in East Asia, 0.15 to 0.37 tonnes / capita / year in South Central Asia and 0.019 to 0.048 tonnes / capita / year in South East Asia.

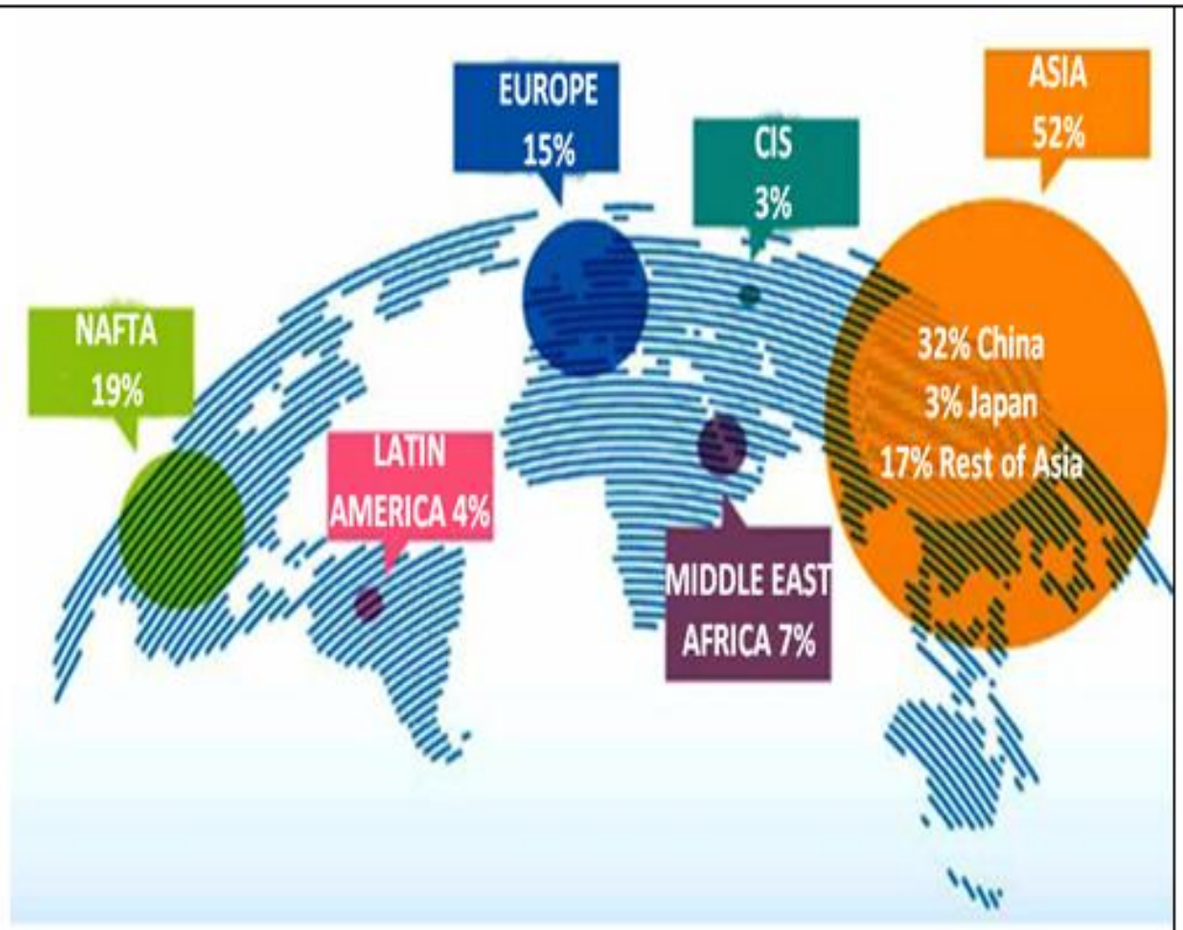
- Source segregation of municipal solid waste is less than 50% in six countries, while it ranges from 50-70% in other countries. Accordingly plastic waste segregation is reported low.

- Data indicates that plastic recycling rate in Japan is closer to those in the European Union while Australia's recycling rate fell in between the US and European rates. Further, the national reporting varies from country to country considering differences in the definition of recycling rate.

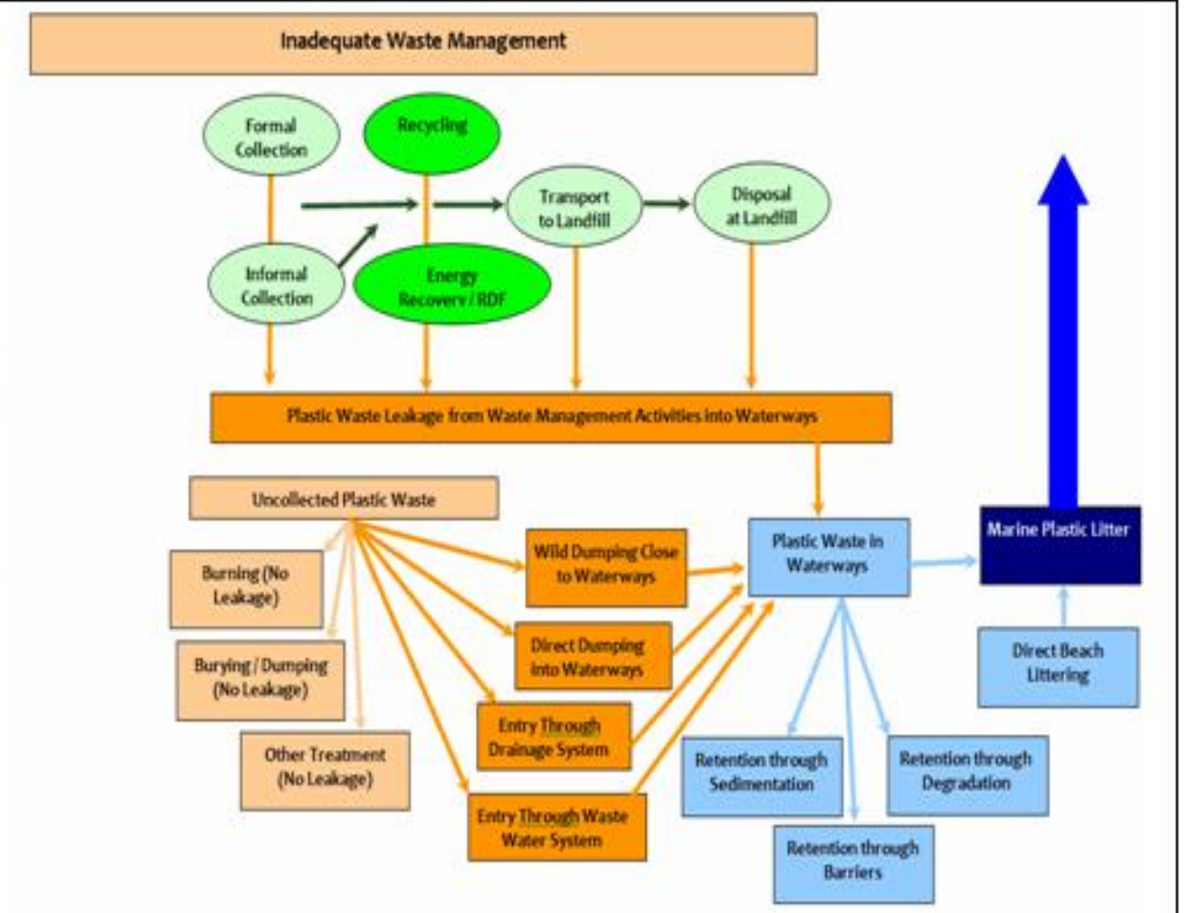
- Low segregation rate of mixed plastic waste further adds to the complexity of their treatment and disposal in the region.

Plastic Waste Contd..





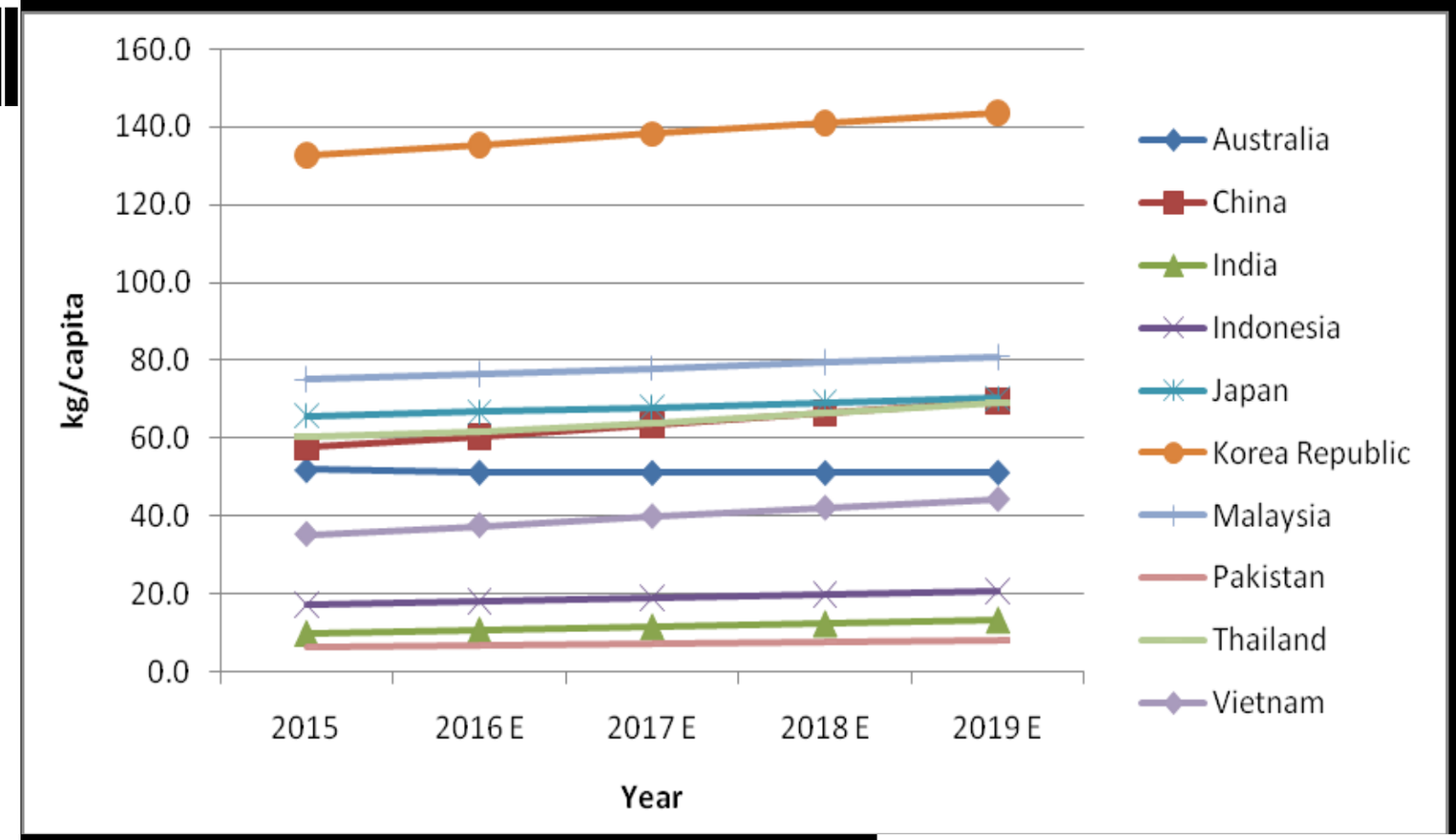
Distribution of Global Plastic Production (2020)



Plastic Waste Management in Asia & the Pacific

Conceptual Plastic Value Chain in Asia and the Pacific

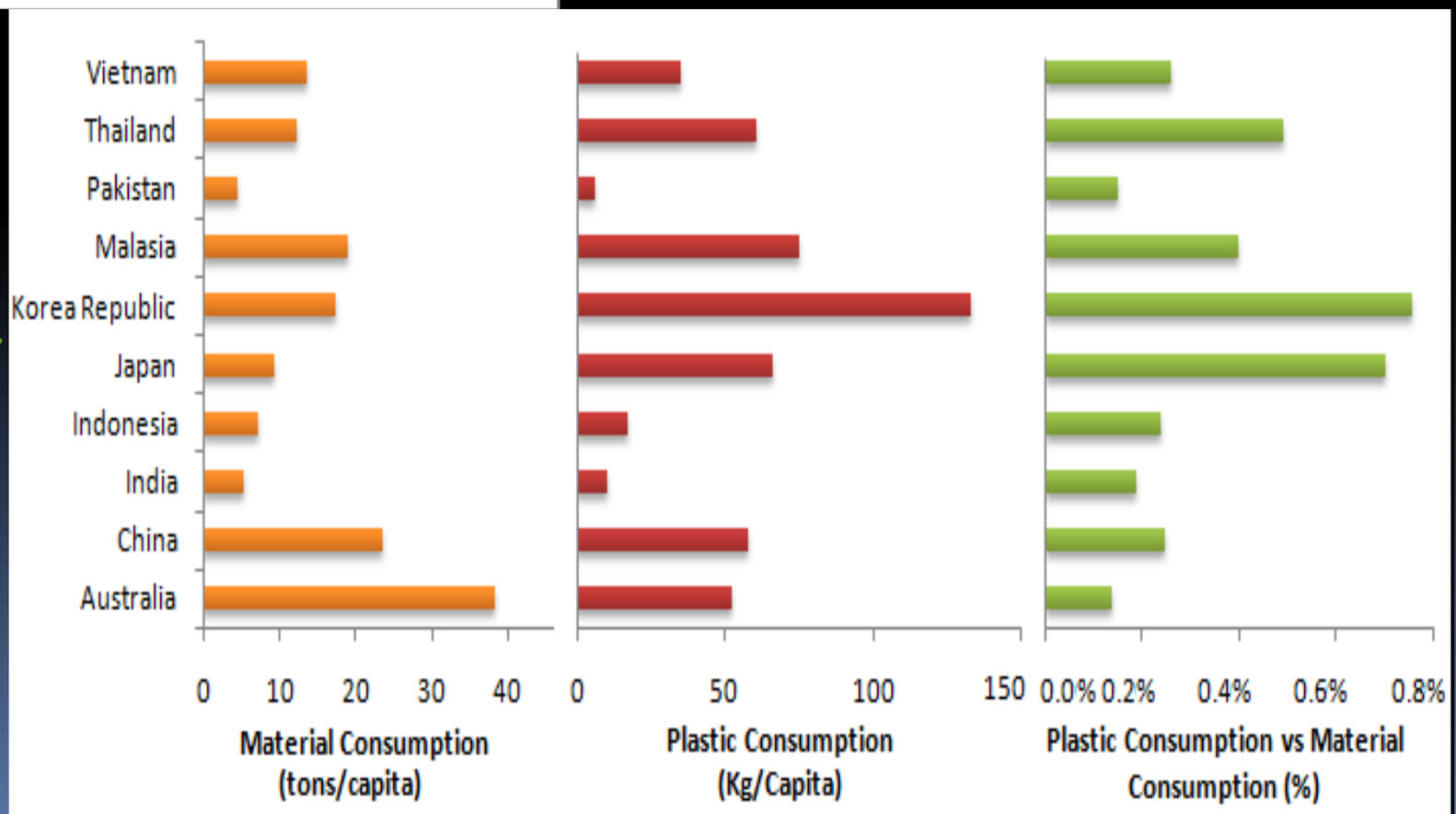
Plastic Waste Contd..



Country wise Plastic Consumption per capita 2015-2019

E – Estimated

Country wise Plastic Consumption vs Material Consumption (%) (2015)



Plastic Waste Contd..

- The national governments in Asia and the Pacific region have initiated policy and regulatory responses at national, regional and global level. The majority of these responses are targeted on single use plastics considering their short life cycle and the scale of their impacts.

- The two main mechanisms employed by national governments are bans or restrictions on supply and distribution of the single use plastics. Majority of the countries have opted for partial bans or restrictions, mostly in the form of thickness requirements and material composition.

- The countries in Asia and the Pacific region have introduced market based instruments particularly specific national legislation on plastic bags while others have packaging laws or regulations which govern plastic bags. Other approaches include implementation of extended producer responsibility (EPR), fixing up of recycling targets, fines related to plastic bag legislation and city level regulation of plastic bags.

- MBIs downstream consumption include EPR, deposit refund schemes and recycling mandates.

- There are thirteen SDGs (SDG 1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14 and 15) which are relevant to reducing the inputs and impacts of waste plastic on terrestrial and marine ecosystem. But the national reporting of SDGs related to plastic waste is lacking.

E-Waste

1. Annual e-waste generation (Mt) in Asia is 24.9, it is the 46.5% of world e-waste generation and 5.6 kg/person e-waste.

2. The average life span of EEE is estimated to be around 4.5-7.5 years, of which mobile phones and tablets have shortest span around 4-5 years (UNEP, 2019).

3. The Asia Pacific region generated nearly 50% of the global E-waste quantities in 2019. Among the Asian nations, PR China (10.1 Mt), India (3.2 Mt), Japan (2.6 Mt), the Russian Federation (1.6 Mt), and Indonesia (1.6 Mt) are among the highest E-waste generators in the region (Forti et al., 2020).

4. The availability and reliability of data on E-waste generation is very limited in many countries as they have not developed proper inventories.

5. E-waste is predominantly handled by the informal E-waste recycling sector that utilises poor recycling methods to extract the valuable metals while disposing the toxic compounds into the open environment.

6. Recycling is one of the most popular options for managing E-waste. Among the Asia Pacific nations, direct E-waste regulations vary significantly.

7. Only 8 countries in the region have fully implemented E-waste regulations while few countries have limited implementation of E-waste regulations or the process of developing one.

8. The transboundary movement of E-waste from industrialised nations to emerging and developing economies has caused significant challenges to many nations in the Asia Pacific region due to a lack of infrastructure and financial resources to deal with the issue.

E-Waste Contd..

9. The major environmental and health impacts occur when the informal sector is involved in the last stage of the E-waste recycling chain where advanced processes/techniques are necessary to extract the valuable components such as metals.

10. Many countries in the Asia Pacific region have either implemented EPR systems or in the process of drafting EPR based regulations. EPR systems can take many forms including product take-back schemes, advanced recycling fees, container deposit schemes, etc. (Khajuria, 2015). Most of these schemes are managed by a government appointed Producer Responsibility Organisations (PROs), to administer the system.

11. Tackling emerging and problematic E-waste streams (e.g. Li-ion batteries, solar panels) will be a major challenge in the region. Recent years have seen an exponential growth of solar photovoltaic panels (solar PV panels) in Asia and the Pacific region to deal with climate issues. Such growth will result in a significant solar PV panel waste legacy within the next 10-30 years as the life expectancy of most PV panels is about 25-30 years.

12. The development of Public-Private Partnerships (PPPs) is vital for sustainable management of E-waste. Although the national governments set the targets to achieve in recycling of E-waste, the operational responsibility of the system heavily depends upon the financial and human resource potential of the local authority.

13. The Ha Noi 3R Goals have been reported widely by countries but SDG reporting for this waste stream is lacking.

Chemical & Hazardous Waste

1. According to the market forecast, the hazardous wastes generation in the A&P region was expected to reach 66.18 million tons in 2027. By 2030, 88.81 million tons hazardous wastes would be produced in A&P region. Hazardous wastes generation in the A&P region exhibited an overall rise from 2011 to 2019.

2. The consumption of pesticides in the A&P region had been increasing from 2001 until 2012. Since 2010, the use of pesticides in the region has been fluctuating between 4,400,000 and 4,600,000 t and show a slight decrease since 2017.

3. The consumption of hazardous materials did not correspond with the generation of hazardous wastes in the A&P region since hazardous waste is not only generated by hazardous materials but also from other sources, while the consumption of hazardous materials does not necessarily produce hazardous wastes.

4. According to UN comtrade database, 14 countries in A&P region reported import and export activities with other A&P countries from 2017 to 2020. In 2017, Malaysia was the biggest exporter and most of the hazardous materials were exported to India.

5. In 2020, Australia became the biggest exporter in the A&P region, Republic of Korea and Japan, which were the most developed countries in the region, were the biggest importers.

Chemical & Hazardous Waste

6. Countries in the A&P region do not classify chemical waste separately or manage it according to one kind of hazardous waste.

7. No evidence shows that the term “chemical hazardous waste” is defined in any acts or regulations in Asia and the Pacific (A&P) countries.

8. Chemical hazardous waste is usually one entry of hazardous waste. Hazardous wastes can be liquids, solids, gases, or sludges.

9. In the A&P region, more than 25 countries have developed hazardous waste classification systems or catalogues to achieve sound hazardous waste management.

10. Data constraints are reported for hazardous waste generation in A&P region.

11. Based on the comparison of policies and main contents of hazardous waste management in various countries, the following common points are obtained:

i. policies and regulations are established based on national environmental laws, regulations and international conventions,

ii. hazardous waste utilization, treatment, transportation, and landfilling are based on these regulations.

Chemical & Hazardous Waste Contd…

iii. “Harmless management’ of such wastes should be the focus instead “harmless” disposal.

iv. Wider stakeholders should be involved in addition to state agencies responsible for environmental affairs which are responsible for issuing relevant technical documents, and private companies focus on collection, transportation, and disposal.

12. There are 15 countries which have issued policies and regulations specifically for the management of chemical and hazardous waste. Most of the nations are still struggling to moving towards a sustainable hazardous waste management system. Though Ha Noi 3R Goals related to this waste stream are widely reported by countries in the Asia and the Pacific region, SDG Goals are not reported covering this waste stream

Construction & Demolition Waste including Disaster Waste (CDW)

1. CDW includes all the waste produced by the construction, demolition and maintenance of buildings and infrastructure including roads and bridges. It contains a wide variety of materials such as concrete, bricks, clay tile, wood, glass, metals, and plastic.

2. CDW management comprises a lot of terms and definitions, which are not clear and uniform.

3. Disasters such as earthquakes, tsunamis, flood, and cyclones which occur frequently in Asia and the Pacific generate a large amount of waste due to their strong destructive force.

4. The amount of DW can equal tens-hundred years' worth of regular municipal waste amount. DW is also difficult to treat due to its characteristics.

5. Data for C&D waste quantification & generation in China ranges from 1,645.00 MT in 2013 to 2,119.98 MT in 2020.

6. In Korea it ranges from 71.98 MT in 2013 to 95.11 MT in 2020.

7. In Australia it ranges from 18.60 MT in 2013 to 27.03 MT in 2020.

8. In Japan it ranges from 72.69 MT in 2012 to 74.40 MT in 2018.

Construction & Demolition Waste including Disaster Waste (CDW) Contd…

1. The Asia Pacific nations, CDW regulations vary significantly.

2. There are three types of policies, (i) land development policy (ii) C&D waste and green building material recycling product utilization policy and (iii) C&D waste recycling material subsidy policy.

3. The countries are divided into three categories the first one is full implementation of C&D waste regulation and laws, next is limited implementation or at draft stage formulation and the last one is “no regulation”.

4. Countries / regions with full implementation of C&D regulations are China, Japan, The Republic of Korea, Australia, New Zealand, India & Hong Kong SAP of PR China.

5. The seven key barriers that influences the key stakeholder’s ability to utilize CDW waste the application of recycled products in the construction industry.

6. These barriers include:
   - increase in energy and transport costs;
   - lack knowledge on recycled products;
   - limited of technologies for waste recovery; low quality and reduced performance;
   - lack of market availability of the products;
   - limitations caused by specifications, standards and permits;
   - and limited acceptability and negative perceptions.

Agriculture Biomass Waste and Livestock Waste

7. Five enablers that would help stakeholders to improve applications of recycled products. These enablers cover:
   - increase community awareness and education on recycled products;
   - develop supportive regulations, policies, and specifications;
   - facilitate sustainability programs; promote product certification and advocate targeted technologies and innovative practice.

8. Most Asia and Pacific countries have limited up to date and publicly accessible data on CDW and DW quantity and composition, which makes it difficult to understand trends in CDW and DW management over time. Therefore, the first important step needs to obtain quantitative and qualitative data.

9. Agricultural biomass waste can originate from several sources, major crops and the respective residues, as well as livestock and livestock waste found in Asia and Pacific countries. In addition to these crops, plantation of vegetables and fruits is also common in Asia and Pacific countries and Agricultural Biomass Waste is generated from these sources as well.

10. Majority of national legislations, policies, plans and strategies of related to agricultural biomass waste are related to energy generation in Asian and Pacific countries. The Act No. 81 and 108 of Japan.

Agriculture Biomass Waste and Livestock Waste Contd…

11. The common theme between policies, plans and regulations of Asia and Pacific countries are:

(i) Clearly stating the share of renewable energy sources in national electricity generation by a certain year. The renewable energy sources include solar, wind, biomass, geothermal and hydropower.

(ii) Special focus on use of renewable energy sources for electricity and power in rural areas to make rural areas self-sustaining and also improve the socio-economic situation of villages.

(iii) Incorporating and implementation of feed-in-tariff scheme. Similarly, other initiatives such as government subsidies and loans (although at lower percentage) are also offered through national legislations.

(iv) Blending of biofuel and biodiesel by a certain year. Most of the countries with specific regulations, plans and strategies on biofuel and biodiesel blending clearly state the use of agricultural waste as the feedstock and

(v) Inclusion and implementation of bio-gasification for power and energy.

Agriculture Biomass Waste and Livestock Waste Contd…

1. There are several examples of developed countries collaborating with developing countries for establishing resource recovery plants in developing countries.

2. About 781 biogas plants have been installed in Bangladesh as of June 2020 under the initiative of Bangladesh Council of Science and Industry Research (BCSIR), GIZ, Ministry of Disaster Management and Relief, and Department of Local Government Engineering.

3. The challenges or issues arisen in implemented energy relation regulations and other initiatives in Asia and Pacific countries are:

(i) Some countries such as Indonesia legally allow plantation of energy crops for biofuel and biodiesel production, whereas The Republic of Korea allows plantation of energy crops for bioenergy.

(ii) The use of term ‘renewable energy sources’ in national legislations and initiatives creates unnecessary biased as seen in The Republic of Korea. Similarly, in most developing countries, solar energy seems to be leading source of renewable energy source.

(iii) In developing countries of Asia and Pacific, the implementation of national legislations and other initiatives on use of agriculture biomass waste as renewable energy source is still less.

Agriculture Biomass Waste and Livestock Waste Contd…

4. The availability of data for utilization of agriculture biomass waste is missing in most of the Asia and Pacific countries.

5. Resource circulation of agricultural biomass waste through 3R (reuse, recycle, recover) depends on the type of agricultural biomass waste and other characteristics such as moisture content, energy content, and others.

6. Though Ha Noi 3R Goals reporting exists in the countries in the region, SDG reporting related to this waste stream is insignificant

Food Waste

1. Food loss and waste also represent lost opportunities for sustainable consumption and production, food security and proper nutrition, and they happen in every stage of the food supply chain. Only Japan and Australia monitor food loss and waste and establish reduction targets throughout the food supply chain (Lipinski, 2020).

2. Data on food loss and waste are important in crafting strategies and policies to adequately address these challenges where they occur in the food supply chain.

3. Evolving socioeconomic conditions in the Asia Pacific contribute to the challenge of reducing food loss and waste as magnified by the rapid urbanization and growing population happening in the region.

4. Globally, 13.8 percent of food is lost along the food supply chain and 17 percent is wasted. Central and Southern Asia subregion recorded the highest food loss with more than 20 percent, while Australia and New Zealand subregion has the lowest with just under 6 percent. In Asia and the Pacific region, Southeast Asia has the highest food waste with 82 kg per capita while Eastern Asia registered the lowest with 64 kg per capita.

5. The causes of food loss and waste in Asia and the Pacific region vary and may be influenced by a number of factors from culture and consumer behavior to economic capacity. Generally, food loss and waste in developed nations tend to be a result of consumption behavior and poor coordination between different actors in food supply chain.

Food Waste Contd…

1. Policy approaches to food loss in the region is closely tied to the focus on **food security** in **Asia and the Pacific nations** as a response to the **growing food demand** and the need to reduce food losses along the food supply chain.

2. Overall, the policy priorities in the region aim to **increase productivity and efficiency of food systems** through a variety of measures like improving agricultural knowledge and research, strengthening technological and personnel capability, and providing financial assistance.

3. The development of master plans, strategies and frameworks is the primary focus of the Asia and the Pacific nations to ensure food supply and security.

4. Food rescuing and redistribution of surplus foods are the main programs done to curb food waste in the region.

5. In more developed nations, policies and programs are implemented regarding food recycling and repurposing to other resources.

6. Technological innovation and behavioral change initiatives are developed to combat increasing food loss and waste in the region. Most of the technological initiatives present in the region are food recycling, composting, and conversion of waste to energy and other useful resources.

7. Several startups also emerge throughout the region focusing on reducing the food waste by connecting food services sector with food surplus to the consumers who can avail the products at a discount.

Food Waste Contd…

8. Policies addressing food waste at the consumption level generally involve food waste recycling or repurposing and food rescuing. Most of the nations in the region also have initiatives focusing on food rescuing and redistributing the excess foods from various sources to those in need addressing the food wastes in the food services consumption stage of the food supply chain.

9. To stimulate behavioral changes, education and awareness campaigns are the most common initiatives done by the Asia and the Pacific nations. Novel strategies and programs such as banning of binge eating (mukbang) videos in the People's Republic of China and **"Pay as you Throw"** using **Smart Bins** in the Republic of Korea have seen positive impacts in reducing food waste.

10. For food waste, approaches may be community-specific, responding to trends, customs, practices and habits of the household or community.

    - Adequate data collection, management and analysis need to be encouraged as well since this will provide a clear picture of the problem, and effectively inform policymaking and program development.
    - track the progress of implemented measures on food loss and waste.

11. **Every stakeholder in the food supply chain has a key role in addressing the challenges on reducing food loss and waste, and it is vital that they are empowered to help achieve the targets of SDG 12 (SDG Target 12.3) and Ha Noi 3R Declaration Goal 10-1 (HNG10-1).**

Healthcare & Medical Waste

1. The global medical waste management market was estimated to grow from $13.5 billion in 2019 to 14.9 billion in 2020 at a compound annual growth rate (CAGR) of 10.6%.

2. The markable growth is mainly due to the COVID-19 outbreak and the measures to contain it. The market is then expected to stabilize and reach $16.62 billion in 2023 at a CAGR of 3.8%.

3. The medical waste generation in kg/bed/day in a few Asian countries ranges from 0.25 to 2.24.

4. Amount of healthcare waste generation (Tonnes per day) in selected countries in the region ranges from 27 to 876.

5. Almost 85% of waste generated by healthcare activity is considered ‘non-hazardous waste’ and the remaining 15% is labelled as “hazardous”.

6. Range of disposal mechanism includes deep burial pits to incineration.

7. Among all member countries, the South-East Asia Region (SEARO), showed the lowest safe disposal setting, with only 44% of the facilities having a system for safely collecting, disposing, and destroying healthcare waste.

Healthcare & Medical Waste Contd…

8. Many of the Asian resource-constrained countries have only fundamental laws and limited regulatory bodies to enforce the management of healthcare waste.

9. However, most of these countries lack in following regulations, as well as considering legislation in healthcare waste management.

10. Asia Pacific Medical Waste Management will have a potential of a huge market size for both Hazardous and Non-hazardous type for Collection, Transportation & Storage Services, Treatment and Disposable Services, e.g., Incineration, Autoclaving, Microwaving, Recycling services for the Waste Generators, e.g., Hospitals, Laboratories and Research Centres, Nursing Homes.

Wastewater Management – Challenges, Treatment and Circular Economy Opportunities

1. Asia Pacific region accounts for 36% of the global surface water runoff and the highest amount of water resources are available in the People's Republic of China, Indonesia and Bangladesh (UNESCAP, 2016).

2. Although, the region has significant amount of water resources, per capita availability is mostly below the world average.

3. Water security is one of the major challenges in Asia Pacific region, which needs urgent attention. 2/3 of the region's population (especially in the People's Republic of China and India) experience water scarcity for at least one month per year.

4. Industries are competing for water due to the economic expansion in the region.

5. Irrigation for agricultural practices consumes highest share of water in the region, accounting for 60-90% of annual wastewater withdrawals. 1.5 billion people living in rural areas and 0.6 billion in urban areas still lack adequate water supply and sanitation facilities.

Wastewater Management – Challenges, Treatment and Circular Economy Opportunities Contd…

6. The on-site sanitation systems have resulted in low treatment efficiencies around 30-60%, which is lower than centralized sewerage systems using aeration.

7. Although, centralized sewerage systems are the most adequate solutions in densely populated areas, they are not widely used in many countries of Asia-Pacific Region mainly due to the large investment cost required for the construction.

8. Most of the countries in Asia-Pacific region have developed national water and sanitation policies. However, all of these policies are not adequately dealing with all the issues associated with sanitation practices.

9. In some of the Asia Pacific countries, there is no proper coordination between the various sectors involved with wastewater sector which needs to be further strengthen when formulation of these policies.

10. The People's Republic of China, Japan, India, Taiwan Province of China, the Republic of Korea and Vietnam have increased their investments in the wastewater treatment (UNESCAP, 2016). Japan has actively engaged in the improvement of the water environment in Asia Pacific region.

11. Benefits of wastewater treatment/sanitation options used in Asia Pacific countries include: Urine diversion toilets, Constructed wetlands, Waste stabilization ponds, Biogas production from sludge and Grey water reuse.

Wastewater Management – Challenges, Treatment and Circular Economy Opportunities Contd…

12. With the exception of Timor-Leste, where water supply is not priced, all other Asia Pacific countries are charging water tariffs.

13. Decentralized wastewater treatment has been successfully implemented in many Asia Pacific member countries due to economical & easier to implement short term option.

14. SDG 6 and its' targets are dedicated to the water and sanitation sector for ensuring the availability and sustainable management of water and sanitation for all.

15. Around 90% of the wastewater is discharged untreated and the implementation of SDG 6 on improving the water quality is urgent due to the growing requirement of fresh water in the region.

16. New business models to be adopted to promote wastewater reuse include

(i) Inter-sectoral water transfers or "water swaps"
(ii) On-site value creation
(iii) Marketing reclaimed water
(iv) Replenishing Natural Capital.

Wastewater Management – Challenges, Treatment and Circular Economy Opportunities Contd…

17. Other include:
(i) Public Private Partnership (PPP) business models to promote wastewater reuse
(ii) Rainwater harvesting in efficient water resources management
(iii) Sewage sludge as a new resource for energy production VS fertilizer production in circular wastewater treatment system
(iv) Recovery of nutrients from bio-solids.

18. Asia Pacific region is making efforts on achieving the SDG targets and the goals of Ha Noi 3R Declaration via successful wastewater and sanitation management practices.

19. Several improvements are required for:
(i) Public perception,
(ii) Policy, legislative and institutional reform, Infrastructure & technology,
(iii) Research and Development and
(iv) Alternate Financing.

Data Issues on New Emerging Waste Streams

1. Quantification is difficult, as a number of studies globally as well as Hanoi 3R indicators reporting indicates that due to informal sector operation in material flow chain the comprehensive data on waste generation, segregation, reuse, repurpose, treated and disposed are not available.

2. It is widely scattered at local and national level. Further, data related to littering or illegal movement at local, national & global level is also very scattered.

3. Therefore, the real magnitude of problem remains unclear, though the impacts of informal treatment in some countries are unquestionably significant.

4. The driving factor is compliance with existing national and global waste legislation. Other drivers are:

   (i) Increasing volumes of new emerging waste;
   (ii) Absence of waste-specific legislation;
   (iii) Limitations of waste management infrastructure;
   (iv) Competition between formal and informal sectors for valuable items;
   (v) Mixing of waste with other waste streams;
   (vi) Complex nature of waste
   (vii) Hazardous extent and nature of waste and;
   (viii) Emergence of concepts like resource efficiency, sustainability & circular economy.

Data Issues on New Emerging Waste Streams

5. Consequently insufficient information on:

(i) Ambiguous definitions;
(ii) (ii) Different categorization;
(iii) (iii) Incomplete reporting;
(iv) (iv) Different methodologies for estimation of new emerging waste;
(v) (v) Discrepancies in reporting and
(vi) (vi) Data inaccuracies due to unharmonised geographical scopes of data collection, interpretation & data reporting.

6. There is very limited local, national & global registry in Asia and the Pacific Region which could facilitate for harmonization, interpretation and reporting of data.

7. Globally and in Asia & the Pacific region, sustainability reporting is being increasingly followed by local and national governments and corporates. It gives broadly the uniform reporting framework, which can be interpreted and followed. But sustainability reporting (SDGs) for waste streams is lacking. So there is need to converge Ha Noi 3R goals into SDGs Tier 1 and Tier 2.

Conventional and Frontier Technologies in Advancing 3Rs and Circular Economy in Asia – Pacific

Waste to Energy (WtE)

1. WtE is broadly classified into four categories: thermal, mechanical and thermal, thermo-chemical and biochemical through different routes or their combination such as: (i) Incineration with energy recovery; (ii) Gasification; (iii) Pyrolysis; (iv) Composting; and Anaerobic digestion.

2. Extensive use of incineration with energy recovery is widely applied in Europe, Japan and the United States.

3. Among all the waste treatment technologies in Asia & the Pacific region, about 29.2 percent is used as incineration with energy recovery while 51.2 percent is landfilled .

4. Though thermal WtE is still used in developing countries as a waste management. The Philippines is the only Asia Pacific country with an incineration ban enforced by law.

5. There are about 1120 WtE plants in Asia Pacific, majority in Japan, Republic of Korea & China.

6. The implementation of thermal WtE in developing countries has technical challenges, such as waste characteristics, and governance challenges, which include social, financial and legislative aspects.

7. Thermal WtE requires significant investment for startup, operation and maintenance.

Conventional and Frontier Technologies in Advancing 3Rs and Circular Economy in Asia – Pacific Contd…

Biobased Plastics and Biodegradable Plastics

1. Bioplastics are not just one single material. They comprise of a whole family of materials with different properties and applications.

2. According to European Bioplastics, a plastic material is defined as a bioplastic if it is either biobased, biodegradable, or features both properties. Global bioplastics production capacities are set to increase from around 2.42 million tonnes in 2021 to approximately 7.59 million tonnes in 2026.

3. Hence, the share of bioplastics in global plastic production will bypass the two percent mark for the first time. Asia further strengthened its position as major production hub with almost 50 percent of bioplastics currently being produced in the region. Asia is predicted to have passed the 70 percent by 2026.

4. **Biodegradation** is a biologically-mediated process involving the complete or partial conversion to water, CO2/methane, energy and new biomass by microorganisms (bacteria and fungi).

5. Compostable industrial plastic waste is capable of being **biodegraded** at elevated temperatures under specified conditions and time scales. Compostable domestic plastic waste is capable of being **biodegraded** at low to moderate temperatures, found in a domestic compost system.

6. Many countries in Asia and the Pacific region cover the bioplastic and biodegradable plastics as alternate to virgin plastic.

Conventional and Frontier Technologies in Advancing 3Rs and Circular Economy in Asia – Pacific Contd…

Used Tyre for Road Construction

1. The old abandoned tyres from cars, trucks, farm and construction equipment and off-road vehicles are stockpiled throughout the region. They are either openly burned, reused in a limited manner for other purpose.

2. There is no estimates of waste tyre inventory in the region. Only official estimates are based on passenger car units, other automobile & off the road tyres estimates.

3. There is a significant variation in average life cycle of tyres in developed and developing countries.

4. Infrastructure & industry development is primarily driving the tyre market in the Asia Pacific region.

5. Waste tyre rubber is used as binding material in bitumen, with aggregate in different layer and also on the top surface layer mixed with bitumen in percentage to increase in strength of road pavement and also economically achieve.

6. The waste tyres are either covered in solid waste management regulations or hazardous waste regulations in the Asia and the Pacific region.

7. The principles of extended producer responsibility (EPR) or product stewardship are applied in the region ex. Japan, Republic of Korea, Vietnam and India have regulatory systems based on EPR.

Conventional and Frontier Technologies in Advancing 3Rs and Circular Economy in Asia – Pacific Contd…

Plastic as Alternative Timber (for example – Case of Australia)

1. Plastics is being increasingly used along with timber to give alternatives, which reduces the need for wood as well as save trees & forests. Both natural fiber and wood composite products can be made with either virgin plastic or post-consumer/industrial recycled material.

2. Advantages of Using Recycled Plastic Timber include: (i) Environmental friendly; (ii) Durable; (iii) Easy to maintain and (iv) Economic. Types of Recycled Plastic Timber & Uses include: (i) High Density Polyethylene; (ii) Commingled Timber; (iii) Wood Filled Timber and (iv) Fiber Reinforced Timber

3. The Asia Pacific wood plastic composites market is growing rapidly with a CAGR of 13.28% in terms of revenue from 2020-2028. Further, in terms of volume the market is projected to register a compounded annual growth rate (CAGR) of 11.82%.

4. China has, the largest market share of more than 61.87%. Other countries driving this growth rate are South Korea, India, Australia, ASEAN, Japan, and the rest of Asia Pacific. The infrastructure and the real estate sectors are driving this rapid growth. In the rest of the Asia Pacific, the growth in the construction and automobile industry will be the primary factors driving the market growth.

Conventional and Frontier Technologies in Advancing 3Rs and Circular Economy in Asia – Pacific Contd…

Application of Smart Technology ex. Waste Management System

1. The rapid waste generation leads to littered waste due to area overflowing waste bins in a densely populated are the application of IoT and artificial intelligence (AI) in waste management system in an urban area has high potential to revolutionize the waste management system.

2. It makes the system more efficient and results in clean cities.

3. IoT powered systems equip waste collection in real time and inform the stakeholders of any waste overflows. Combining IoT waste data analytics with modern IoT solutions helps identify challenges and improve.

4. To save money from the operational inefficiencies of traditional methods of trash collection and disposal procedures, IoT-driven solutions are required.

5. More cities across Asia and the Pacific are implementing smart waste management solutions to more efficient and clean waste management system in order to save money and reduce the environmental impact.

6. It includes smart bins with RFID readers, Smart Waste Management Platform, Intelligent Routing / Route Optimization, Container Tracking, Pneumatic waste pipes and Smart recycling. Other existing smart waste management system are: (i) Solar-Powered Trash Compactors; (ii) Garbage Truck Weighing Mechanisms; (iii) E-Waste Kiosks and ; (iv) Recycling Apps.

Conventional and Frontier Technologies in Advancing 3Rs and Circular Economy in Asia – Pacific Contd…

End of Life Batteries

1. The extensive use of batteries in a broadly from storing energy to operating various equipment's results in millions of tonnes batteries in operation in all countries. Primary (single-use or "disposable") batteries are used once and discarded.

2. Depending on battery chemistry and usage, the primary and secondary batteries are classified.

3. The development in the field of automobile, aviation & aerospace, marine hybrid propulsion, defence, telecommunication, micro-grid, etc. predict higher growth of battery market.

4. The global automotive battery recycling market is predicted to register a revenue of $19,222.3 million by 2028 and grow at 8.1% CAGR .

5. Higher operational costs in recycling of batteries is the major constraint in the growth of the battery recycling.

6. Other constraints are:

(i) Large quantities and range of strategic minerals needed to power renewable energy transition and digital tech including demand for battery metals (nickel, cobalt, copper, lithium).

(ii) Needed only in small quantities, cannot be easily recycled using conventional technologies.

(iii) About 3% of rare-earth materials are recycled world wide. Crude recycling targets mean that most valuable materials are not reclaimed in recycling processes.

Conventional and Frontier Technologies in Advancing 3Rs and Circular Economy in Asia – Pacific Contd…

End of Life Batteries Contd..

7. The automotive battery recycling market in the Asia-Pacific region is predicted to have the fastest growth rate of 8.5% CAGR in the current decade (2021-2030).

8. Robust manufacturing and recycling base of lead acid battery in China, Japan and India along is expected to increase lead acid battery market share in the future. Japan, China, ASEAN countries, India, Australia & New Zealand, South Korea and the Rest of APAC together constitute the Asia-Pacific's battery recycling market.

9. End of life batteries are considered as hazardous waste. They fall in the category of hazardous waste regulations and are controlled and regulated by these regulations in each country.

10. They are increasingly covered under "Extended Producer Responsibility" regime in major countries.

Conventional and Frontier Technologies in Advancing 3Rs and Circular Economy in Asia – Pacific Contd…

Carbon Neutral Technologies

Carbon Neutral Technologies in Asia and the Pacific include

(i) **Technologies for renewable energy,** Solar Energy, Wind Energy, Ocean Energy, Bioenergy, Hydrogen Energy, Nuclear Energy, Geothermal energy, Energy Storage;
(ii) **Technologies for enhanced carbon sink in global ecosystems include:** Carbon sink in terrestrial ecosystems, Carbon sink in marine ecosystems, Zero waste biochar as a carbon-neutral tool and;
(iii) **Other Technologies include** Carbon neutrality based on satellite observation and Digital Earth.

The renewable energy, such as hydropower, such as solar energy, wind power, and ocean energy, are regarded as some of the most important and efficient means to achieve carbon neutrality along with other sources like nuclear and H2 energy. The other technologies are at R&D stage.

Conventional and Frontier Technologies in Advancing 3Rs and Circular Economy in Asia – Pacific Contd…

Assessment of World Cases and Best Practices of Circular Economic Utilization of Food Waste

1. Food waste utilization priorities in the Ha Noi 3R Declaration's Sustainable 3R Goals (3RGs) for Asia and the Pacific for 2013-2023 can be primarily attributed to goal 2 and goal 10 (UNCRD, 2013).

2. There is a plethora of benefits in adopting circular economy systems to resolve food waste problems reduced greenhouse gas (GHG) emissions cut by 49% by a circular economy for food by 2050 (Robertson-Fall, 2021).

3. Best practices of circular economy utilization of food can be found across the food supply chain. Some examples of circular economy principles which are applicable are: (i) Targeted valorization of food waste and; (ii) Assessment of value of utilization practices.

4. IoT & Block chain has been active and disruptive as a secure ledger applied to innumerable areas within the past years.

Conventional and Frontier Technologies in Advancing 3Rs and Circular Economy in Asia – Pacific Contd…

Assessment of World Cases and Best Practices of Circular Economic Utilization of Food Waste Contd…

1. As for trends and develops on relevant Ha Noi 3R Declaration goals and SDGs, People's Republic of China, Japan, Viet Nam, Malaysia, and Australia developed targets aligned with SDG 12.3.

2. State-of-art technologies such as block chain, IoT, AI and other smart systems and devices can greatly assist the efficiency of food circular economies, also allowing traceability, transparency, big data analytics, and systemic studies of food circularity (de Souza, et al., 2021).

3. Moving forward, panel experts recommend several clear goals or targets including: 1) data collection, 2) quantitative targets of utilization, 3) quantitative targets of increase in installed capacity for bioenergy, and 4) encouragement of technology-sharing and capacity-building between developed and developing countries of the Asia Pacific.

Progress Towards Implementation of the Ha Noi 3R Declaration (2013-2023)

The progress towards implementation of the Ha Noi 3R declaration in Asia and the Pacific region has been described in terms of trends describing 3R policies & legislative framework, definition of MSW waste, hazardous waste including generation, policies & regulations and nationally implemented 3R projects programmes & master plan.

3R Policy Implementation in Asia and the Pacific

1. The major trends have been described in terms of policy and regulatory framework, definitions, related to MSW and hazardous waste, emerging of both waste streams and Extended Producer Responsibility (EPR).

2. Waste management exists in the basic environmental policy of all the countries, with the developed ones having specific legislation and framework for recycling, take-back schemes and e-waste management.

3. The definition and classification on MSW including associated waste streams vary across the region depending on the situation, context and the Country priority. Accordingly the quantity and the waste stream regulated varies across Asia and the Pacific. For example, Japan and Singapore define MSW as “general waste”.

4. Overall Assessment indicate positive movement towards policy and regulatory regime formulation, implementation and monitoring of the waste value chain in the region.

Progress Towards Implementation of the Ha Noi 3R Declaration (2013-2023) Contd..

3R Policy Implementation in Asia and the Pacific Contd…

- Extended Producer Responsibility (EPR) is considered as one of major policy approaches to promote take-back and recycling of end-of-life products that are usually considered difficult to be treated and managed by municipalities, including used plastic and paper containers, electronic wastes and batteries and other waste stream.

- Some of key issues associated with EPR adoption in emerging countries are overcoming constraints related to: (i) Physical responsibility (ii) Financial responsibility (iii) Infrastructure for treatment & disposal (iv) Development of ecosystem for waste value chain (v) Readiness of brands to adopt it (vi) transparent monitoring & reporting of the ecosystem.

Nationally Implemented 3R – Related Programmes, Project & Master Plans

- Almost all the countries have planned to develop policies and master plans for Municipal Solid waste management for the year 2013 to 2021.

- The majority of countries have planned to develop master plans/ plans/strategies for hazardous waste management, Resource Efficiency and resource productivity and Agricultural biomass management.

Progress Towards Implementation of the Ha Noi 3R Declaration (2013-2023) Contd..

Waste Management System Trends

- At institutional level, urban local bodies (ULBs) as well as private sector (formal and informal) are involved in collection, transportation, treatment and disposal of MSW in Asia and the Pacific region.

- Plan, program and projects are formulated by both nodal ministry and as well as local governments (ULBs) in respective country.

- An analysis of the solid waste institutional structure indicates that multiple agencies both at national and city level with strong presence of informal sector further exacerbate the existing regulatory compliance and management (segregation, treatment and disposal) issues in the region.

CONTENTS

CHAPTER 4: EXPERT'S ASSESSMENT OF POLICY READINESS FOR RELATED HA NOI 3R GOALS AND PROGRESS AT NATIONAL LEVEL

Summary of 3R Goals at National Level

- Majority of countries have reported subscription to policy , programmes, projects, regulations, related to twenty two out of thirty three Ha Noi 3R goals.
- Goal 1, 2 and 3 related to solid (municipal & other) waste, its sub streams ex. paper, metal, organic etc. and their recycling aspects are widely reported in the region.
- The recycling activities are happening both in formal and informal sector. Majority of countries have specific 3R policies, programs & projects in place.
- The policies have been translated into specific regulations of municipal solid waste, which have been institutionalized at national level to be implemented at provincial and local level.
- The facilities for recycling of construction waste is poor in majority of countries. Institutional and financial challenges are reported to be significantly followed by policy and technical.
- The majority of the countries in the region, which have vibrant industrial sector have reported initiatives as per goal 6, 7, and 8.
- Majority of the countries have not defined the amount of agricultural biomass waste and livestock waste that was grossly generated per annum.
- Majority of the countries make composts / fertilizers from the agricultural biomass waste.

Summary of Progress of 3R Goals at Regional Level

- With regard to emerging waste issues, e-waste management has been prioritized and a number of countries have started to apply EPR-based policies for e-waste management (Goal 13 and 15).

- Whilst marine/coastal plastic waste has been given increasing regional attention, concrete actions taken by national governments are limited in most countries (Goal 12 and 15). Goal 15 is evolving across the region.

- The majority of countries have introduced specific energy efficiency schemes for production, manufacturing and service sector.

- Majority of the countries support Goal 23, Goal 24, Goal 25, Goal 27, Goal 28 and Goal 29. Goal 30 and Goal 31 i.e. attention on developing countries including SIDS and the concept of “Return” have received **limited response** from countries.

- Social governance issues like child labour (Goal 32) and gender bias (Goal 33) have received significant addressal from the majority of countries.

- The low response by countries has been observed for Ha Noi Goals 6, 8, 20, 22, 24, 26, 29, 30, 31, 32 and 33. It indicates the priority areas for future attention at regional level.

Summary of Progress of 3R Goals at Regional Level

Summary of 3R Goals at National Level (2013-2023) is summarized below.

Overall Hanoi 3R Goal Wise Implementation in Asia and the Pacific Region

Goals No.	Description	Ranges	Name of Country (Example)	Specific Interventions (Examples)
Goal 1	Reduction in the Quantity of Municipal Solid Waste Generated	M – H	Japan Republic of Korea	Policy, Technical & Financial
Goal 2	Full-scale utilization of the organic component of municipal waste, including food waste, as a valuable resource, thereby achieving multiple benefits such as the reduction of waste flows to final disposal sites, reduction of GHG emission, improvement in resource efficiency, energy recovery, and employment creation.	M – H	Japan	Technical & Collection on Mechanism
Goal 3	Increasing Recycling Rate of Recyclables (e.g., plastic, paper, metal, etc.)	M – H	Japan	Recycling Industry
Goal 4	Build sustainable cities /green cities by encouraging “zero waste” through sound policies, strategies, institutional mechanisms, and multi-stakeholder partnerships (giving specific importance to private sector involvement) with a primary goal of waste minimization	M – H	Japan, Singapore & Republic of Korea	Private sector participation & PPP Model
Goal 5	Encourage the private sector, including small-and medium-sized enterprises (SMEs) to implement measures to increase resource efficiency and productivity, creation of decent work and to improve environmentally-friendly practices through applying environmental standards, clean technologies, and cleaner production.	M – H	India	Energy Efficiency program in SME. Make in India Program
Goal 6	Promote the greening of the value chain by encouraging industries and associated suppliers and vendors in socially responsible and inclusive ways.	L	Japan, Singapore, China Republic of Korea	Examples of Major retailers in the region

Summary of Progress of 3R Goals at Regional Level

Goals No.	Description	Ranges	Name of Country (Example)	Specific Interventions (Examples)
Goal 7	Promote industrial symbiosis (i.e., recycling of waste from one industry as a resource for another), by providing relevant incentives and support.	M – H	Indonesia	Waste Bank Programs
Goal 8	Build local capacity of both current and future practitioners, to enable the private sector (including SMEs) to obtain the necessary knowledge and technical skills to foster green industry and create decent, productive work.	L	Thailand, Vietnam, Cambodia	Cleaner Production Program
Goal 9	Inventory of Hazardous Waste	M – H	India	Implementation of Rules on Hazardous waste
Goal 10	Reduce losses in the overall food supply chain (production, post harvesting and storage, processing and packaging, distribution), leading to reduction of waste while increasing the quantity and improving the quality of products reaching consumers.	M – H		
Goal 11	Agricultural Biomass Waste Management	M – H	Vietnam	Regulation, Strategy / Plans
Goal 12	Eliminating Marine Plastics	M – H	Japan	Programs &I infrastructure to prevent marine litter
Goal 13	E-Waste Management	M – H	Japan	Policy, laws & recycling ecosystem

Summary of Progress of 3R Goals at Regional Level

Goals No.	Description	Ranges	Name of Country (Example)	Specific Interventions (Examples)
Goal 14	Effective enforcement of established mechanisms for preventing illegal and inappropriate export and import of waste, including transit trade, especially of hazardous waste and e-waste.	M – H	Japan	Policy, laws & recycling ecosystem
Goal 15	Implementation of Extended Producer Responsibility	M – H	Japan, Republic of Korea, India	Regulations
Goal 16	Promote the 3R concept in health-care waste management.	M – H	India	Regulations & Waste Management System
Goal 17	Improving Resource Efficiency and Resource Productivity	L-M	Japan, Republic of Korea	
Goal 18	Co-benefits for Local Air, Water, Oceans, and Soil Pollution and Global Climate Change	M – H	Japan, Republic of Korea	Policy, Regulation & Ecosystem
Goal 19	Enhance national and local knowledge base and research network on the 3Rs and resource efficiency, through facilitating effective and dynamic linkages among all stakeholders, including governments, municipalities, the private sector, and scientific communities.	M – H	Japan, Republic of Korea, Singapore	Policy, Regulation & Ecosystem
Goal 20	Strengthen multi-stakeholder partnerships among governments, civil society, and the private sector in raising public awareness and advancing the 3Rs, sustainable consumption and production, and resource efficiency, leading to the behavioural change of the citizens and change in production patterns.	L	Singapore	Policy, Regulation Implementation & Ecosystem Development

Summary of Progress of 3R Goals at Regional Level

Goals No.	Description	Ranges	Name of Country (Example)	Specific Interventions (Examples)
Goal 21	Integrate the 3Rs in formal education at primary, secondary, and tertiary levels as well as non-formal education such as community learning and development, in accordance with Education for Sustainable Development.	M – H	Japan	Sapporo city elementaty & Junior High School effort of conversion food waste into compost
Goal 22	Integrate the 3R concept in relevant policies and programmes, of key ministries and agencies such as Ministry of Environment, Ministry of Agriculture, Forestry and Fisheries, Ministry of Industry, Ministry of Trade and Commerce, Ministry of Energy, Ministry of Water Resources, Ministry of Transport, Ministry of Health, Ministry of Construction, Ministry of Finance, Ministry of Labour, Ministry of Land and Urban Development, Ministry of Education, and other relevant ministries towards transitioning to a resource-efficient and zero waste society	L	Japan	Different ministries following 3R concept
Goal 23	Promote green and socially responsible procurement at all levels, thereby creating and expanding 3R industries and markets for environmentally-friendly goods and products.	M – H	India, Japan, Republic of Korea	Changesx in government procurement policies
Goal 24	Phase out harmful subsidies that favour unsustainable use of resources (raw materials and water) and energy, and channel the freed funds in support of implementing the 3Rs and efforts to improve resource/energy efficiency	L	Japan	Policy & Regulation
Goal 25	Protect public health and ecosystems, including freshwater and marine resources by eliminating illegal activities of open dumping, including dumping in the oceans, and controlling open burning in both urban and rural areas.	M – H	Major countries in the region	Implementation of MARPOL protocols

Summary of Progress of 3R Goals at Regional Level

Goals No.	Description	Ranges	Name of Country (Example)	Specific Interventions (Examples)
Goal 26	Facilitate the international circulation of re-usable and recyclable resources as well as remanufactured products as mutually agreed by countries and in accordance with international and national laws, especially the Basel Convention, which contributes to the reduction of negative environmental impacts and the effective management of resources.	L		
Goal 27	Promote data collection, compilation and sharing, public announcement and application of statistics on wastes and the 3Rs, to understand the state of waste management and resource efficiency.	M – H	Japan, Singapore, India	Public disclosure ex. websites, annual reports of ministries
Goal 28	Promote heat recovery (waste-to-energy), in case wastes are not re-usable or recyclable and proper and sustainable management is secured	M – H	China, Japan & India	Waste to energy & RDF Plants
Goal 29	Promote overall regional cooperation and multi-stakeholder partnerships based on different levels of linkages such as government-to-government, municipality-tomunicipality, industry-to-industry, (research) institute-to-institute, and NGO-to-NGO. Encourage technology transfer and technical and financial supports for 3Rs from developed countries to less developed countries.	L	NA	NA
Goal 30	Pay special attention to issues and challenges faced by developing countries including SIDS in achieving sustainable development.	L	NA	NA
Goal 31	Promote 3R + “Return” concept which stands for Reduce, Reuse, Recycle and “Return” where recycling is difficult due to the absence of available recycling industries and limited scale of markets in SIDS, especially in the Pacific Region.	L	Palau	Take back program
Goal 32	Complete elimination of illegal engagement of children in the informal waste sector and gradually improve the working conditions and livelihood security, including mandatory provision of health insurance, for all workers.	L	NA	NA
Goal 33	Promote 3Rs taking into account gender considerations.	L	NA	NA

Summary of Progress of 3R Goals at Regional Level

Country wide Policy, Programs, Plans & Projects Implementation as per Ha Noi 3R in Asia and the Pacific Region

Sr. No.	Country	Goal – 1	Goal – 2	Goal – 3	Goal – 4	Goal – 5	Goal – 6	Goal – 7	Goal – 8	Goal – 9	Goal – 10	Goal – 11	Goal – 12	Goal – 13	Goal – 14	Goal – 15	Goal – 16	Goal – 17	Goal – 18	Goal – 19	Goal – 20	Goal – 21	Goal – 22	Goal – 23	Goal – 24	Goal – 25	Goal – 26	Goal – 27	Goal – 28	Goal – 29	Goal – 30	Goal – 31	Goal – 32	Goal – 33
1.	Bangladesh																																
2.	Bhutan																																
3.	Cambodia																																
4.	Cook Islands																																
5.	Federated States of Micronesia																																
6.	India																																
7.	Indonesia																																
8.	Japan																																
9.	Kiribati																																
10.	Kyrgyzstan																																
11.	Lao PDR																																
12.	Malaysia																																
13.	Marshall Islands																																
14.	Mauritius																																
15.	Mongolia																																
16.	Nauru																																
17.	Nepal																																
18.	Pakistan																																
19.	Palau																																
20.	Philippines																																
21.	Republic of Korea																																
22.	Russian Federation																																
23.	Singapore																																
24.	Solomon Islands																																
25.	Sri Lanka																																
26.	Thailand																																
27.	Tonga																																
28.	Tuvalu																																
29.	Vietnam																																

Data not available / not applicable Policies / Regulations Implementation

Existing and Emerging Waste Management System Trends Contd…

- The evaluation of Ha Noi 3R goals gets reflected in the waste management systems in Asia and the Pacific. This waste management ecosystem can be broadly classified into three generic models based on observed waste streams, technologies employed and practices across the waste value chain.

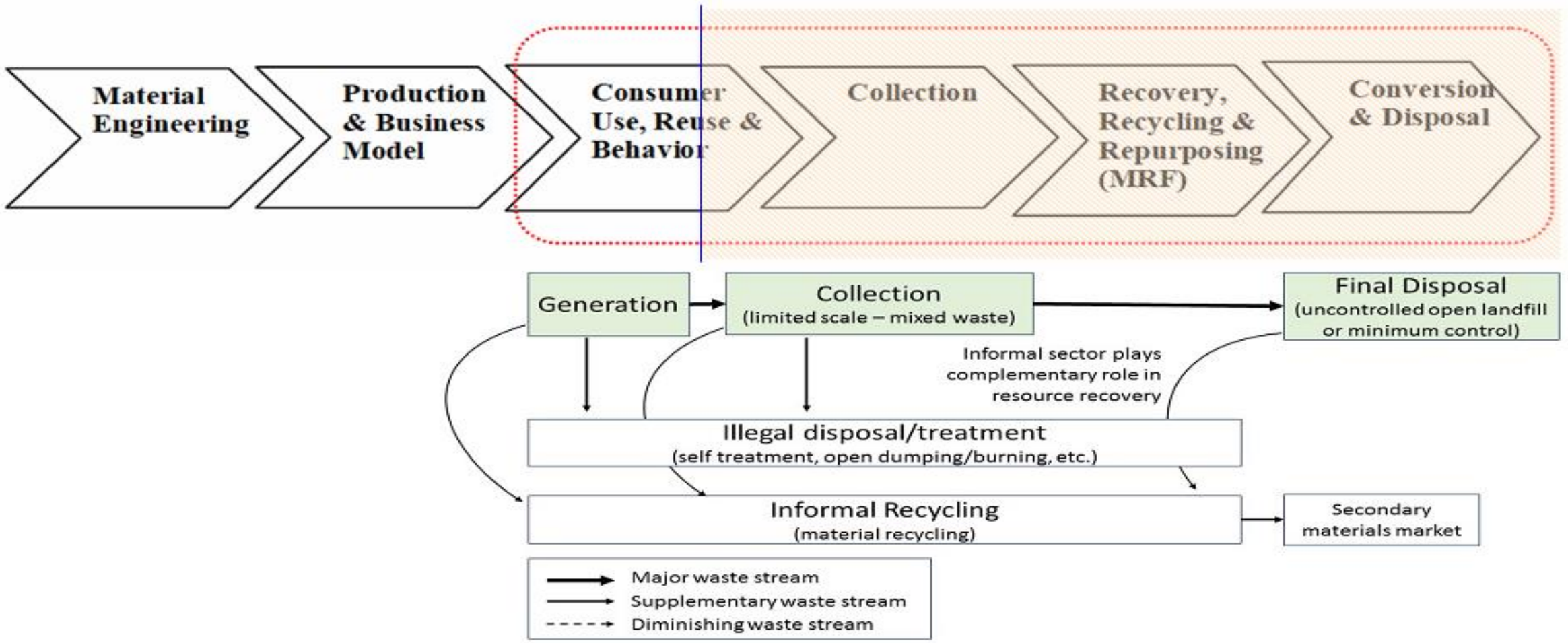
- The three different types of models, Model 1, Model 2 & Model 3 are describing Country wide Status of Waste Management System.

Country	Waste Management Systems		
	Model 1	Model 2	Model 3
Bangladesh	√	√	
Bhutan	√	√	
Cambodia	√	√	
Cook Islands	√		
Federated States of Micronesia	√		
India	√	√	√
Indonesia	√	√	
Japan			√
Kiribati	√		
Kyrgyzstan	√	√	
Lao PDR	√	√	
Malaysia	√	√	
Marshall Islands	√		
Mauritius	√	√	
Mongolia	√	√	
Myanmar	√	√	
Nauru	√		

Existing and Emerging Waste Management System Trends Contd…

Country	Waste Management Systems		
	Model 1	Model 2	Model 3
Nepal	√	√	
Pakistan	√	√	
Palau	√	√	
Philippines	√	√	
Republic of Korea		√	√
Singapore		√	√
Solomon Islands	√		
Sri Lanka	√	√	
Thailand	√	√	
Timor Leste	√		
Tonga	√		
Tuvalu	√		
Vietnam	√	√	
China	√	√	√
Australia		√	√
Fiji	√	√	
Maldives	√		
Papua New Guinea	√		
Samoa	√		
Vanuatu	√		
Brunei Darussalam	√	√	

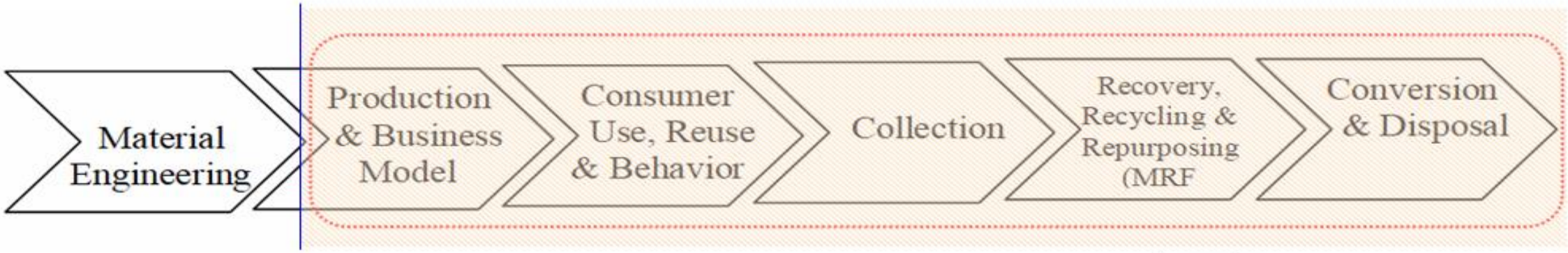
Existing and Emerging Waste Management System Trends Contd…

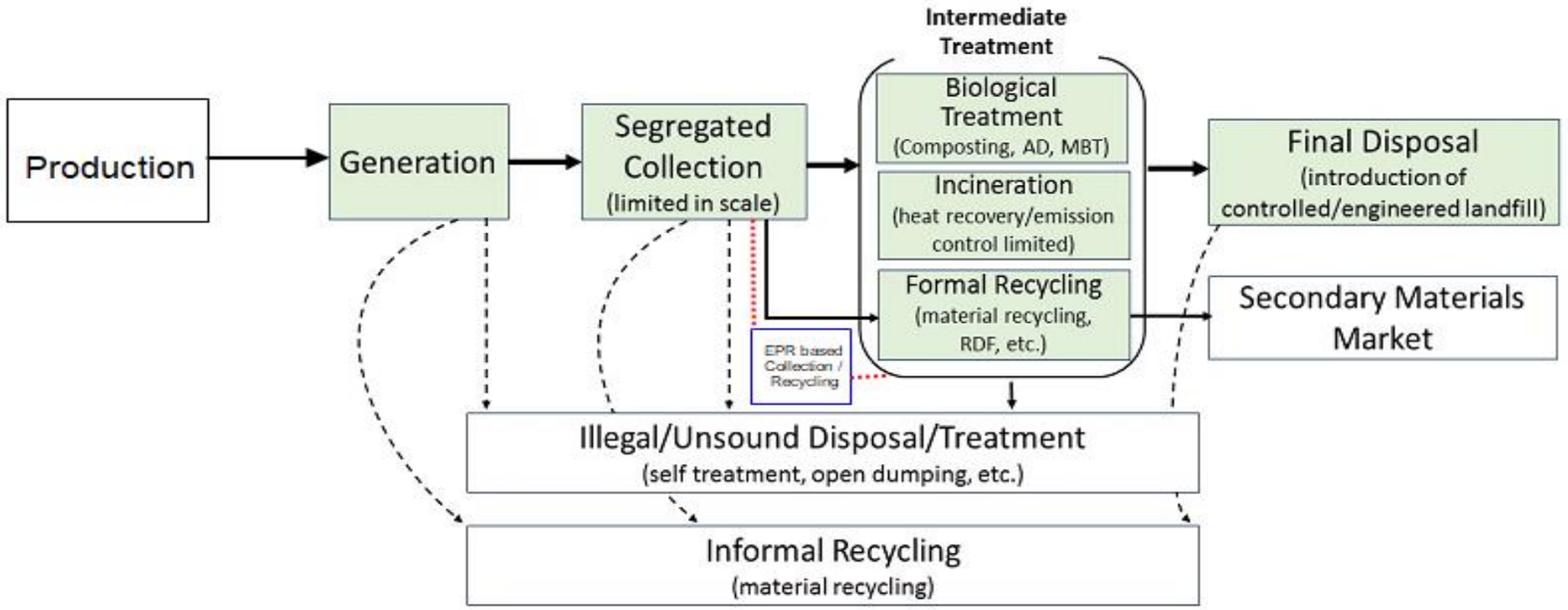


Model 1 - Emergence of Simple Waste Management System

Salient Features

- Limited segregation of waste in informal sector
- Minimum collection coverage in a geography
- Major valuable resources recovered by informal sector / very limited formal sector participation
- Limited no options for intermediate treatment
- Final disposal at dumpsite / open landfill / landfill with minimum control
- Rampant illegal disposal/treatment

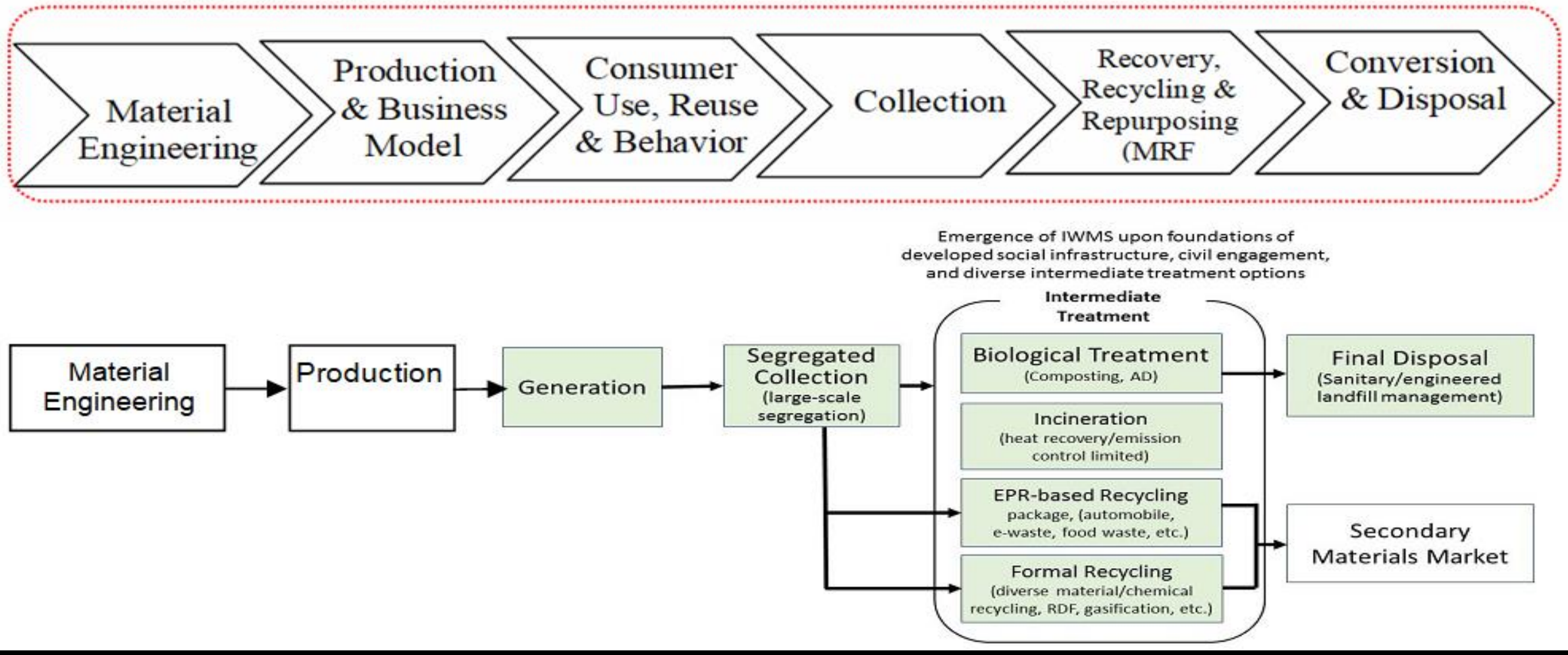




Model 2 – Waste Management System in Transition

Salient Features

- Both formal & informal segregation of waste depending on appropriate treatment option
- Improved collection coverage across geography
- Items of value are collected through informal and formal sector
- Different intermediate treatment options are explored and introduced, including incineration and other 3R technologies
- Infrastructure for disposal ex. controlled landfills are replicated across different geography
- Illegal disposal/treatment still exists while concepts like EPR / Product Stewardship and Circularity are introduced.



Model 3 – Development of Integrated Waste Management Systems

Salient Features

- Segregation practices are widely practiced and customized available treatment options
- Complete waste collection coverage
- Recyclable waste collection conducted by formal sector leading to conversion and assimilation of informal sector into the formal chain.
- Recycling industry gets expanded
- Resource Efficiency and material engineering are introduced and practiced.
- Incineration with heat recovery representing the major treatment option while diverse options also exist including Sanitary landfill.
- Insignificant illegal disposal/treatment
- Environmentally benign alternate products are introduced in the market which are easy to segregate & recycle
- Material engineering undergoes transformation with internalization of design for environment.

Internalization & Evolution of Ha Noi 3R Goals & Strategic Evaluation

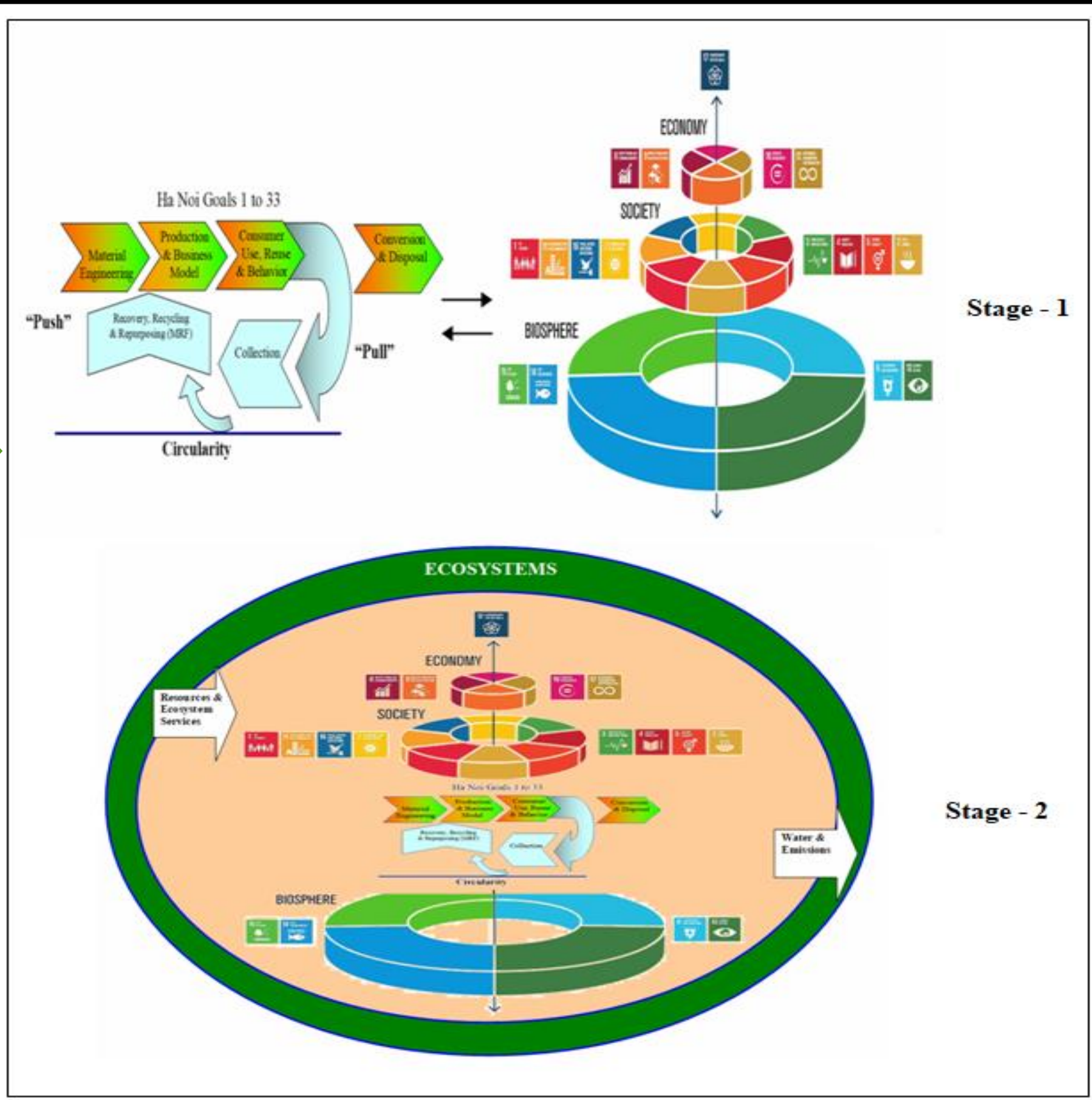
An analysis of internalization and evolution of Ha Noi 3R goals has been carried out considering “Circularity” and “Sustainability” in Asia and the Pacific region. Above analysis indicates the Ha Noi 3R declaration has made a significant impact in triggering transformation from “Linear’ to “Circular” economy. As a result, the major economies are adopting policies / regulation, programmes, plans & projects related to “Circularity” thereby pulling their economies towards material recycling, resource productivity pushing for resource efficiency and sustainability. This “Pull” and “Push” strategy is driving as shown in **Stage 1**. This is further leading to an evolution of resource management ecosystem where all the three components (i) Society (ii) Biosphere and (iii) Economy are interlinked on the same pivot as shown in **Stage 2**.

Country Analysis

Japan
Republic of Korea
Singapore
China
India
Thailand
Vietnam

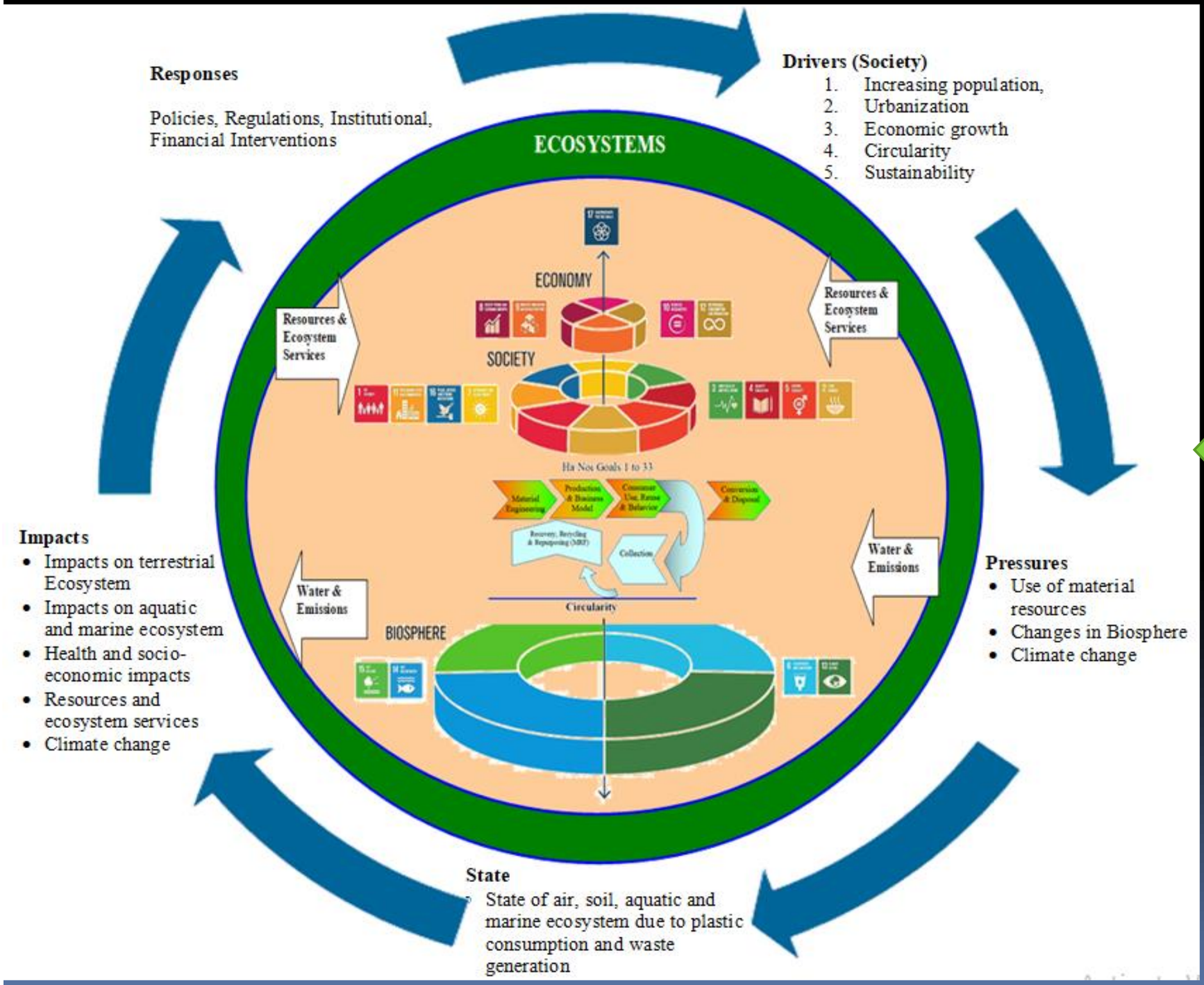
Internalization & Evolution of Ha Noi 3R Goals & Strategic Evaluation Contd…

Sustainable Future Policy & Waste Management Ecosystem (linear vs circular) in Asia & the Pacific



Strategic Evaluation

The strategic DPSIR framework shows major drivers, pressures, the state and response. Analysis of the response in the region is fraught with constraints and barriers in the region.



Asia and the Pacific, summary of drivers, pressures, state and trends, and impacts

Strategic Evaluation Contd…

Drivers

Major drivers include rapid growth in population, urbanization, economic growth, circularity and sustainability. The region's population is projected to rise to 5.08 billion by 2050, which is about 60% of the world's total population[1]. The growth of mega cities (15 out of 28) are triggering urbanization in the region. At the same time the rapid economic growth as summarized in Chapter 1 with the growing middle class is driving the economy of the region. GDP of the major countries in the region was above 25 trillion ranging from US$ 583 to US$ 73,187 per capita.[2] Majorly it is based on "Linear" model of indicators show that the resource intensity & material footprint is increasing in the region. In order to optimize the financial resources different national governments have embarked on circular model of development based on sustainability principles.

Pressures

The population growth, industrialization and urbanization have led to a sharp increase in unsustainable & inefficient material resource use in the region. The domestic material consumption of approximately 2 Kg per dollar (US$) of economic output versus 1.2 Kg per dollar (World's average) with an increasing trend is leading to changes in biosphere and climate of the region. The changes in biosphere includes changes in land use, finite natural resources, terrestrial, aquatic and marine ecosystem of Asia and the Pacific region.

Strategic Evaluation Contd…

State

The generation of both liquid & solid emissions leads to deterioration of air, soil, aquatic & marine ecosystem. For example, the amount of plastic waste entering the ocean from Asia. Inadequate treatment of waste & emissions can cause pollution and environmental and ecosystem degradation the deteriorating the resource & ecosystem services.

Impacts

The negative impacts on the terrestrial, climate and aquatic and marine ecosystem lead to negative health and socio-economic impacts with low resource & ecosystem services.

Response

A number of policies, regulations, programs, plans & project interventions across the value chain defines the institutional response. Financial mechanism integrate the interventions into development of sustainable business models.

The strategic DPSIR framework shows major drivers, pressures, the state and response. Analysis of the response in the region is fraught with constraints and barriers in the region. These are majorly policy, institutional, technology & financial which are evolving as the region embarks to adopt circularity & sustainability.

CONTENTS

CHAPTER 5: MAJOR RECOMMENDATIONS AND THE WAY FORWARD

Introduction

This section describes the challenges and recommendations to overcome them. Further, the way forward considering the sustainable development goals have been described in the chapter. This analysis has been carried out based on the findings of (i) Urgent needs and multiple benefits of implementing 3Rs and circular economy approach in Asia and the Pacific (ii) trends of 3R and circular economy in Asia and the Pacific (iii) trends in 3Rs waste management policies and responses; (iv) Growing volume and diversification of waste streams with presence of new emerging waste streams and; (v) Conventional and frontier technologies in advancing 3Rs and circular economy in Asia and the Pacific and (vi) Expert's assessment of policy readiness for related Ha Noi 3R Goals and Progress at national level.

The Challenges

The challenges have been framed based on: (i) Recognition of the issue; (ii) Prioritization of the issue; (iii) Policy promulgation and regulation enforcement; (iv) Development & evolution of institutional framework and; (v) Technological interventions. There is an increased recognition that a circular business model is necessary and there is a need to move in this direction. However, changes are happening at a very slow pace, because there are multiple challenges throughout the entire value chain to meeting the 3R goals. These challenges are categorized as (i) Policy / Regulatory Challenges (ii) Institutional Challenges (iii) Technology Challenges and (iv) Financial challenges.

The Challenges Contd…

Summary of Challenges under Each Head

Policy / Regulatory
• Uncontrolled dumping and burning of municipal wastes.
• Compliance to the regulations
• Illegal trafficking in waste.
• Transboundary movement
Technology
• Problematic including additives in the product.
• Limited collection schemes and treatment technologies for different countries.
• Non applicability of available technology.
• Lack of available infrastructure
• Lack of technology adoption & assimilation
Institutional
• Poor data on the recycling industry and waste management chain.
• Regulatory burdens of materials classified as waste.
• Concerns over environmental standards for recycling in emerging markets.
• Waste collection systems for wastes not available for a substantial proportion of the value chain.
• Lack of segregation of waste.
• Global markets concentrated in a small number of countries
Financial
• Costs of collecting, sorting and processing waste.
• Limited resilience of the sector to market shocks.
• Lack of differentiated demand for recycled products.
• Competition between recycling and energy from waste.
• Regulatory burdens of materials classified as waste.

Way Forward

A way forward has been proposed in terms of summary of interventions across the upstream, downstream and the entire chain.

Upstream
• Mandate requirement for recycled content to create demand.
• Use public sector procurement policies to create demand for recycled content.
• Ban or reduce contaminants including hazardous contaminants & additives.
• Mandate labelling for biodegradable items and improve associated standards.
• Use taxes or trading mechanisms to internalise the externalities associated with primary plastics. This will support the price of recycled plastics.
• Develop alternatives to problematic and hazardous additives and design for environment including effects of problematic additives in recycled waste.
• Provide information and training to designers and manufacturers to encourage use of recycled content.
• Provide information to consumers to encourage purchase of products using recycled content and drive demand.
• Encourage openness about standards and provide information on end-destinations.
• Work with supply chain to encourage use of recycled content.

Way Forward Contd…

Down Stream
• Set statutory targets for recycling to drive supply of material, increase economies of scale, reduce costs and increase resilience of the supply chain.
• Ban plastics from landfill to drive supply of material and increase economies of scale, reduce costs and increase resilience.
• Use Extended Producer Responsibility (EPR) regulation to drive supply of material and increase economies of scale, reduce costs and increase resilience.
• Standardise waste collection systems to increase economies of scale and reduce costs.
• Introduce mandatory data reporting mechanisms for plastics recycling.
• Ensure regulation is proportionate and clarify end-of-waste requirements.
• Enforcement action to reduce illegal dumping, particularly in low and middle income countries where dumping is common place.
• Enforcement action to reduce illegal waste trafficking.
• Mobilise investment for developing collection, sorting and processing systems, particularly in low income countries including Island Nations.
• Support development of domestic reprocessing capacity to reduce reliance on global markets.
• Direct or indirect government support for recycled products.
• Incentivise recycling over energy from waste by introducing a tax to reflect the relative environmental burden/benefit.
• Charge waste producers for collection and disposal of non-recyclable waste.
• Support development of better and more cost- effective technologies including digital & smart for collecting, transporting and sorting waste.
• Support the development and demonstration of commercially viable technologies for mixed and/ or low value waste.
• Develop effective voluntary standards for recycling sector to limit need for regulation.
• Industry-led initiatives to prevent waste crime including transboundary movement.

Way Forward Contd…

Value Chain & Ecosystem
• Regulation and enforcement to ensure consistent environmental standards in global markets.
• Mandate sellers to establish and audit end- destinations for environmental standards.
• Use financial market mechanisms to increase the resilience of the market to fluctuations in prices (e.g. futures markets).
• Raise public awareness in order to create demand for recycled products, and to reduce littering and dumping.
• Share best practice on all aspects of the collection, segregation and reprocessing supply chain.
• Industry-led initiative to ensure consistent environmental standards in global markets.
• Business need to invest in technologies and innovation that make it possible to avoid materials that are unrecyclable because of toxicity.
• A plan needs to be in place for consumers to use products responsibly and reduce the amount of waste created during the use phase
• Business must promote design for environment and agree to use materials that are recycled and ensure that their raw material extractions are sustainable & socially responsible.
• Circularity needs to be introduced with materials.

Way Forward Contd…

Broadly these interventions can be classified as:

(i) Strengthening Institutional Foundation – legislations, policies, strategies, and standards

- One of the biggest challenge is to develop the waste management ecosystem, which is able to promote policies, legislation and standards. Even in the most developed system in the region there are inefficiencies due to lack of coordination among different ministries / agencies. At the same time new & emerging waste streams load already existing ecosystem.

- Resource efficiency, resource productivity and waste reduction measures need to be accelerated. This has a direct influence on ensuring effective service delivery, clarifying roles and responsibilities among different stakeholders, and setting clear objectives, priorities and built-in-mechanisms for implementation, monitoring, feedback and improvement. Therefore the waste management system should be flexible enough to accommodate new waste streams in the ecosystem e.g. waste from solar panel and EV batteries.

- A combination of policy instruments like bans or prohibition should be applied prudently so that it is easily applicable. So stakeholder engagement and consensus building based policy making need to be addressed.

Way Forward Contd…

(ii) Securing Finance and Promotion of Private Sector Investment

There is a need to reform the existing public sector funding of waste management systems. In addition to public sector funding there is a need to intensify private sector funding to support waste management system. This could in the foum of public private partnerships & “Polluter Pay Principles” as per EPR regulations. Brands should be made accountable for the cost of pollution from their products. Public sector financing should cover volume based fee system, solid waste collection / treatment charge to cover investment cost as well and “financial incentives such as subsidies, soft loans, for tax benefits for sound recycling technologies” can be introduced. Other mechanisms to mitigate pollution from a product should internalize costs, incurred diving its “Life Cycle”. Further, gaps between institutional and financial requirements should be bridged.

(iii) Filling Implementation Gaps between Rural and Urban Areas

There is a huge urban and rural divide in the sound waste management systems in Asia and the Pacific region. The rural waste management system should be synergistic with urban waste management system. For example, a “hub and spoke” model has the potential for extending the boundary of the 3R waste management ecosystem but also diffusing the principles of circularity & sustainability across the population. An example, “Swachh Bharat – Rural” launched with “Swachh Bharat – Urban” mission provide a synergistic program of garbage free India at national level.

Way Forward Contd…

(iv) Promoting Capacity Development for emerging ecosystem, Operation and Maintenance

As the system is evolving due to internalization of circularity, sustainability & environmental and social governance (ECG), there is an urgent need for “Reskilling” and capacity development. Further, the quick intervention of technology in every aspect of waste value chain has further accelerated it and needs to be done at top priority. Therefore, capacities for data management and evidence based policy making need to be enhanced for continued progress on the 3Rs.

Convergence of 3R Forum with Sustainability

The momentum generated by the countries for facilitation 3R policy dialogues and consolidation of 3R policies, strategies, programs & projects need to be sustained in future. Since the reporting of goals provide a regional framework of comprehensive reporting, it should be continue. Further it should converge towards sustainability.

THANK YOU

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