

Second Meeting of the Regional 3R Forum in Asia

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Need for 3R Strategies

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How does waste issues dynamically link with bio-physical & socio-economic system?



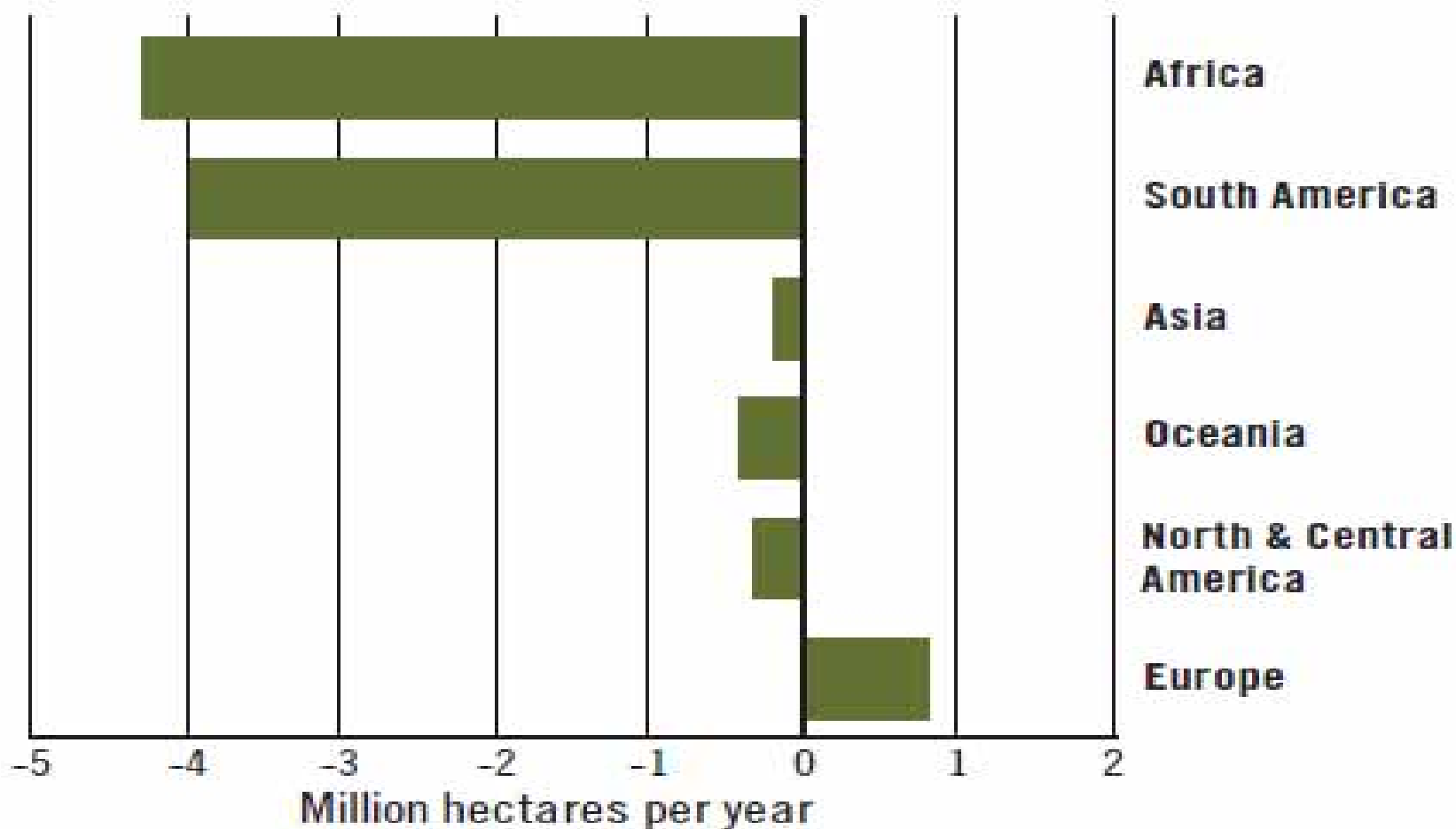
Selected Global Natural Resource and Environmental Trends

Fossil fuels and atmosphere	<ul style="list-style-type: none">• Global use of coal, oil, and natural gas was 4.7 times higher in 2002 than in 1950.• CO2 levels in 2002 were 18% higher than in 1960, and estimated to be 31% higher since the onset of Industrial Revolution in 1750.
Ecosystem degradation	<ul style="list-style-type: none">• More than half of Earth's wetlands, from coastal swamps to inland flood plains, have been lost.• In 1999, global use of wood for fuel, lumber, paper and other wood products was more than double that in 1950.
Sea level	<ul style="list-style-type: none">• Sea level rose 10-20 cm in the 20th Century, an average of 1-2 mm per year, as a result of melting continental ice masses and the expansion of oceans due to climate change.
Soil/land	<ul style="list-style-type: none">• Some 10-20 % of the world's cropland suffers from some form of degradation, while over 70% of the world's rangelands are degraded.
Fisheries	<ul style="list-style-type: none">• In 1999, total fish catch was 4.8 times the amount in 1950.
Water	<ul style="list-style-type: none">• Quality of groundwater is deteriorating as a result of runoff of fertilizers and pesticides, petrochemicals that leak out of storage tanks, chlorinated solvents and heavy metals discarded by industries, and radioactive wastes from nuclear devices.

Source: Worldwatch Institute (2004), p. 17, with modifications.



FIGURE 1.2 ECOSYSTEM DECLINE: ANNUAL NET CHANGE IN FOREST AREA BY REGION, 1990-2005



Source: FAO 2005a:XV

Preserving forests key to climate change mitigation & adaptation



The Millennium Ecosystem Assessment (2005) found that 15 out of 24 ecosystem services it assessed were in global decline - service such as plant pollination, provision of freshwater, wood fuels, wild foods, and fish, which provides the basis for many of the livelihoods of the poor.

Dynamic Sustainability Goals

Poverty reduction, using the assets from ecosystems as a basis for wealth creation

Resilience of local communities-especially poor families-to accommodate environmental and social change, particularly arising from climate change



Elements to scale up these goals

Environmental income- Income from ecosystems and nature-related activities,

Access- the power to use ecosystem resources to support livelihoods and empowerment,

Environmental enterprise -generators of environmental income and livelihood skills, and

Community based natural resource management (CBNRM)-the basis of much enterprise, social learning and empowerment.



Selected global trends – Pressure on the world's ecosystem by human activities

Population growth:

- World population is projected to increase to **9.1 billion by 2050**.
- **99 percent of global population growth** projected to occur in **developing nations**.
- About **3.2 billion people lived in the urban areas** in the world in 2005, which accounts for approx. 49% of the total population. This is further projected to grow to 4.2 billion by 2020 (approx. 54%).

Unsustainable pattern of production and consumption:

- Between 1960 and 1995, world use of **minerals rose 2.5-fold, metals use increased 2.1-fold, wood products 2.3-fold, and synthetics, such as plastics, 5.6-fold**.
- This growth of resource use outpaced the increase in global population.
- Mass consumption society correlates with a decline in health indicators in many countries.

Generation of wastes:

- **Estimated quantity of waste collected worldwide** is at between **2.5 and 4 billion metric tons**.
- Estimated **municipal waste** collected world wide is **1.2 billion metric tons** (2004).

Source: Worldwatch Institute (2004), CyCLOpe and Veolia Environmental Services (2006), and <http://esa.un.org/unpd/wup/index.htm>.



Implications on water security



Highly contaminated leachate seeps untreated into groundwater, a source of drinking water....

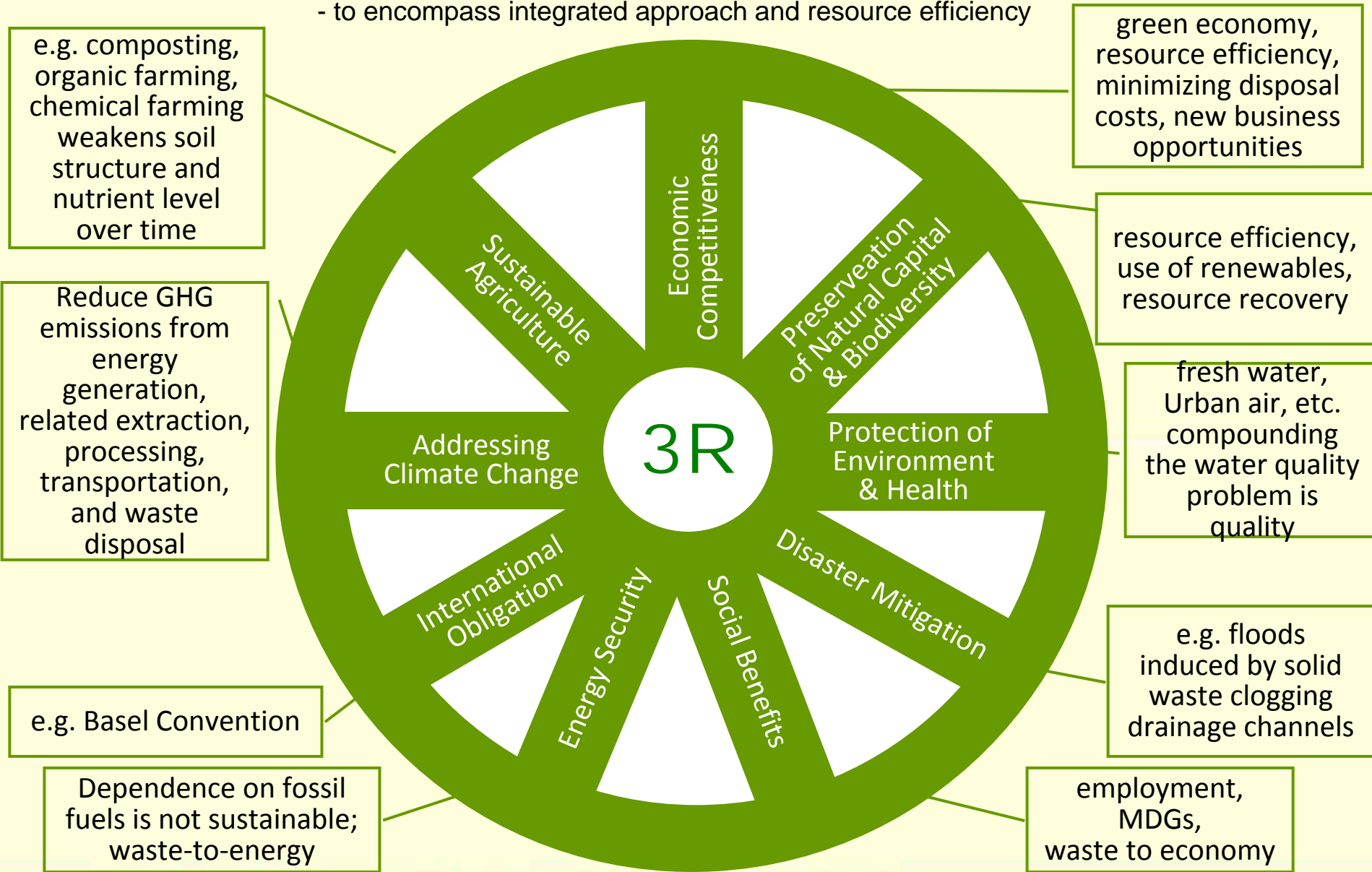
Water availability is an emerging issue in Asia with some countries already heading towards water stress, but water quality deterioration because of industrial discharges and municipal sewage, agrochemicals will further accelerate the issue!

Source: ADB (2004)

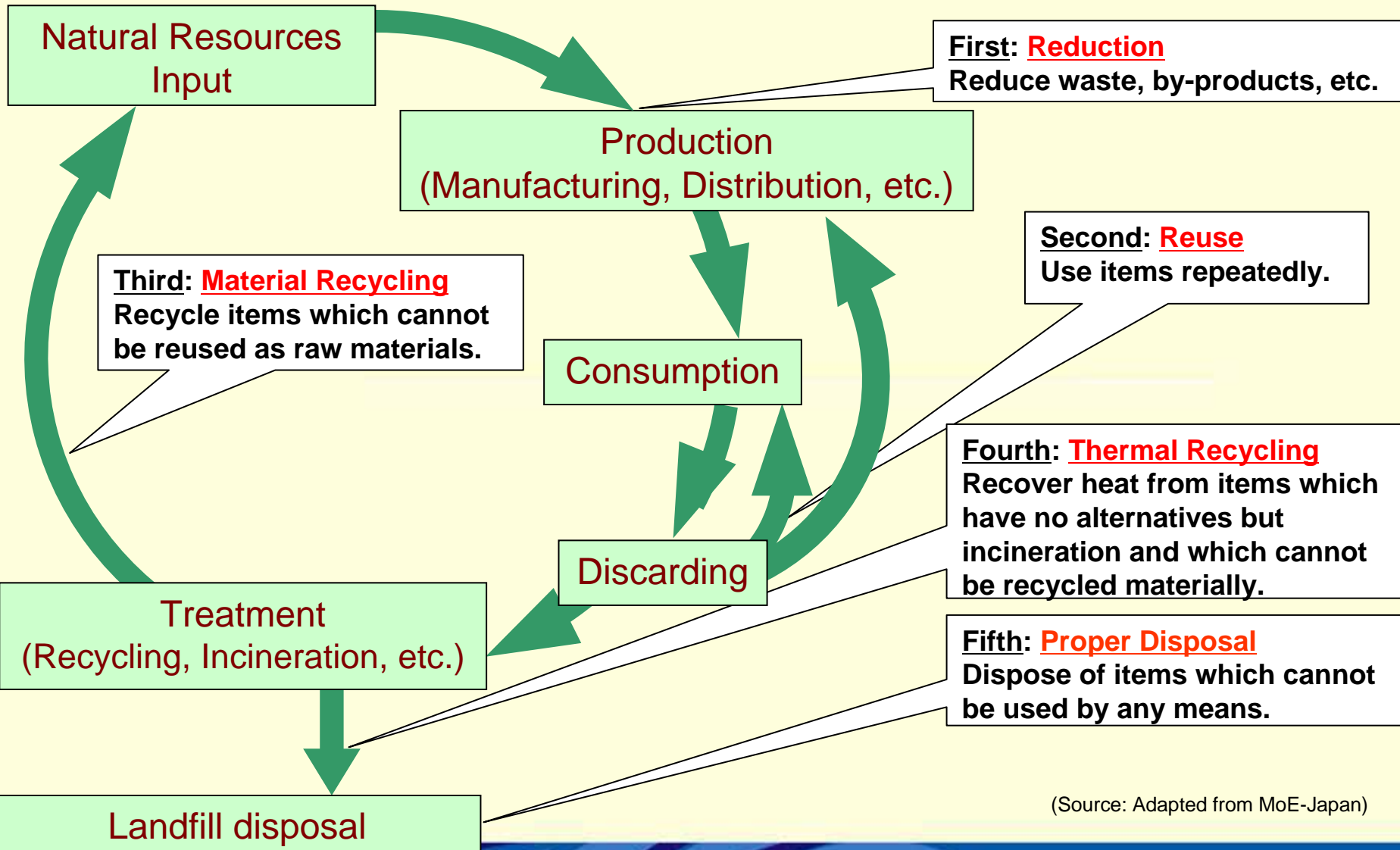


3R needs to be addressed in a broader context

- to encompass integrated approach and resource efficiency



3Rs offer an environmentally friendly alternatives to deal with growing generation of wastes and its related impact on human health, economy and natural ecosystem



(Source: Adapted from MoE-Japan)



3Rs could also offer...

- ***a complementary and integrated package of measures and tools to harness resources, energy, and economic benefits from waste.***
- ***a unique opportunity to local and national authorities for creating a new paradigm for the creation of a more human urban environment by effectively promoting resource efficiency and waste prevention as the top priority within the overall policy, planning and development.***
- ***opportunities for source reduction (increased resource efficiency/minimize raw material input), waste prevention/minimization of environmental risks through eco-friendly designs and products, and structured or reorganized production processes so that the waste of one industry becomes a valued input to another (industrial symbiosis).***



Contribute towards MDGs through 3Rs/SWM

1. Eradicate extreme poverty and hunger	employment generation through informal sectors working in waste collection and recycling
2. Achieve universal primary education	phasing out of child labour in informal waste management; income of waste pickers could support their children education
3. Promote gender equality and empower women	sharing burden in waste sorting, separation, and disposal; improvement and equal working conditions for men and women by creating financial and other arrangements that build capacity and empower women
4. Reduce child mortality	ensuring clean land, water, and air; children living in houses without an effective waste collection service suffer significantly higher rates of diarrhoea and acute respiratory infections; reduce child labour and direct contact of children with the wastes
5. Improve maternal health	Enhance recycling may directly/indirectly improve the health and living conditions of women waste pickers
6. Combat HIV/AIDS, malaria, and other diseases	clean water and land are essential to combat diseases like malaria; uncollected waste clog drains, causes flooding and provides breeding grounds for mosquitoes, flies, rodents which cause diarrhoea, malaria, and other infectious and parasitic diseases; mixing healthcare wastes with MSW and its uncontrolled collection & disposal can result in various infections, including hepatitis and HIV.
7. Ensure environmental sustainability	sustainable production and consumption, CP, 3Rs contribute to conservation of natural resources, energy saving, and reduction in GHG, and other emissions (co-benefits)
8. Develop a global partnership for development	enhanced international and regional cooperation among various stakeholders

Source: UNCRD & Adapted from UN HABITAT, 2010 [Gonzenbach et al (2007), Coad (2006), Hickman et al (2009)]



18th Session of Commission on Sustainable Development (CSD-18)

Key messages and recommendations:

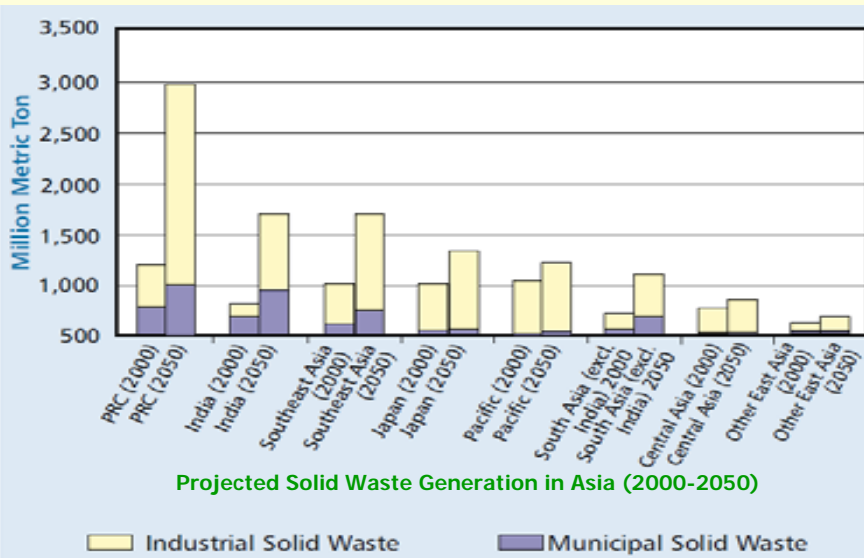
- A **zero waste economy**, recognizing waste as a resource and waste prevention and minimization should be considered as valuable concepts to guide action on waste;
- Waste management needs to be addressed through **integrated approaches**;
- **Reducing waste production, recycling waste and reusing materials** should form the basis for sustainable waste management, and further, implementation of extended producer responsibility (EPR) should be considered;
- Emerging new waste streams such as **electronic waste, plastics in the marine environment, oil and lubricants** require special international and national action aiming at a high rate of recovery worldwide, and these streams need to be addressed through appropriate programmes and environmentally sound technologies to promote material and energy recovery;
- There is a need to build local capacity in the developing countries to address the flow of e-wastes, in particular, the **shipment of e-waste to developing countries** as second-hand and near-end-of-life goods needs to be urgently addressed - in this regard, electronic companies take full responsibility for the safe recycling of their products.

Source: http://www.un.org/esa/dsd/csd/csd_csd18.shtml.



Why should Asian countries mainstream 3R ?

- Prevailing economic system does not provide adequate incentives for conservation and efficient resource allocation
- Prevailing production and consumption patterns are not adequately oriented towards resource efficiency, contributing to growing quantities of wastes that must be managed for final disposal
- As Asian industrial economies continue to grow, the region will generate more toxic chemicals & hazardous wastes, mostly coming from industrial, agriculture, and manufacturing processes



Projected Solid Waste Generation in Asia (2000-2050)

Industrial Solid Waste Municipal Solid Waste

PRC = People's Republic of China.

Source: Solid Waste Projection Study by Tanaka et al. Source: ADB & IGES, 2009



Conventional waste management and the consequences we face

What we see...

- Limited efforts on reducing wastes at source
- Lack of segregation, poor collection, illegal dumping, open dumping and burning
- Limited involvement of private sector and communities
- Lack of integrated approach, and conventionally waste being thought of having no value
- Slums are deprived of municipal services



Photo courtesy: C. F. Kura, ITC38 Training Course Participant, UNCRD.

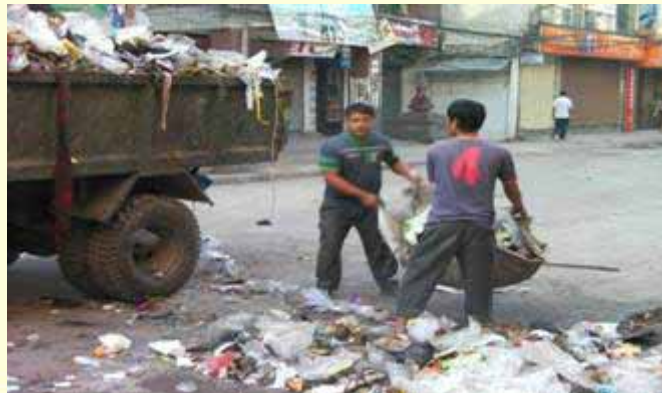


Photo courtesy: B. Paudel, ITC38 Training Course Participant, UNCRD.



Photo courtesy: C. Viengsan, ITC38 Training Course Participant, UNCRD.



The consequences: ENVIRONMENTAL RISKS

- **Local environmental risks** (odour and air pollution, water contamination, effects on flora and fauna, etc.)
- **Global environmental impacts** (GHG emission, e.g., methane gas)



Photo courtesy: Shinetsetseg, M., ITC37 Training Course Participant, UNCRD

The consequences: ECONOMIC LOSS

- **Opportunity cost** (municipalities often spend approximately 50% of their total annual budget on waste management, which reduces capital for other developmental works and public services)



Photo courtesy: H. Tessema (International Consultative Meeting, 2010).



The consequences: HEALTH RISKS

Health risks for informal sector workers, local communities living near dumpsites, etc.

How serious is the health risks of waste pickers, who most often operate without any protective measures?

- hospital waste (HIV)
- jagged metal (tetanus)
- smoke (PCBs)
- lead (neural damage)
- violence (knife cuts)
- adult behaviour (premature drinking)
- stress
- skin, gastric, respiratory problems

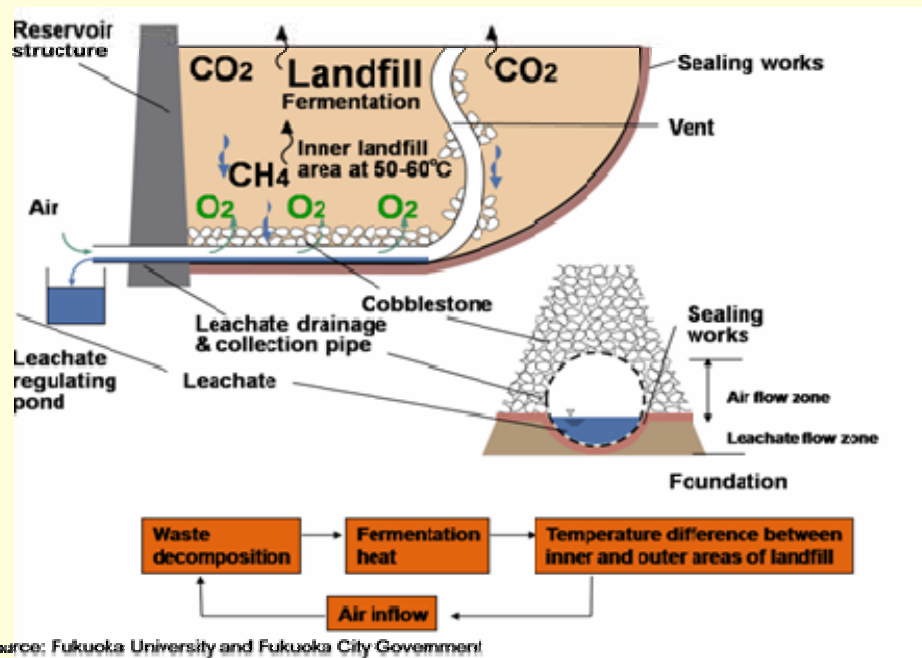
Waste dumps potentially serve as breeding ground for Malaria, thus having implications in achieving MDGs.

Source: Adapted from ILO (2009), presented at the Inaugural Meeting of the Regional 3R Forum in Asia in November 2009 in Tokyo.



Why should Asian countries mainstream 3R ?

- Over reliance on conventional type waste management such as landfills and incineration is not sustainable (landfills are major source of methane (CH_4), a powerful GHG, and land costs are getting very high).



GHG emissions from waste are directly affected by numerous policy & regulatory measures that encourage energy recovery from waste, restrict choice for ultimate waste disposal, waste prevention / minimization through 3R. In many countries, e.g., in EU & Japan, waste management policies are closely related to & integrated with climate policies.

Why should Asian Countries mainstream 3Rs – Landfills and Incineration versus Resource Recovery and Recycling

Problems with conventional waste management (Landfills and incineration)

- Waste disposal is expensive
 - Requires substantial inputs of labor, materials, energy, and land.
- Establishing new landfills and incineration facilities is difficult because of high land costs and “NIMBY” attitudes.
- Even the “modern” landfills with advanced systems could potentially face problems in a long term, as these technologies are not infallible.
- Landfills are major source of methane (GHG).



Benefits of integrated waste management (Resource recovery and recycling)

- Countries and cities should pay equal attention to upstream options to reduce waste for final disposal and to reuse and recycle valuable resources.
- Upstream options are almost always more costs effective than disposal.
- Segregation and composting does not create substantial GHG if done properly.



Why should Asian countries mainstream 3R ?

- Focus is more on downstream or end-of-pipe solutions and local governments spend significant amount of money on waste collection & disposal without adequate consideration on resource saving measures and their economic return or input

where as up-stream solutions provide opportunities for –

- source reduction (increased resource efficiency/minimize raw material input)
- waste prevention/minimization of environmental risks through eco-friendly designs and products
- structured or reorganized production processes so that the waste of one industry is a valued input to another (industrial symbiosis)

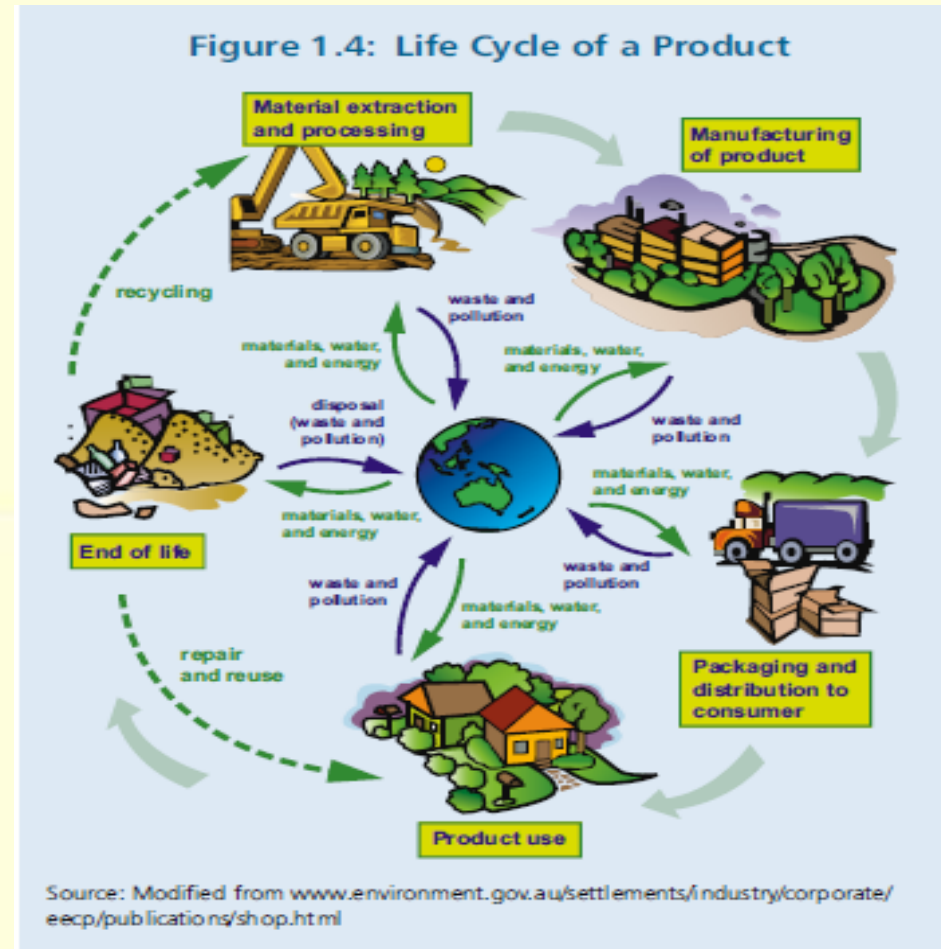
Resource efficiency refers to amount of resource (materials, energy, and water) consumed in producing a unit of product or services. It involves using smaller amount of physical resources and generating less waste to produce the same product or service, and encourages patterns of consumption that use few resources through the design of products and services and their delivery to consumers (ADB, 2008)



Stages in Product Life Cycle

- Extraction of natural resources
- Processing of resources
- Design of products and selection of inputs
- Production of goods and services
- Distribution
- Consumption
- Reuse of wastes from production or consumption
- Recycling of wastes from consumption or production
- Disposal of residual wastes

Source: ADB, IGES, 2008



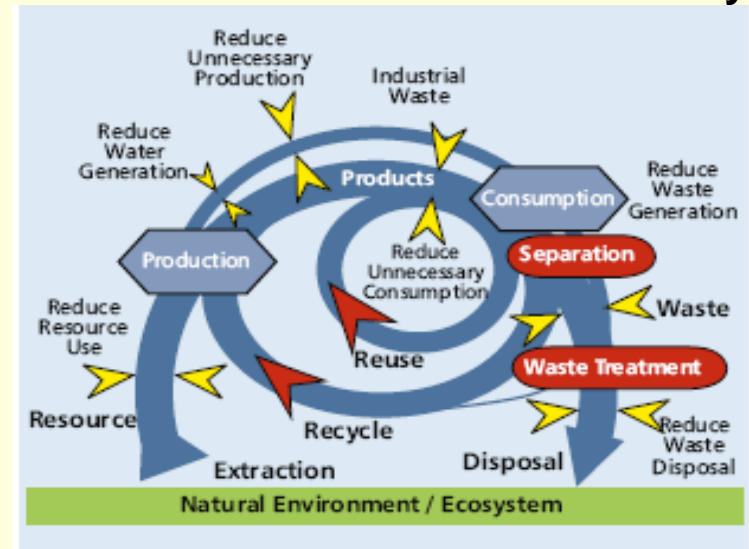
Transitioning to more resource efficient economy

1. One-way Economy



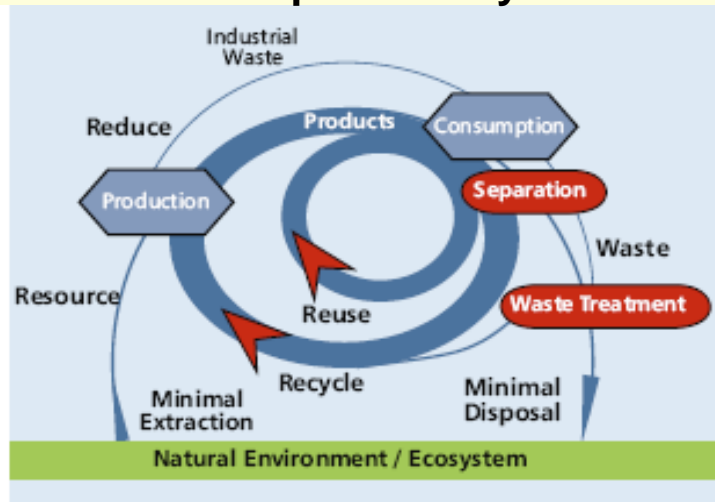
Source: ADB.

2. More resource efficient economy



Source: ADB.

3. Closed Loop Economy



Source: ADB.

1. In one way economy, a little effort is made to reduce the amount of materials consumed in production and hence the wastes are produced. Also little effort is made to reuse or recycle those wastes which mainly go for landfill.
2. Greater resource efficiency by reducing consumption and waste of materials, and by reusing and recycling by products. By implementing measures on both the production and consumption sides, countries may be able to reduce (per unit of product) both the quantity of the resource extraction stream and the quantity and environmental impact of the residual materials flow that ultimately reaches disposal sites.
3. In closed-loop economy, nearly all outputs either become inputs to other manufacturing processes or are returned to natural systems as benign emissions rather than as pollutants, e.g. a closed-cycle processing plant takes in freshwater and does not discharge any liquid effluents. Rather, the water is constantly recycled and possibly utilized in the final product itself



Eco-Efficiency & Importance of 3Rs

Eco-efficiency is the delivery of competitively priced goods and services that satisfy human needs and bring quality of life, while progressively reducing ecological impacts and resource intensity throughout the life cycle, to a level at least in line with Earth's estimated carrying capacity.

Seven elements or steps companies can make to improve Eco-efficiency:

- 1.) Reduce material intensity
- 2.) Reduce energy intensity
- 3.) Reduce dispersion of toxic substances
- 4.) Enhance the ability to recycle
- 5.) Maximize use of renewable resources
- 6.) Extend product durability
- 7.) Increase service intensity



Source: DeSimone, Livio, and Frank Popoff, 2000



Valuing Ecosystem Services

Valuing ecosystem services attempts to re-orient natural ecosystems from being conceived of as a public good to a resource to be protected. This is so that they are not taken for granted to the point of degradation, which results resource depletion, natural disasters such as floods, and/or threatened livelihoods.

As major beneficiaries of ecosystem services, the private sector can and should play a critical role in expanding the concept of PES.

At present, there are three main markets emerging from ecosystem services that 3Rs would have an impact on -

- 1.) **Watershed management**, which may include the control of flood, erosion, sedimentation, and water quality as well as maintenance of aquatic habitats and dry season flows.
- 2.) **Biodiversity protection**, which includes eco-labeled products, eco-tourism, and payments for the conservation of wildlife habitats.
- 3.) **Carbon sequestration** wherein international buyers pay for planting new trees or protecting existing ones to absorb carbon, thereby offsetting carbon emissions elsewhere.

Source: adapted from ADB, 2005



New Environmental Business Opportunities & 3Rs

“Going green” can be profitable through the expanding market of environmental goods and services. Recycling market offers a competitive ‘sink’ as an alternative to increasingly expensive landfill, incineration, and other treatment options.

Significant opportunities that exist for the private sectors could be divided in three categories:

Equipment & technology: water equipment and chemicals, air pollution control, instruments and information, waste management (waste minimization, resource recovery technology, etc), process / prevention technology.

Services: solid waste management, hazardous waste management, consulting and engineering, remediation and industrial, analytical services, water treatment services.

Resources: water utilities, resource recovery, environmental energy.



Source: adapted from ADB, 2005 & UN HABITAT, 2010



Corporate **Greening** – check whether?

-Is a recycling plant that emits air pollution a “**green** company?”

-Is an aluminum smelter that dramatically reduces air pollution or waste sent to a landfill but that contributes large emissions of GHGs a producer of “**green** jobs?”

-Are all jobs associated with the ecotourism industry “**green**?”



“**Green**” corporate initiative may be one that reduces the negative impact by a company on the environment.

Source: adapted from ADB, 2005



Where should Asia countries be heading?

Product
policy

versus

Waste Policy

(Preventive/up-
stream solutions)

(Down-stream/end-of-
pipe solutions)



Where should Asia countries be heading?

Waste
prevention,
extended
use, re-use

versus

An expanded
recycling
industry

(Resource
Conservation/Resource
efficient economy
& society)

(Resource intensive
and hazardous
production of
expanding markets)



Where should Asian countries be heading?

The governments must be clear in their strategy –

- Whether to continue with business-as-usual with 'more waste and more recycling' approach?

-OR-

- whether the goal is to encourage the producer to alter the design of the products?
- whether the goal is to utilize the expertise of the manufacturers in managing the used products after they attain end-of-life?
- whether the goal is to develop modalities for gradual shifting of the cost of managing the used products from municipalities to manufacturers (EMS, EPR, etc.)



Strategic link towards successful mainstreaming and realization of 3Rs objectives

