



# reduce reuse recycle 3R Source Book









UNITED NATIONS CENTRE FOR REGIONAL DEVELOPMENT  
NAGOYA, JAPAN

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The United Nations Centre for Regional Development (UNCRD) was founded in 1971 as part of the United Nations (UN) system of organizations promoting regional development in developing countries and countries with economies in transition in the Asian-Pacific, African, and Latin America and the Caribbean regions. It was set up in pursuance of the terms of the UN Economic and Social Council (UN/ECOSOC) resolutions 1086 C (XXXIX) and 1141 (XLI) which called for global action to promote regional development, and resolution 1582 (L) which provided guidelines for its operations.

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- (2) To provide advisory services in regional development and planning and related fields at the request of developing countries;
- (3) To assist developing countries in promoting the exchanges of data on research, practical experience, teaching, and other relevant subjects in regional development and planning and related fields; and
- (4) To assist and cooperate with other organizations, national or international, concerned with regional development and planning and related fields.

To meet the goals, the Centre targets its programmes towards socially and environmentally sustainable development. The three multidisciplinary themes of human security, environment, and disaster management serve as a guide for the Centre's training and research activities.

The Centre's operations have benefited greatly from the cooperative relationship with UN/DESA and its valuable and consistent support.

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# Preface

The Asian region has recorded a significant increase in waste generation in recent years, which is projected to grow even further. The quantity of waste is increasing significantly both in terms of gross amount and per-capita basis, and the types of waste are also diversifying with the addition of hazardous and e-wastes. This phenomenon is closely linked to the global spread of the unsustainable consumption and production pattern. There is an absolute need to decouple the development process from environmental degradation. Such an effort would not only lessen the pressure on the natural environment and the risks to human health, but also have a wide range of benefits for Asian countries, for example, by improving energy security, preserving natural capital, improving economic competitiveness, pursuing social benefits, and providing innovative business opportunities.

Changing consumption and production patterns was highlighted as one of the essential elements for sustainable development in the Johannesburg Declaration on Sustainable Development, adopted at the World Summit on Sustainable Development in September 2002. In the Johannesburg Plan of Implementation (JPOI) adopted at the Summit, preventing and minimizing waste, maximizing reuse, recycling, and using environmentally friendly alternative materials were identified as being among the critical actions that need to be taken towards this end (JPOI, Chapter 3, Para 22). JPOI further noted that the highest priority should be placed on waste prevention and minimization, reuse and recycling (reduce, reuse, recycle- the 3Rs), and environmentally sound disposal, and that waste prevention and minimization should be promoted by encouraging production of reusable consumer goods and biodegradable products as well as by developing the required infrastructure.

The 3Rs can significantly complement the efforts towards achieving The United Nations Millennium Development Goals (MDGs) by: (a) improving the living conditions of the poor, (b) protecting the local ecosystem, in particular land and fresh-water resources, that provides subsistence living for rural and indigenous communities, (c) building a recycle-based economy and generating employment for poor communities, and (d) addressing the issues involved with the informal sector, in particular involvement of children in hazardous and unregulated waste picking and collection work. Given that the poor and developing countries in Asia are likely to be the hardest hit from the impacts of climate change, Asian countries need to identify an alternative path for more resource-efficient economic development that would prevent economic decline and environmental degradation. The 3Rs approach can help countries to achieve a climate-resilient society and economy.

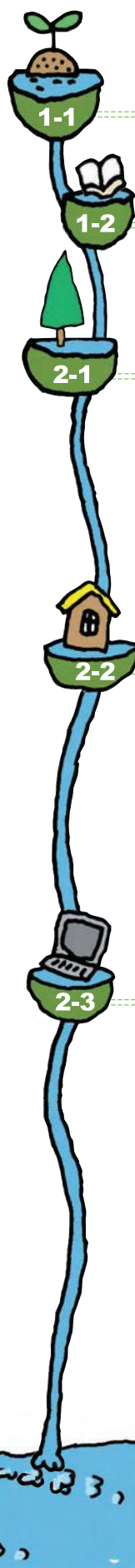
The 3Rs received global attention at the G8 Summit, Sea Island, Georgia, in June 2004, when the 3R Initiative was proposed by the Japanese Prime Minister as an effective approach towards realizing a sound material-cycle society. The significance of the 3Rs as an effective tool to meet the environmental and economic objectives has been reaffirmed at the succeeding G8 Summits, as well as in the series of international conferences and senior official meetings. In view of the potential impact 3R promotion could have towards achieving MDGs, and also in view of its potential contribution towards changing consumption and production patterns, UNCRD has been assisting Asian countries in the area of 3Rs since 2005, in collaboration with the Ministry of the Environment, Government of Japan and other partners. With the objective of disseminating and sharing among Asian countries the best practices, tools, and technologies on various aspects of the 3Rs as well as facilitating a regional mechanism vis-à-vis high-level policy dialogue to address the 3Rs, waste management, and inter-related sustainability issues on a regular basis, UNCRD and the Ministry of the Environment, Japan, launched the Regional 3R Forum in Asia on 11-12 November 2009, which resulted in the Tokyo 3R Statement (see Annex).

This Source Book has been produced to offer vital information about the 3Rs to the general public of the developing countries in Asia, so that they better understand the importance of resource efficiency and the value of practicing 3R in their own locality. The Source Book also aims to motivate the general public to change their ways of life, and to empower them to influence the key stakeholders in their countries, such as industries, small- and medium-sized enterprises, and local authorities, to take appropriate actions.

The Source Book highlights the current situation of waste in the developing Asia in various sectors, including agriculture, small- and medium-sized enterprises, municipal solid waste, e-waste, and medical waste, and presents selected best practices from other parts of the world that can be applied in Asian countries. It also provides good lessons that illustrate that even small steps taken by each individual in day-to-day life can make a big difference in environmental protection and resource conservation. It is our wish to see this Source Book become a catalyst for encouraging the general public, local authorities, private sector, and governments to take practical actions in implementing the 3Rs so that we can together move forward in practicing sustainable consumption and production, and realize a resource-efficient and sound material-cycle society.

Kazunobu Onogawa  
Director, UNCRD

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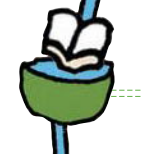


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# Background

Since the Industrial Revolution, the way of life that places “mass production,” “mass consumption,” and “mass disposal” at the centre of economic and social activities has become commonplace all over the world. This kind of lifestyle has led to the excessive use of natural resources and has caused severe environmental pollution, both posing serious threats to the precious natural environment. Furthermore, global environmental issues such as rapid depletion of non-renewable resources and climate change have become increasingly aggravated in recent years.

Mass production requires intensive use of non-renewable resources such as coal and oil. Sewage and hazardous chemical substances discharged during the production processes cause environmental pollution. Lifestyles that aspire for wealth and convenience, characterized by disposable items and products that require frequent replacement, result in massive disposal of waste, which has grown to the level beyond the earth’s carrying capacity.

An economy-driven society based on mass production, mass consumption, and mass disposal not only provokes the serious environmental issues mentioned above, but also has implications on other social issues of concern such as conflicts due to regional disparities, poverty, and human rights violation.

The Johannesburg Declaration on Sustainable Development, adopted at the World Summit on Sustainable Development in September 2002, underlined the importance of changing consumption and production patterns as one of the essential elements for sustainable development. In the Johannesburg Plan of Implementation (JPOI) adopted at the Summit, a recommendation was made to encourage and promote the development of a 10-Year Framework of Programmes in support of regional and national initiatives to accelerate the shift towards initiation of 3Rs/Sustainable Production and Consumption.<sup>1</sup> The idea behind this recommendation was to promote social and economic development within the carrying capacity of ecosystems by, where appropriate, decoupling economic growth and environmental degradation through improving efficiency and sustainability in the use of resources and in the production processes, and by reducing resource degradation, pollution, and waste.

The United Nations Millennium Development Goals (MDGs) provide a set of eight goals to be achieved by 2015 (see Box 1). These goals, which take into consideration the wide range of global issues such as peace and security, development and poverty, and human rights, provide a common blueprint for the future. Being ratified by 189 head of states in 2000, the MDGs have been serving as a driving force for an unprecedented global effort to meet the needs of the poorest segments of the world’s population.

There is a close link between the MDGs and the 3Rs in Asia (see Box 2). For example, there are children in Asian countries who make a living by picking waste at open dumps. They spend their time all day on the dump pile searching for valuable materials, while being exposed to foul odour and hazardous materials. These children are mired in poverty; we must strive to build a society where they can go to school and receive proper education.

The Asian economies will continue to grow, and the level of burden that will be placed on the natural environment will very much depend on whether the mounting demand of resources can be met by newly extracted natural resources or by recyclable resources. While the use of recyclable resources needs to be promoted at both the national and regional levels, incidences have been reported regarding transboundary movement of recyclable resources where non-recyclable wastes are imported/exported under false claims of being recyclables. Even recyclable resources have the potential of causing environmental and health damages to people unless properly treated at their destinations.

Much work remains and in order to achieve progress towards establishing a sustainable sound material-cycle society, governments, the private sector, Non-Governmental Organizations (NGOs), and citizens of every nation must play their respective roles.

## Box 1

### Millennium Development Goals

The Millennium Development Goals (MDGs) include eight goals, eighteen targets, and forty-eight indicators, which are to be achieved globally by 2015. The MDGs provide a common framework for nations around the world, by integrating the Millennium Development Declaration and the various international development goals/targets adopted at major international meetings and summits.

### MDGs:

1. Eradicate extreme poverty and hunger;
2. Achieve universal primary education;
3. Promote gender equality and empower women;
4. Reduce child mortality;
5. Improve maternal health;
6. Combat HIV/AIDS, Malaria, and other diseases;
7. Ensure environmental sustainability; and
8. Develop a global partnership for development.

<sup>1</sup>Following the recommendation made in the JPOI, a global process called “the Marrakech Process” was initiated to support the implementation of a 10-Year Framework of Programmes on sustainable consumption and production, with UNEP and UN/DESA serving as the lead agencies.







# How to Use This Source Book



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How to Use This Source Book

This Source Book is intended to serve as educational material that will help the general public understand the importance of the 3Rs, and encourage them to practice the 3Rs towards establishing a resource efficient and recycle-based society.

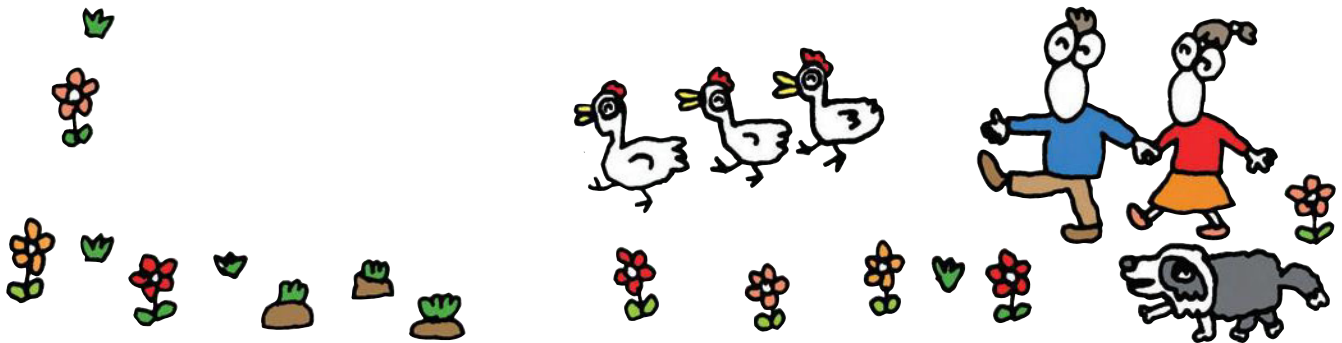
We hope that anyone who picks up this book will be able to easily understand its contents. We have used simple language and have presented information in a concise way. We have used many illustrations, photos, and other visual materials to help explain the current situation of waste and its management in the world.

This Source Book mainly focuses on five types of waste: agricultural waste, industrial waste, household waste, e-waste, and medical waste. It explains how each kind of waste is generated, what its impacts are, and how to handle them properly.

The book also gives advice to the general public on how they can promote 3R efforts. Each section gives examples of successful 3R policies and innovative efforts from Asia and other parts of the world. The section on "What We Can Do" offers practical advice such as how to bring about change and how to avoid certain risks.

This book may be used without permission from UNCRD for non-commercial purposes such as education and public awareness raising. For example, NGOs can use the Source Book as informational material to enhance their community's understanding of the importance of waste segregation at source and proper waste disposal. Teachers can also use the Source Book for teaching their students about the 3Rs and having them practice it in their daily life.

We are hopeful that sustainable production and consumption and waste prevention through the application of the 3Rs will soon become common goals for all.



## Box 2

### What are the 3Rs?

The 3Rs stand for Reduce, Re-use, and Recycle.

- **Reduce** calls for waste reduction by using things that you already have until the very end of their life cycle and by avoiding waste generation.

Example 1: Buy only what you need and buy only green or eco-friendly products.

Example 2: Bring your own bag for shopping so that you do not have to receive a plastic shopping bag for your purchases.

- **Re-use** calls for re-utilization of goods and materials.

Example 1: Choose products that can be refilled, instead of buying both the container and product every time.

Example 2: Give away things that you don't use anymore to people who need them.

- **Recycle** calls for re-utilization of waste as resources.

Example 1: Sort waste properly to increase the recycle ratio.

Example 2: Use products that are made out of recycled resources.

Example 3: According to the International Aluminum Institute, recycling of aluminum can save 95% of energy compared to aluminum production from bauxite, and recycling of copper can save 85% of energy required for production from copper ore.

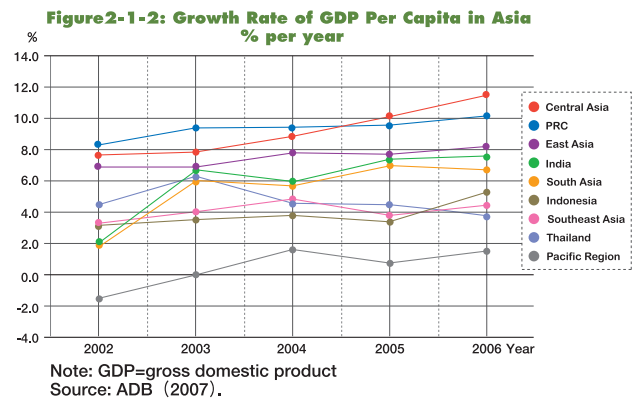
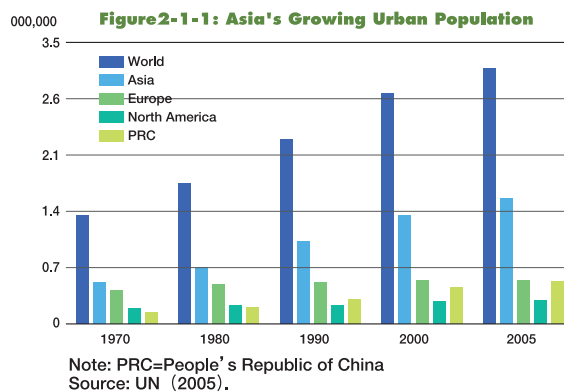


# An Overview of Resource Recycling

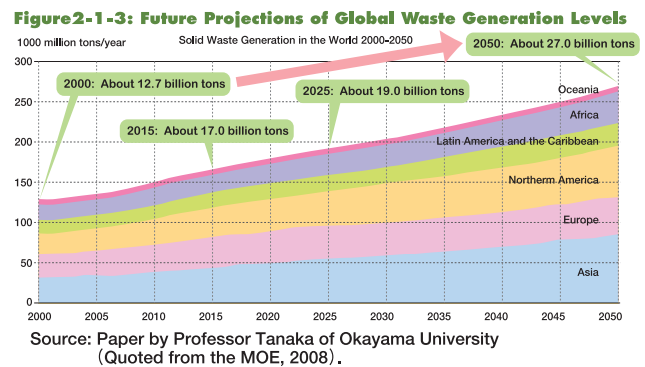
## 1 Increase of Waste in Asia and Development of the Recycling Industry

The growing economy associated with the rapid population growth in Asia in recent years has resulted in a remarkable increase in waste volume. Economic advancements have influenced lifestyles and consumer behaviour, thereby diversifying the types of waste that are produced in massive volume.

Efforts are being made in Asian countries to set up/improve regulations and mechanisms for the proper handling of waste. Among the various types of waste, particular attention is being given to e-waste and medical waste as they contain infectious and/or hazardous materials.



As the volume of waste increases around the world, so does the movement of recyclable resources across borders. On the one hand, the movement of recyclable resources across international borders has economical benefits, such as growth of the recycling industry and the creation of jobs. On the other hand, not all countries have put an adequate framework into place nor do they have the technologies for proper waste management. Therefore, an inflow of recyclable resources in massive quantities to such countries could potentially aggravate local pollution problems and damage the health of those involved in recycling industries that do not give due consideration to environmental impacts and occupational health.



## 2 Product Life Cycle and Resource Circulation

Broadly speaking, the products we use have a life cycle that includes production, consumption, and disposal. In the different stages of the life cycle, the environment is burdened in various ways such as the consumption of resources and energy, release of environmental pollutants, and disposal of waste.

We need to efficiently use the limited resources stored on the planet and establish a system for resource circulation. For this purpose, producers need to use the limited resources sensibly and produce goods that are recyclable in a resource-efficient manner. Consumers should also choose environmentally friendly products, use them for as long as they can, and at the end of product life separate and dispose them correctly so that they can be properly recycled.



# ng and Importance of the 3Rs

## 3 Establishing a Sound Material-Cycle Society



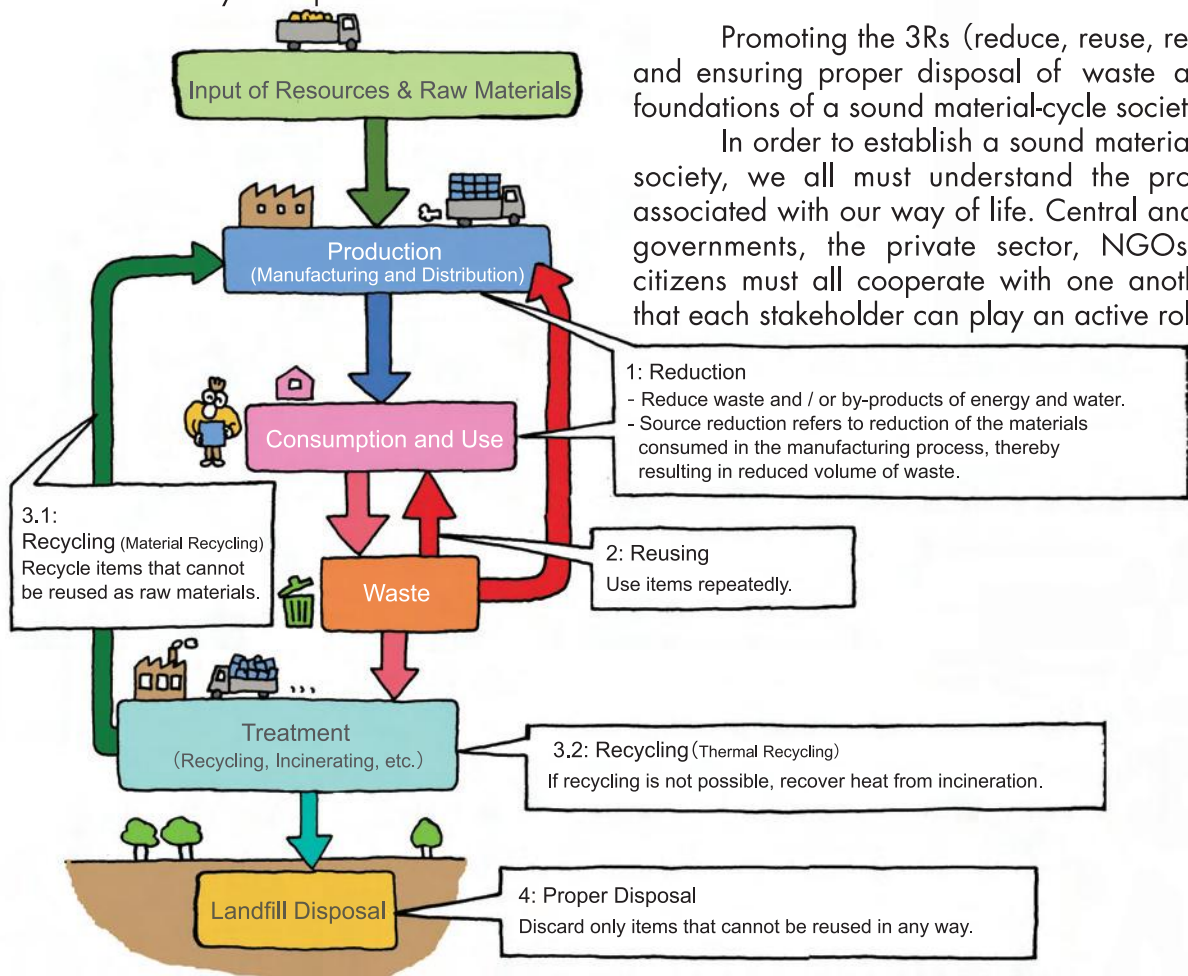
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An Overview of Resource Recycling and Importance of the 3Rs

### The 3Rs in a Sound Material-Cycle Society

Our current system places high value on economic development, which is based on mass production, mass consumption, and mass disposal. To ensure the well-being of future generations, we must move towards building a sustainable society that takes into consideration the environmental burden of the entire life cycle of products.



Source: Adapted from MOE (2008).

### The 3R Initiative and Regional 3R Forum in Asia – aiming to establish a sustainable society by promoting the 3Rs

The 3R Initiative was proposed by the Japanese Government and agreed upon at the G8 Sea Island Summit in 2004. The Initiative seeks to: (a) reduce waste, reuse and recycle resources and products to the extent economically feasible; (b) encourage cooperation among the various stakeholders; (c) promote science and technology suitable for the 3Rs; and (d) cooperate with developing countries in areas such as capacity building, raising public awareness, and implementation of recycling projects. In order to further complement the objectives of the 3R Initiative, the Regional 3R Forum in Asia was launched on 11-12 November 2009 in Tokyo, which resulted in the Tokyo 3R Statement in order to provide a strategic framework and basis for the promotion of the 3Rs in Asia (see Annex).

### What is Resource Efficiency?

Resource efficiency refers to the quantity of resources consumed to produce a unit of product or service. In order to improve resource efficiency, it is essential to promote sustainable production and consumption through 3R activities. In other words, we need to think about the efficient use of resources and how to reduce the burden on the environment at every stage of the product life cycle, including resource input, manufacturing processes, consumer choices, product use, reuse, and recycling.



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# 3Rs for Municipal Solid Waste

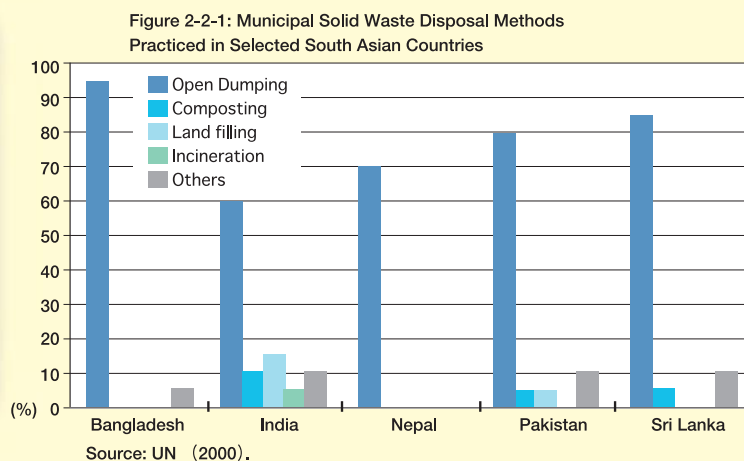
## 1 Current Situation of Municipal Solid Waste

### Solid Waste Management in Asia

As population increases and urbanization remains unchecked, the volume of solid waste in Asian cities continues to grow. Poor waste management, such as inconsistent waste collection and dangerous disposal practices, plague these urban areas and consequently cause pollution and threaten public health. At the same time, the diversification of waste streams driven by lifestyle changes also pose specific challenges for the municipalities. According to the World Bank, it is common for municipalities in developing countries to spend 20% to 50% of their available budget on solid waste management. In some developing countries, collection alone drains up to 80% to 90% of the municipal solid waste management budget. The Small Island Developing States (SIDS) face specific challenges considering their unique characteristics. Environmental damage to their rich flora and fauna and valuable coastal and marine ecosystems due to inappropriate waste treatment and disposal is one of the prime concerns.



Source: ADB (2004).



### Open Dumping

In many developing countries of Asia, various problems arise due to a shortage of sanitary landfill sites. These dumps are filled with various kinds of waste, including raw garbage and hazardous substances, resulting in problems such as bad odour and soil contamination. This has a negative impact on the lives and health of the neighbourhood residents.

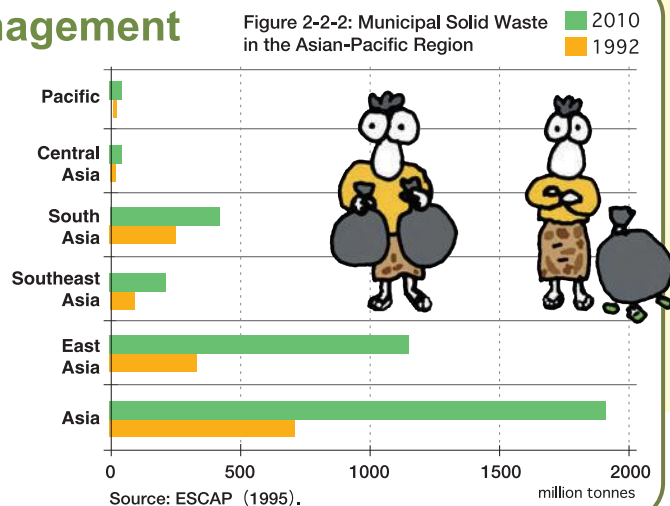
There are also people who collect valuables from these dumps, sell them, and live on the income generated. These waste pickers face health risks and physical danger, for example, spontaneous combustion and collapse of the waste-dumps. Such conditions need to be improved.

### The Need for Proper Waste Management

A system to separate resources that can be reused or recycled from other waste and to collect them efficiently is needed, in order to treat the waste properly in ways that would not have a negative impact on human health and the surrounding environment. Wastes that cannot be reused or recycled have to be treated in a properly designed and managed sanitary landfill.

In addition to the establishment of such a system, it is important that each individual is aware of the problems, and to make a habit of reducing waste and sorting it properly.

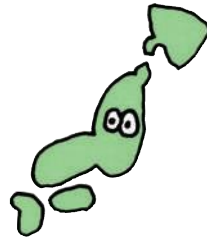
Figure 2-2-2: Municipal Solid Waste in the Asian-Pacific Region



## 2 Best Practices of Japan

### Municipal Solid Waste and the 3R Approach

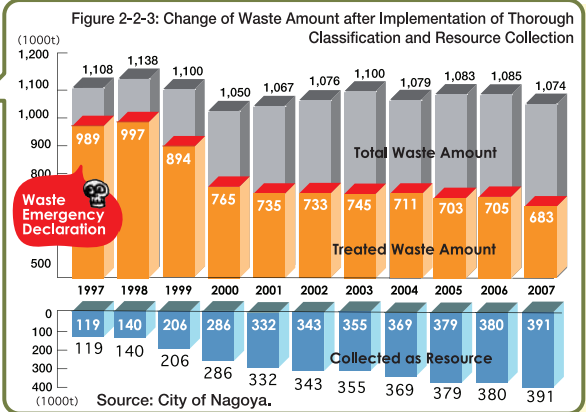
Japan is facing a shortage of waste disposal sites, where municipal solid waste can be disposed in landfills. Therefore, the necessity of reducing the amount of waste is becoming increasingly recognized and the concept of 3R is spreading among the citizens. Collection and treatment systems are established by the municipal governments.



#### Waste Separation and Recycling, Nagoya City

Case Study

The annual amount of municipal solid waste in Nagoya in the late 1990s was about 100t. At the time, Nagoya City was running short of waste disposal ground and there were plans to convert a wetland into the next landfill site. However, because the wetland was the landing zone for migratory birds, an opposition movement arose from the local people and environmental groups. The City gave up the plan after engaging in a long discussion and giving it careful consideration. Thereafter, Nagoya City announced "the waste emergency declaration"



School children participating in waste separation/Photo by Kazuya Chabata

Classification example

Collected as resources: plastic and paper packaging, PET bottles, glass bottles, cans, newspapers/magazines/cardboard, and old clothing.  
Waste: burnable garbage, non-burnable garbage, spray cans, large-sized waste such as furniture.

ation" in 1999, setting the goal of 20% waste reduction (200,000t) in two years so that the city could manage its waste without creating new landfill sites. As a waste reduction measure, Nagoya City implemented a thorough classification scheme of all waste and expanded the resource collection to glass bottles and cans, and plastic packaging throughout the city. Furthermore, a waste collection of materials and treatment fee was introduced for waste discharged from business activities. As a result of these measures, Nagoya City achieved the goal of 20% reduction in 2002.

#### Interview "Cooperation Key to Success in Waste Reduction"

Waste Reduction Promotion Officer,  
Environmental Affairs Bureau, City of Nagoya



Despite providing briefing sessions to its citizens (2,300 times at various locations in different parts of the city) to promote thorough waste classification and waste reduction in Nagoya at the start of the new sorting and collection system, about 100,000 calls of inquiries and complaints came to City Hall from citizens in a two-month period stating that the new sorting system was too complicated. However, people gradually learned to classify the waste properly. According to our survey, there was an increase in the number of people who thought about how it should be disposed when they buy an item. Gaining the understanding of all the citizens required some time and effort, but we think the key to success was the cooperative promotion of the activities by both the administration and citizens. Such cooperation can be referred to as being "Nagoya style," and it enabled us to solve the waste problem that could not be solved by the government alone. In the future, we would like to cooperate further and achieve increased waste reduction by avoiding waste generation.

#### Roles of Each Stakeholder in Waste Management, Case of the City of Nagoya



Source: City of Nagoya.



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3Rs for Municipal Solid Waste



# 3Rs for Municipal Solid Waste

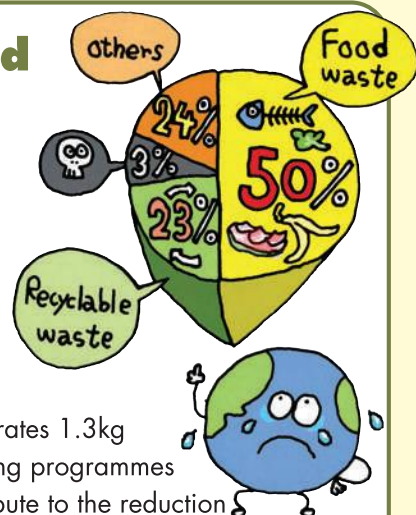
## 3 Best Practices of Asia

### Waste Reduction in Rayong, Thailand



In Rayong, the waste problem is becoming more serious due to population growth and urbanization. It has been projected that the total amount of solid waste will exceed the capacity of disposal sites in 2010; thus, the reduction of garbage has become an urgent issue which has to be dealt with by the city. The daily

amount of waste in the city is 75 – 85 tons/day, which means each person generates 1.3kg of waste per day; 50% is food waste and 23% is recyclable waste. The following programmes have been carried out as part of the city's climate protection plan as they contribute to the reduction of CO<sub>2</sub> emissions. Plan preparation and its implementation was supported by the Cities for Climate Protection campaign of International Council for Local Environmental Initiatives (ICLEI).



### Activities in Thailand

#### 1 Garbage classification/recycling campaign

Schools and communities carry out a campaign to exchange glasses, aluminum, plastic, and paper for eggs and school supplies once a month. The collected waste is sold to a recycling dealer.

#### 2 Idea for reducing food waste

The collector facility is distributed to homes, markets, and restaurants and the food waste is collected. The collected garbage is used for the production of compost and power generation of biogas at a biogas plant that has been in operation since 2004. The electricity generated is used for compost production energy at the plants, and surplus electricity is supplied to the community.



1. Scene of garbage classification/recycling campaign.

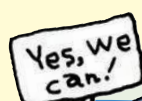


2. Scene of garbage collection.



Source: ICLEI-Local Governments for Sustainability, Japan Office

Photos: Courtesy of ICLEI-Local Governments for Sustainability, Japan Office



## 4 What We Can Do

Suggestions to policymakers

- Establish a clear definition and classification rules for waste and recyclables.
- Establish a proper sorting, collection, and treatment mechanism.
- Raise citizens' awareness on waste classification.
- Establish a recycling system involving citizens and the private sector.
- Establish recycling stations to convert the waste into resources after they are collected.

# What Can We Do in Our Daily Lives?



## Reduce

Reduce waste by using things with care until the end of their life cycles. For example...



- Do not choose one-way disposable items; select things that are reusable.
- Do not leave food uneaten. Some cultures have the habit of leaving some food on the plate or table. However, it is a waste of resources and energy that is put into producing food.

## Reuse

Use things repeatedly For example...



- Give away things you don't need anymore.
- Convert things for different uses.

When things cannot be utilized any more, then...

## Recycle

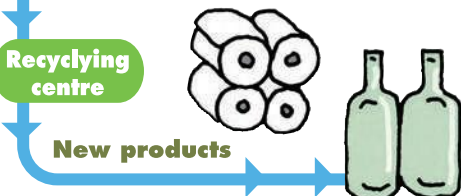
Collect and separate waste for recycling. They can be utilized again as resources.

<Classification example> Follow the classification and collection rules set by your municipality or community.

### Save recyclables



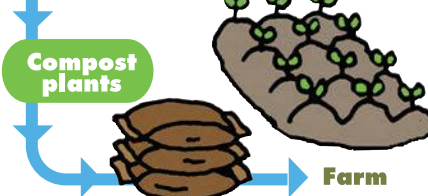
Collect or bring to recycling station



### Organic waste



Collect



### Other wastes



Collect



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3Rs for Municipal Solid Waste



# 3Rs for E-Waste

## 1 Dangers of E-Waste

### Have you ever seen old TVs or refrigerators discarded in rivers or on mountains?

Throughout the world today, e-waste<sup>2</sup> is produced, used, and thrown away in mass quantities. In developing regions in Asia, in particular, we will be likely seeing a rise in volume of e-waste in the future.

### Hazardous Materials Threaten Our Health

A lot of e-waste contain harmful chemical substances such as lead<sup>3</sup> and cadmium.<sup>4</sup> These have major effects on human health and the environment. If we don't handle e-waste properly, issues such as health problems among workers and local citizens or the environmental destruction of surrounding areas are likely to arise. Lot of e-waste in developing regions are subjected to open burning causing severe damage to human health and the environment.

### Hazardous Chemical Substances Dissolve in Our Water and Return to Us in a Lethal Way!

When e-wastes are disposed in open dumps near sources of drinking water, harmful chemical substances can leak out into ground water we drink. Furthermore, the chemical substances that pollute our rivers and oceans are taken in by fish and other seafood. When we eat such food, the chemicals accumulate in our bodies and can cause food poisoning when they exceed our bodies' tolerance levels. Japan has experienced serious incidences of health damages in the past caused by harmful chemical substances in the water discharged in industrial effluents.

#### Environmental Issues in Japan: Minamata Disease

In Japan, the prefectures of Kumamoto and Niigata in the 1950s and 1960s, respectively, suffered from an outbreak of the Minamata disease, a condition caused by environmental pollution. The outbreaks occurred when chemical factories discharged organic mercury (methyl mercury), a hazardous chemical substance, into the water without treating it properly. The methyl mercury that was discharged polluted rivers and sea water. Then, the food chain brought about high concentration levels of methyl mercury in seafood, causing symptoms in the people who ingested the contaminated seafood such as brain and nervous system problems, numbness in hands and feet, ringing in ears, tunnel vision (concentrically constricted visual fields), as well as hearing/speech impairments. An investigation of corporate and governmental responsibility for this issue, in which numerous people suffered health problems, continued many years after the fact and is still going on today.

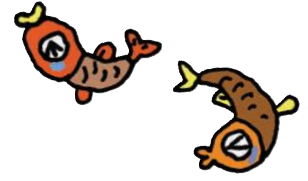
The lessons learned from the mercury contamination disaster have led Japan to implement its current environmental preservation measures with stronger regulations and measures to protect against corporate environmental contamination.

<sup>2</sup> **E-waste:** electrical and electronic equipment such as TVs, refrigerators, washing machines, air conditioners, computers, and mobile phones that have been discarded.

<sup>3</sup> **Lead:** used in solder and electrode plates in rechargeable batteries. Intake by the human body can cause symptoms of digestive disorders such as loss of appetite. Kidney disorders may also occur.

<sup>4</sup> **Cadmium:** used in alloys, plating, and electrode plates in rechargeable batteries. Its main toxic effects include bones and joints becoming brittle and weak. It is also a carcinogenic.





## 2 Exported E-Waste

### Exported E-Waste

In recent years, the amount of e-waste exported from developed to developing countries has increased. The handling cost of e-waste is higher in the countries that produce them. E-waste moves across country borders when there are countries where e-waste is traded as valuable material. In many countries in Asia, importing and exporting e-waste for recycling purpose is prohibited and/or require the procedures stipulated in the Basel Convention.<sup>5</sup> However, there are incidents where e-waste is exported or imported under the false claim of being "second-hand goods". While the circulation of resources has its benefits, we need to be aware that it could be linked to environmental pollution when waste that is expensive and difficult to treat gets dumped in developing countries that are not equipped with an adequate disposal system and techniques.



<sup>5</sup> Basel Convention: an international agreement regarding the regulation of movement of hazardous waste across borders and the disposal of such waste; adopted in 1989.



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3Rs for E-Waste

### Contamination Caused by E-Waste Importation

In certain parts of China, e-waste materials imported from overseas are dissolved and treated. For the overseas countries that export e-waste, it is an inexpensive way to manage their waste. But the citizens of areas where such waste is discarded are suffering from damaging health effects. Specifically, removing valuable metal components from computer boards, illegally dumping worthless materials, and throwing residual materials into rivers have contaminated water wells and groundwater to the extent that water has been made undrinkable. Also, the rate of children in the area suffering from lead poisoning<sup>6</sup> has reached high proportions. If we don't handle e-waste properly, serious contamination will spread in this way.



Unprotected dismantler cracking the yoke of a Cathode Ray Tube (CRT) screen. Source: International Institute for Sustainable Development (IISD)(2008).

<sup>6</sup> Lead Poisoning: symptoms such as headaches, numbness, difficulty in walking, loss of appetite, nausea, severe stomachaches, and pain in bones and joints arise; furthermore, kidney problems often progress without any symptoms. For children, the sudden onset of encephalitis along with its exacerbation over several days may occur; and ultimately convulsive seizures or lethargy may result. Source: Walsh (2009).



# 3Rs for E-Waste

## 3 Mobile Phone Collection and Recycling

Use of mobile phones is expanding rapidly in many Asian countries. For example in China, more than 400 million people owned mobile phones in 2006, a rapid increase compared to 100 million in 2001. When used phones are recycled properly, they can be valuable resources; however, they can cause severe damage to the environment and human health when discarded improperly. Statistics indicate that only 3% of used mobile phones are recycled globally.

Similar to other electric appliances, mobile-phone batteries are also toxic and contain lead and cadmium; therefore, it is important to recycle them properly and not just dispose them. In addition, lithium batteries could explode and cause fires, if not disposed properly.

A mobile phone contains valuable resources such as gold, silver, palladium, and platinum. Extracting rare metals from used mobile phones and recycling them as resources is a valuable way of resource extraction, especially since each mobile phone contains certain amount of precious metals.

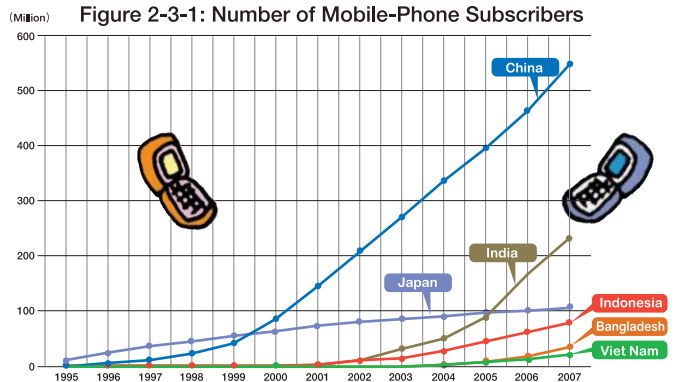
For example, 150 grams of gold can be extracted from 1 ton of mobile phones, while only 10 grams of gold can be extracted from 3 tons of gold ore.

### Steps to recycle mobile phones:

- 1 Store the data or remove the memory card.
- 2 Bring the phone to a collection point. Batteries, chargers, and other accessories can also be recycled at collection centres.

Source: Nokia.

Figure 2-3-1: Number of Mobile-Phone Subscribers



Source: International Telecommunication Union.

### Best practices of Asia

#### In Malaysia

A recycling campaign was launched by a phone manufacturer and local retailers that gave consumers a 20% discount voucher to buy batteries or enhancements in exchange for returned mobile devices. Through this campaign, 3,000 mobile phones were collected and recycled. Since 2008, automated kiosks have been installed in Malaysia specially designed to ease the recycling process. Mobile users can drop off their old phones at the kiosks for repair and also for servicing.



#### In China

The Green Box programme was introduced by a mobile-phone service provider and manufacturers to set up mobile phone recycling boxes at business branches of mobile phone sales and service sites. Through this recycling scheme, over 80 tons of materials have been collected as of 2006.

Source: Nokia.

## 4 Risks to Keep in Mind When Dealing with E-Waste

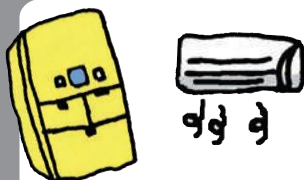
### Risks Associated With E-Waste

E-waste is associated with the following risks. When you are aware of these dangers, you will be more careful when disposing of these products.



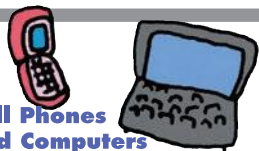
All E-Waste (TVs, etc.)

Most electrical and electronic appliances contain lead and cadmium. If they are discarded in an open air dump, these elements will seep into surrounding waters (rivers, lakes or seas) and soil. As lead and cadmium are extremely poisonous to humans, it is essential to properly dispose of products containing them.



Refrigerators and Air Conditioners

Refrigerators and air conditioners contain chemicals used as refrigerants (cooling medium). Chlorofluorocarbons (CFCs) were widely used as refrigerants until they were banned under the Montreal Protocol, due to their damaging impact on the ozone layer that protects us from the harmful ultraviolet rays of the sun. While the newly produced refrigerators and air conditioners now contain alternative refrigerants that do not destruct the ozone layer, you should check whether the one you are using contains CFC or not. If it does, the CFC in the product should be safely disposed of before discarding the product.



Cell Phones and Computers

Cell phones and computers contain not only cadmium and lead, but also gold and palladium. Supplies of these rare metals are at risk of being exhausted in the near future if we do not recover and recycle them in an environmentally sound manner.

\* Please check the legislations and procedures applied in your own countries for safe disposal.



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3Rs for E-Waste

## 5 What We Can Do

The problem of e-waste starts when the product reaches their end of life. As long as they are functional, electronic appliances should be used with good maintenance. When they reach the end of their life, they should be disposed of properly.

What We Can Do



### Reduce

If an appliance breaks, repair it; use it as long as possible.



### Reuse

Buy used appliances, and bring your old items to a used goods store instead of throwing them away.



### Recycle and dispose of waste safely

Bring your end of life materials to facilities that recover precious materials and finally dispose them in harmony with existing rules and regulations.

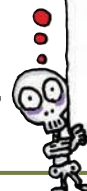


### Suggested Measures and Policies

- Encourage manufacturers to make or develop products that are easily recycled.
- Set up and operate recycling facilities in order to provide safe and appropriate recycling.
- Conduct research on recycling technologies and adopt leading-edge technologies.
- Facilitate cooperation of relevant industries and citizens who would be involved in the recycling scheme.
- Create a legal system for recycling that addresses issues such as appropriate disposal, manufacturers' liability for the cost burden of recycling, a deposit refund system, and a system for dealing with the cost of refuse disposal.

**Danger!**

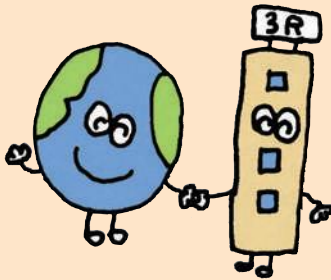
\*Never dispose of products near a water source (seas, rivers, wells, etc.). Melting lead at home and removing parts from an appliance are also dangerous activities and may be hazardous to your health.





# 3Rs for Small- and Medium-sized Enterprises

## 1 Role of the Private Sector in Working Toward the 3Rs



Businesses and industries have made our lives more comfortable and convenient by producing more and more goods that meet consumer needs. Parallel to the increase in consumer demands, both the private sector and consumers have prospered. With the increase in manufacturing activities, so have the quantities of waste and pollution from hazardous chemicals. The increase in energy usage has led to the depletion of energy resources and other environmental problems.

Ecologically advanced countries have begun to enforce regulations to avert these environmental problems. Businesses and industries need to comply with these regulations while fulfilling their social obligation as manufacturers. This is called corporate social responsibility (CSR), and it involves the proper treatment and disposal of waste, among others.

To promote proper waste disposal, many companies have adopted the 3R principles. Companies enjoy a wide range of benefits when practicing the 3Rs, for example, the reduction of final waste disposal volume (therefore lowering disposal costs), the emergence of an eco-friendly society resulting from the efficient use of resources, reduction of operational risks related to improper treatment of waste, and improved brand image. Many private and business sectors in the world are working hard to put the 3Rs into practice.

Meanwhile, as globalization of businesses rapidly progresses in Asia, this trend has had implications on the movements of waste. Some countries are allowing industrial waste that can be recycled or reused as resources to cross their borders (see p.10 for the Basel Convention). However, sending waste across national borders raises several concerns. For example, it is not clear as to what extent the companies that originally produced the waste should be held responsible. Also, the management of hazardous substances at recycling centres may be inadequate, if adequate technologies and standards are not available in the recipient country.

The global trend is to place more responsibilities on the producers, and to strengthen waste management and other environmental practices. Such efforts are expected to become more common in developing countries in the coming years. On the other hand, the nexus between international trade and environmental sustainability has developed significantly over the years. For example, environment vis-à-vis greater coherence and mutual supportiveness between trade and environmental policies have become an integral part of the World Trade Organization (WTO) agenda and the Doha Round negotiations. Environment and 3R policies can make substantial contributions towards meeting sustainable development objectives and improving market access conditions for eco-friendly goods and services.

### Case Study



### The Concept of "Extended Producer Responsibility"

Manufacturers have the responsibility to produce goods while creating as little waste as possible. In Germany, for example, container and packaging material makers, businesses using those materials to package their products, and those who import such materials are subject to German waste disposal laws. According to the law, they must take back used packaging, and recycle up to 70% of the materials used in their products. They must also submit documents certifying they have done so.

Such a recycling system based on the concept of "extended producer responsibility" encourages product development and production that minimizes waste generation.



### "Optimized Glue-stick Packaging"

This glue-stick does not need a fancy sales pack. A simple hook on the cap makes the traditional blister pack superfluous. Many creative and material-saving packs have been put on the market since the packaging recycling system was introduced.

Source: ©Der Grüne Punkt Duales System Deutschland GmbH.

## 2 The Recycling Business in Viet Nam

Case Study

### Recycling Villages in Viet Nam

In the second half of the 1980s, Viet Nam enjoyed rapid economic growth. Rural communities became industrialized, especially in the north region, and "craft villages," where handicrafts have become the main industry, emerged. At the same time, waste created by industrial production and waste from urban cities were discarded in great quantities. As a result, recycling businesses that collect and separate such waste developed. In the suburbs of Hanoi, several communities (craft villages), called "recycling villages," have made the recycling business their economic core. Presently, there are around 90 recycling villages that collect and separate factory-produced waste or household trash, such as paper, metals, and plastics.

These recycling villages are relatively prosperous compared to suburban agricultural communities. However, workers in the recycling plants wear only simple protective clothing such as masks, while cutting and welding iron and other similar jobs involve health risks.

Moreover, the nearby villagers are exposed to air and water pollution. Hazardous substances such as nitrogen oxide or sulfur dioxide are emitted into the air because plants are not equipped with any smoke extraction apparatus. Furthermore, pollutants stream into rice paddies and the drainage channels connected to neighbourhood rivers, thereby affecting the environment and health of the surrounding communities.

The Vietnamese Government is working on policies to change these recycling villages into industrial parks, as well as to separate and isolate residential zones from pollution.

In order to improve the socioeconomic and environmental conditions of the recycling villages while ensuring the safety and well-being of the residents, strict enforcement of environmental regulations, including the regulation of hazardous substances at the production stage, is considered critical. In this regard, it is necessary to introduce more advanced, environmentally conscious technologies into the recycling villages so that they can maintain their means of livelihoods while reducing environmental impacts and improving their own occupational health conditions.

Sources: Sakata (2007, 2008).



Smelting lead and making ingots. Soil was contaminated with lead.



Removing plastics from coated copper cable, by using fire, which generates air pollution, including harmful dioxins.

Photos taken in January 2008, by Michikazu KOJIMA, IDE/JETRO



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3Rs for Small- and Medium-sized Enterprises



#### Health Hazards Resulting from Open Burning

Open burning is dangerous because it produces hazardous substances and triggers air pollution and health risks. For example, since plastic products include various chemical substances, burning these products in the open releases smoke containing hazardous substances, such as dioxins, into the air. This can lead to foul odors and health issues such as respiratory system illnesses (e.g., asthma). In order to gain from the various potential benefits of the 3Rs and to protect our living environment, it's vital that we refrain from open dumping and burning.



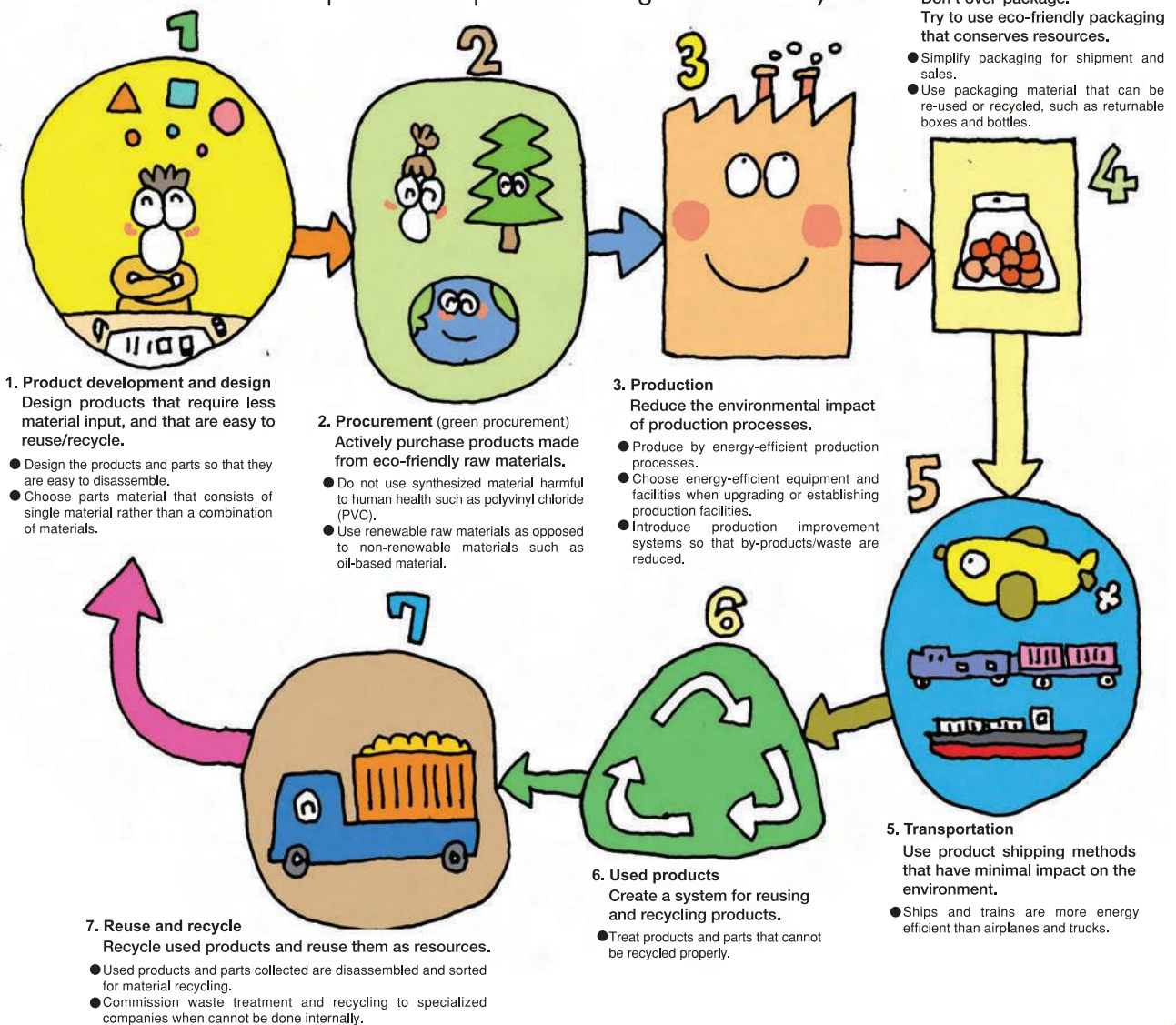


# 3Rs for Small- and Medium-sized

## 3 The Role of Manufacturing Industries in the 3Rs

### Manufacturers Can Practice the 3Rs Throughout the Product Lifecycle.

The industrial sector can have a great effect on the 3Rs as they can readily reduce the environmental impact of their products throughout their lifecycles.



### Do you know about the Marrakech Process?

The Marrakech process is a dynamic multi-stakeholder platform to support the: (a) implementation of projects and strategies on Sustainable Consumption and Production (SCP), and (b) elaboration of a Global Framework for Action on SCP – the so-called “10-Year Framework of Programmes on SCP (10 YFP),” a process that responds to the call of JPOI/WSSD-2002 to support regional and national initiatives to accelerate the shift towards SCP patterns. The process aims to secure and incorporate multi-stakeholders’ input on the elaboration of a 10 YFP to be submitted as input to the Commission on Sustainable Development (CSD) 18 and CSD 19. The Marrakech Process Business and Industry Forum is a key mechanism in serving as a platform to broaden business engagement in the SCP agenda.



## 4 Best Practices of Japan

### Trends in Japan

The notion of corporate social responsibility (CSR) has become widely accepted in Japan. CSR is the idea that for businesses to be sustainable, they need to fulfill not only their economic role but their societal role as well. Concern for the environment is a particularly essential component of CSR. One major concern is furthering 3R activities that involve group companies and supply chain businesses. Businesses can show accountability by reporting on these types of activities on websites, environmental reports, and CSR reports, thus striving to improve confidence levels by communicating with stakeholders. CSR reports are becoming major factors in decisions about investment choices as well as product and service selection.



Environmental and CSR reports.



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3Rs for Small- and Medium-sized Enterprises



## 5 What We Can Do

### Recommendations for Governments

#### 1. Effective dissemination of information to the public

Governments can promote dissemination of corporate information, especially with regards to their environment and 3R efforts. Information can be packaged in ways that are easily understood by the citizens (including photos of production sites, interviews with officers-in-charge, etc.).

#### 2. Support the establishment of 3R schemes

Assist companies in establishing 3R schemes by, for example:

- Providing information on best practices, relevant technologies, etc.;
- Improving laws/regulations/policies so that it is easier to implement the 3Rs;
- Linking up relevant industries/companies, communities, and other players who can participate in the scheme; and
- Introducing an award scheme for leading companies.

#### 3. Encourage purchase of environmentally friendly goods and services produced by companies practicing the 3Rs such as:

- Green purchasing by the government (i.e., when purchasing goods and services, prioritize those that have less environmental impact); and
- Publicize and promote goods and services that are produced by companies practicing the 3Rs.



### Legislative Framework of Japan to Establish a Sound Material-Cycle Society



#### What You Can Do as an Individual Purchase products made by companies committed to the 3Rs.

- Companies that are committed to green procurement;
- Companies that disclose their environmental and/or CSR reports; and
- Companies that act on their environmental guideline.

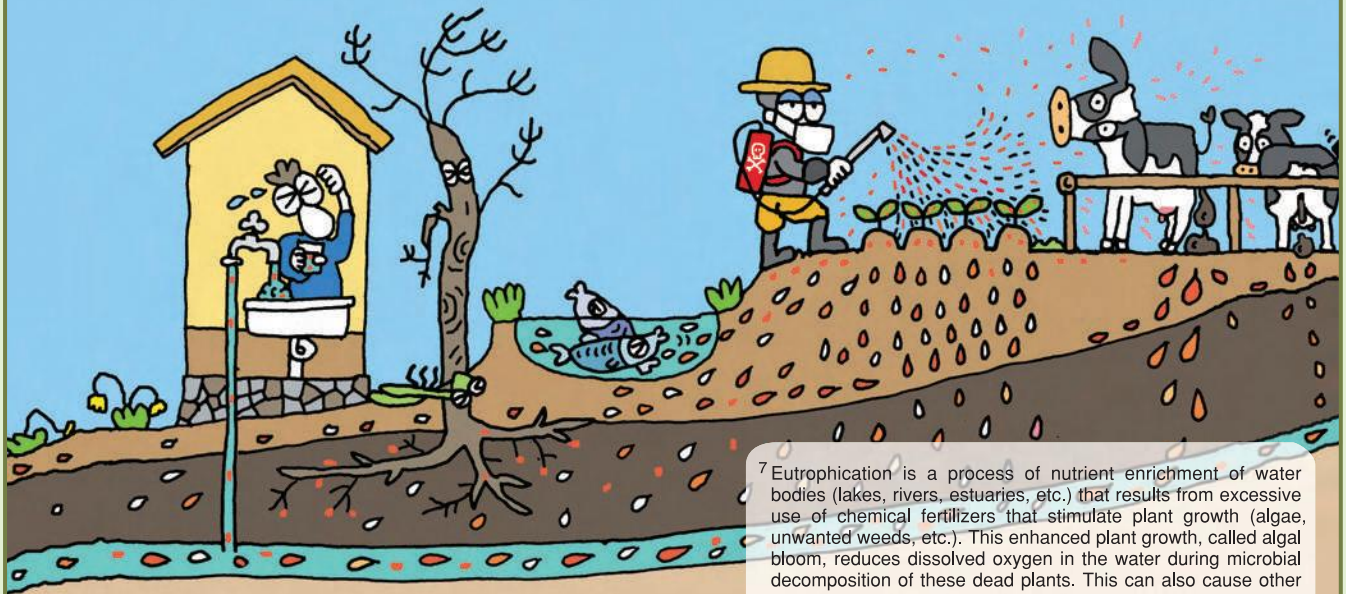


# 3Rs for Agriculture

## 1 Agricultural and Environmental Issues

**Do you know where and how your food is produced? Do you know if your food is really safe to eat?**

Modern agricultural practices employ agrochemicals to kill insect pests and weeds, and use synthesized fertilizers to make crops grow faster and bigger. While these chemicals have contributed to increased yields, they have also given rise to various problems. Excessive agrochemical use destroys ecosystems by killing pests, insects, and plants. Excessive application of synthesized fertilizers can lead to contamination and/or eutrophication<sup>7</sup> of nearby rivers and water bodies. Furthermore, agrochemicals and synthesized fertilizers can remain in agricultural products and cause health problems to people who consume them if the residual level is high.



<sup>7</sup> Eutrophication is a process of nutrient enrichment of water bodies (lakes, rivers, estuaries, etc.) that results from excessive use of chemical fertilizers that stimulate plant growth (algae, unwanted weeds, etc.). This enhanced plant growth, called algal bloom, reduces dissolved oxygen in the water during microbial decomposition of these dead plants. This can also cause other organisms and aquatic species to die.

### Biophysical Concerns

Certain farming practices, such as excessive tillage and improper irrigation drainage, can cause long-term damage to soil.

#### Excess Tillage



Although tillage can be beneficial to crop growth, excessive tillage damages the soil structure, kills beneficial soil organisms (e.g., earthworms), and destroys organic matter. It can cause erosion of nutritious topsoil, which leads to a reduction in crop yields.

#### Improper Irrigation



In order to be sustainable, an irrigation system must be properly managed. Irrigation without adequate drainage can lead to soil salinization, which increases the salt concentration of the land and makes the land unsuitable for agricultural production. 3Rs can provide unique opportunities to make use of composts to enrich soil nutrients for increased crop yield.

### Do You Know about POPs?

POPs (persistent organic pollutants) are substances that are not easily degradable in the environment and are stored in living organisms. They can travel great distances over the Earth and affect the environment even in places far from their origins. Once they are released into the environment, they can have a harmful effect on our bodies. In recent years, evidence has shown that some POPs interfere with normal hormonal activity, making it clear that urgent action must be taken to deal with them.

The Stockholm Convention on POPs was adopted in May 2001 and came into force in May 2004. The Convention identifies twelve kinds of substances as POPs, including intentionally manufactured products and unintentional by-products. Nine of these substances are pesticides that have been banned from production, use, and export and import (with the partial exception of DDT, which is not banned in countries where it is needed to prevent Malaria). The Convention also calls for the adequate management and disposal of existing POPs stockpiles and related waste.

For example, in Japan, which is a Party to the Convention, some pesticides that had been put into circulation are being recalled and measures are being taken to store them in suitable containers. If you happen to possess pesticides designated as POPs by the Convention, treat the substances carefully, in line with the national management system of your country.

#### Substances targeted by the international convention on POPs

- Intentionally produced chemicals
  - Pesticides
    - Aldrin, dieldrin, endrin, DDT, heptachlor, chlordane, hexachlorobenzene (HCB)\*, mirex, toxaphene
  - Industrial chemicals
    - Polychlorinated biphenyls (PCBs)\*
- Unintentional chemical by-products
  - Polychlorinated dioxins (PCDDs) and polychlorinated furans (PCDFs)

\*HCB and PCB can also be unintentionally generated as by-products.



## 2 Sustainable Agriculture

<sup>8</sup> Renewable resource: a natural resource that can be replaced faster than it is consumed.

<sup>9</sup> Non-renewable resource: a natural resource that is consumed faster than it can be re-grown or re-generated, for example, natural gas or mineral ores.

“Sustainable agriculture” means agricultural practices that produce food in a sustainable way by minimizing negative effects on the environment and local ecosystem. It involves farming that is socially just, economically viable, and environmentally sound, which means that farmers can continue to produce crops and sustain their lives without causing irreversible damage to the land. Sustainable agriculture involves farming techniques using renewable resources<sup>8</sup> while minimizing the use of non-renewable resources.<sup>9</sup> The Food and Agriculture Organization of the United Nations (FAO) promotes the improvement of food security as one of its most important goals, and recognizes that the realization of sustainable agriculture is essential in order to achieve this. This is based on the principle stated in Agenda 21<sup>10</sup> as follows:

The major thrust of food security is to bring about a significant increase in agricultural production in a sustainable way and to achieve a substantial improvement in people's entitlement to adequate food and culturally appropriate food supplies. (Ch14.6, Agenda 21, UN)

<sup>10</sup> Agenda 21 is a comprehensive plan of action to be taken globally, nationally, and locally by organizations of the United Nations system, governments, and major groups in every area in which humans have an impact on the environment. Agenda 21 was adopted by more than 178 governments at the United Nations Conference on Environment and Development (UNCED).

Source: UN, with slight modifications.

## 3 Learning from Traditional/Organic Agriculture

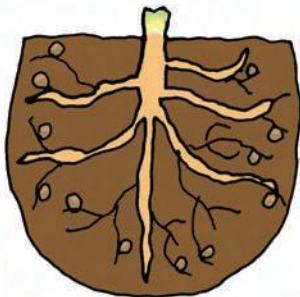
There are two main trends in sustainable agriculture: organic farming, which uses methods developed before chemicals were invented, and natural farming, which leaves crop growth largely to nature. These methods shun the overuse of chemical fertilizers and pesticides, and avoid forcing changes on the existing natural environment. In this way, they help protect farmland from exhaustion so that food can be grown year after year. Using little or no chemicals and pesticides allows farmers to grow produce that is safe for consumption and for the environment. Sustainable agriculture leads to more secure living conditions for us all.

### How to Farm Organically

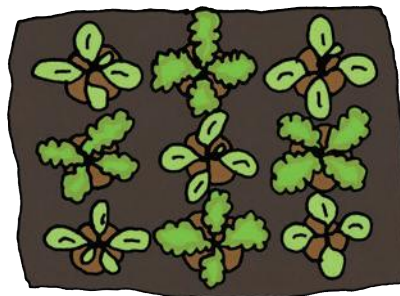
#### Utilizing the Characteristics of Organisms

Certain combinations of crops can help reduce the amount of pesticides, fertilizers, and other farming materials you need to buy.

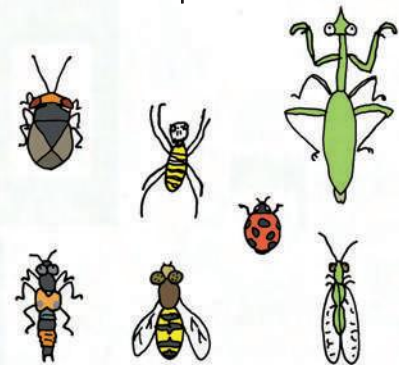
The soil, ecosystem, and various plants work together to strengthen soil nutrients and crops.



- To enrich the soil: plant astragalus, clover, soybean or other members of the legume family close to your other crops or simply mix them into the soil. Nitrogen in the air fixes onto the root nodule bacteria in legumes and enriches the soil. This can reduce excessive reliance on harmful agrochemicals.



- To get rid of pest insects: mixing a plant an insect likes with one it dislikes will keep that insect away. For example, plant cabbages with lettuce, or watermelons with corn. Choose your combinations carefully, as certain plant combinations will compete for nutrients or hinder each other's growth.



- You can also attract pest insects' natural enemies, such as mantises, ladybugs, or spiders, by mixing plants such as white clover, sorrel or broad bean with your crop.

#### Use Animal Excrement and Food Residue Effectively

- Make fertilizer by composting.
- Spread plants such as cut or fallen weeds over the earth to prevent soil dryness and reduce the quantity of water needed for sprinkling.



The cheapest form of composting techniques followed by many households in Japan and can be easily replicated by communities in developing countries.

#### Avoid Intensive Farming Methods

- Large-scale logging to expand arable land causes soil erosion. Land will lose its nutrients and dry out. The ecosystem can be destroyed and water shortages may occur.

- Crop rotation: by producing different types of crops, it will be possible to maintain a balance in the major nutrients of the soil essential for crop growth, such as nitrogen, phosphoric acid, and potassium. Consequently, the soil will be nourished and an increase in disease-causing bacteria can be prevented. As one of the basic rules, rotation of the following species is recommended:

Graminaceous family: corn absorbs nutrients from land that has excess nutrients.

Legume family: beans such as soy, pisum, and kidney bean enriches the soil by increasing nitrogen in the soil.

Root crops: e.g., potatoes and carrots help to make deep breaks into the soil through root development and cultivation.

It is productive to plant leafy vegetables and fruit-bearing vegetables, after rotating these 3 types of crops.



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3Rs for Agriculture

## 4 New Technology: Biomass Power Generation

While traditional agricultural technology is gaining recognition for its environmental benefits, sustainable new technologies are also being developed. For example, there are cases where utilization of agricultural by-products as a biomass energy source have improved poor villagers' living standard in India.

Fossil fuels such as oil and coal are used extensively to generate electricity. Power generation using fossil fuels result in various environmental problems such as climate change through CO<sub>2</sub> emissions and resource depletion. As an alternative to fossil fuels, sustainable energy sources have been sought that do not cause environmental damage, can be supplied over the long term, and do not require expensive infrastructure and facilities. The use of biomass is a sound 3R strategy since it promotes the use of agricultural residues as energy instead of just disposing them. It also contributes to the reduction of fossil fuel use, thereby reducing CO<sub>2</sub> emissions as well. According to the BIOMASS Energy Centre (UK):

Biomass is biological material derived from living, or recently living organisms. In the context of biomass for energy this is often used to mean plant-based material, but biomass can equally apply to both animal and vegetable-derived material.

Biomass includes forest and mill residues, agricultural crops and waste, wood and wood waste, animal waste, livestock operation residues, aquatic plants, fast-growing trees and plants, and municipal and industrial wastes.

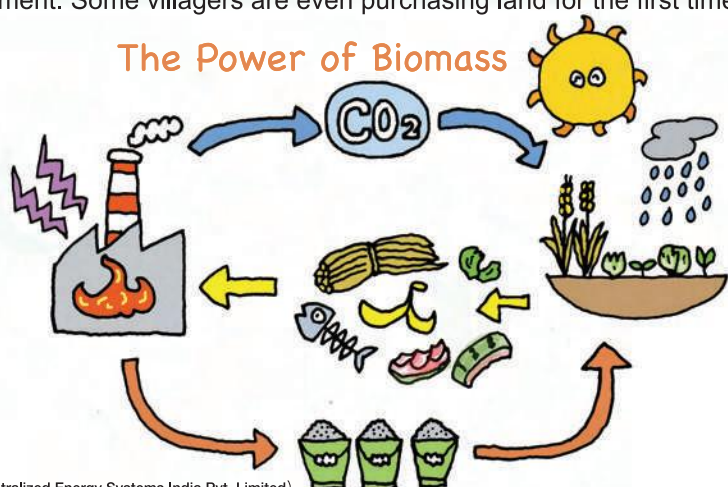
Best practice of India

### Biomass in Baharwari

The isolated developing village of Bahawari, India, has no electricity or telephone service. But it does boast a rice husk-fueled biomass gasifier that runs a power plant capable of powering agro-processing machines, irrigation pumps, and battery-charging stations. This new-found power has boosted the local economy and improved the lives of the villagers. Irrigation has increased crop yield. Local communities, including physically impaired residents are finding full-time employment. Some villagers are even purchasing land for the first time.

Neighbouring villages witnessed the success of Bahawari and wanted to duplicate it. They have petitioned the government for biomass gasifier power plants. The Indian Government has pledged to provide electricity to 18,000 isolated villages. Biomass-produced power is one key to achieving this goal.

In addition to NGO initiatives, the Government of India's IREDA<sup>11</sup> is promoting renewable energy, such as hydro, wind, bio, and solar energy.



Source: DESI Power (Decentralized Energy Systems India Pvt. Limited).

<sup>11</sup> IREDA, or Indian Renewable Energy Development Agency Limited, is a public limited government company established in 1987. It is under the administrative control of the Ministry of New and Renewable Energy (MNRE) to promote, develop, and extend financial assistance for renewable energy and energy efficiency/conservation projects with the motto: " ENERGY FOREVER ".

## 5 What We Can Do

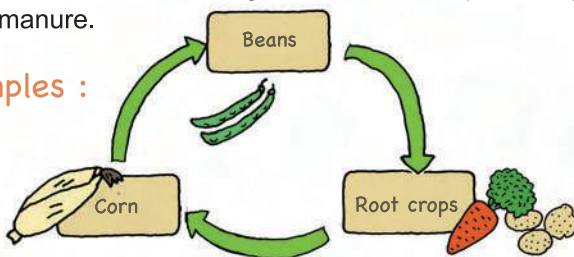
Farming is how we produce much of our food; it is essential for our survival. Farmers are not the only ones who are involved in keeping our food resources safe: ordinary citizens and governments can also act in many ways to encourage sustainable agriculture. In fact, sustainable agriculture really becomes possible when we all work together.



### What Farmers Can Do

- Strive to reduce the use of pesticides, fertilizers, and herbicides, and increase the use of composts (see Section 3. Small 3R Steps for a Big Difference). Such practices will reduce health risks associated with agrochemical use.
- Practice organic farming. It produces safe and value-added products and reduces production costs by cutting the need for pesticides, fertilizers, and herbicides. It also protects biodiversity in the environment and maintains microbial cultures needed for fertile soil.
- Ensure the distribution of organic products by promoting the quality and safety of organic food, and opening distribution routes when the demand arises.
- Refrain from farming practices that damage the natural environment, as this may result in degraded soil and water shortages, and can destroy ecosystems.
- Make use of crop rotation as a means of avoiding the excessive use of harmful agrochemicals and promoting green manure.

Examples :



### What Citizens Can Do



- Encourage the purchase of organic produce. Not only does it ensure that your food is safe to eat, but organic farming also helps reduce the risk of health problems associated with groundwater pollution.
- Prioritize locally grown food when shopping. Your food will be fresher, and buying local food will stimulate the agriculture industry in your area. It also cuts down on the amount of energy used for transport.
- Select foods that are currently in season because this is when they are at their most nutritious and delicious. They are also cheap as there is an abundant supply on the market. Seasonal foods not grown in greenhouses take less energy to produce.



Organic market  
Photo by Satomi Furukawa (Fuluhashi Environmental Institute)

### Suggestions for Governments

### Consider the following points to encourage and promote sustainable agriculture.

- Build biomass energy-generating facilities and biomass energy recovery systems. Farm animal excrements and agricultural produce are two sources of biomass energy.
- Support agricultural technologies by holding events such as technical guidance seminars and study tours to learn from experienced farmers.
- Introduce financial incentives to farmers.
- Collaborate with the private sector, consumers, and farmers to develop and expand the market for organic products.
- Consider making efficient use of land on streets and in parks for agriculture as well as urban areas.



Urban agriculture: people grow vegetables in small gardens in cities of Japan  
Photo by Fuluhashi Environmental Institute



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3Rs for Agriculture

Yes, we can!





# 3Rs for Medical Waste

## 1 The Reality of Medical Waste

### The Dangers of Infectious Medical Waste

Have you ever seen bloodstained surgical cotton, gauze, bandages, or syringe needles thrown away as ordinary trash? This kind of refuse from hospitals and health-care facilities is called medical waste.

Medical waste includes infectious waste<sup>12</sup> that contains biohazard materials. Medical waste may contain infectious pathogens; therefore, it must be disposed of in a very carefully controlled way to protect our health and the living environment.



If we throw out infectious waste without separating it from other kinds of waste, we will end up having to treat all waste as hazardous waste, which would result in soaring disposal costs. Also, if hospital waste handlers and sanitation workers come into contact with hazardous infectious waste, they would be susceptible to infectious diseases like Hepatitis or HIV/AIDS.

<sup>12</sup> According to WHO, the following wastes should be classified as infectious waste: sharps (needles, scalpels, etc.), laboratory cultures and stocks, blood and blood products, pathological wastes, and wastes generated from patients in isolation because they are known to have an infectious disease.


### Measures for Disposal of Medical Waste

Medical waste must be discarded with careful attention given to the following.

#### 1 Separate Infectious and Non-infectious Waste and Reduce Volume of Infectious Waste

In many Asian countries, infectious waste materials are not segregated at the hospitals or clinics that produce them. This waste is collected, transported, and mixed with various other kinds of waste at the final disposal site, creating severe challenges for municipalities.

#### 2 Dispose of Infectious Waste Properly

Methods for disposing of infectious waste include sterilization, incineration (restricted only to non-plastic items), or at high temperatures and disinfection. Infectious waste must not be mixed with other kinds of waste during the collection, transportation, or disposal processes. Measures must be taken to prevent infectious waste-related accidents at the workplace. 

## 2 Problems and Best Practices of Asia

Sanitation workers who accidentally stab themselves with a used needle can develop Hepatitis B or other serious illnesses. To prevent this, all sanitation workers should be vaccinated against Hepatitis. Besides this, the use of a device that has been developed to melt each disposable plastic syringe by exposing it to electromagnetic radiation, thus sanitizing the needle and enveloping it in a plastic casing for safe disposal, is recommended.

However, in many instances medical waste is not treated properly and remains a public health concern. Often medical waste items are reused without adequate sterilization. There have also been reports of drug-addict patients stealing used syringes from the hospital disposal sites, leading to infection.

Another increasing problem is the presence of medical waste in bins and containers used for the collection of non-hazardous municipal waste. Medical waste is often illegally dumped, at both the local and international levels.

At the end of 1999, a large volume of medical waste was transported illegally by boat from Japan to the Philippines. This violated the Basel Convention on the Control of Transboundary Movement of Hazardous Waste and Their Disposal, which stipulates that hazardous waste cannot be transported without the prior informed consent of both countries. The Basel Convention also encourages each country to develop the capacity to dispose of hazardous waste properly domestically.

Source : MOE (2001).

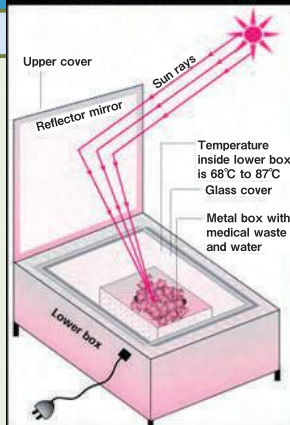
Example of  
affordable technologies

### Solar Treatment

While this technology is yet to be recognized widely, Choithram Hospital and Research Centre in India has developed a solar-powered cooker to disinfect medical waste. Waste is fed into the box and exposed to the sun's rays for 6 hours. The device is extremely simple, consisting of two foil-covered boxes and a sheet of transparent glass. It produces a temperature of up to 150°C, killing most harmful bacteria. The cooker could be a good solution in poor or developing countries where more advanced or sophisticated technologies are not easily affordable.

Source: Jamwal (2004).

A SIMPLE SYSTEM  
To disinfect medical waste



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# 3Rs for Medical Waste

## 3 What We Can Do

### Reduce Waste

Reduction is the key to sound medical waste management.

Its benefits include:



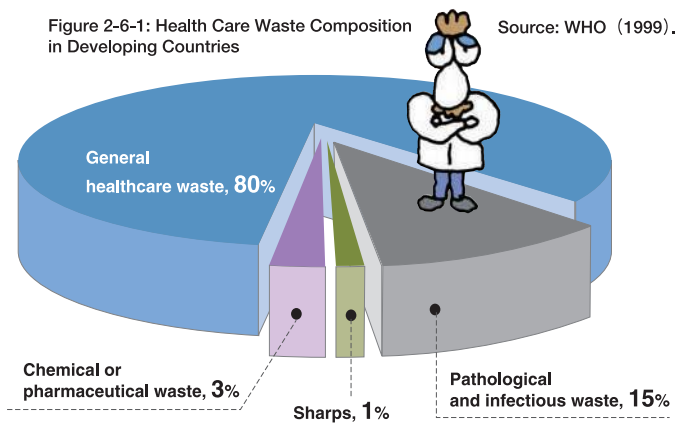
### Source Reduction Practices:

#### Segregate Waste

Proper sorting of medical waste could reduce the amount and danger of medical waste tremendously. About 80% of medical waste is non-hazardous general waste and does not require special treatment. This waste has to be separated properly from other hazardous waste, such as pathological and infectious wastes, chemical or pharmaceutical waste, and sharps such as needles and knives. When these different types of medical waste are mixed together, the entire mixture of waste is considered hazardous waste, thus requiring specific storage, collection, and treatment measures.

Separating waste can significantly reduce the volume of hazardous health-care waste, thereby lowering the cost of waste management.

Figure 2-6-1: Health Care Waste Composition in Developing Countries Source: WHO (1999).



#### Segregate PVC Products

Burning Polyvinyl Chloride (PVC) emits dioxins and furans. Avoid their production by separating medical waste containing PVC and keeping them from incineration.

#### Substitute Materials and Devices

Substitute potentially harmful materials such as products with PVC plastic and mercury with safe and environmentally friendly alternatives.

#### Increase Awareness

Train hospital staff in the sound management of medical waste, with special focus on the management of hazardous materials and waste minimization.

# Collection and Treatment Technologies

## Collection and Storage

Proper collection and handling of medical waste is essential. Improperly managed waste can threaten the health and safety of patients, health workers and citizens as well as the environment.

Medical waste should be collected separately from other waste, and all health care establishments should have designated storage facilities.

### Collection & Storage Guidelines

- Collection should be frequent.
- Bags should be labeled and colour-coded.
- Highly infectious waste should be sterilized.
- Storage facilities should have adequate flooring, lighting, and ventilation.

## Collection Containers with Different Color Coding and Labeling

World Health Organization (WHO) recommends colour coding and labeling of hazardous medical waste as follows:



**Recommended Sorting System for Various Waste and Their Potential Health Risk**

Type of Waste	Type of Container	Potential Health Effects
Highly infectious waste	Strong leak-proof plastic bag or container capable of being autoclaved	Respiratory infections, genital infections, skin infections, Meningitis, HIV/AIDS, viral Hepatitis A, B, and C
Other infectious waste, pathological and anatomical waste	Leak-proof plastic bag or container	
Sharps, including needles and knives	Puncture-proof container	Double risk: injury and potential transmission routes for HIV/AIDS, and Hepatitis B and C from contaminated sharps
Chemical and pharmaceutical waste	Plastic bag or container	<ul style="list-style-type: none"> <li>· Intoxication, burns and skin irritation, pollution of groundwater, surface water, and air; possibility of fire, poisoning</li> <li>· Ineffective medical care from the consumption of expired pharmaceuticals</li> </ul>
Radioactive waste	Lead box, labeled with the radioactive symbol	Cancer, burn and skin or eye irritation, headache, dizziness, and vomiting
General health care waste	Plastic bag	Non-risk, when separated properly from hazardous-health care waste

Source: WHO (1999).

## Where Does Medical Waste End Up?

Examples of medical waste with various risks being treated and disposed inappropriately: mixed with general waste with access to anyone, thus spreading health and environmental risks.



**Inappropriate disposal**



**Appropriate disposal**

Proper treatment of medical waste: sorted and collected appropriately according to the WHO guideline.



Photos: Courtesy of the 3R Knowledge Hub, reprinted from 3R KNOWLEDGEHUB (2008).

eco 2-6 3Rs for Medical Waste

# International Flow of Resources and Waste

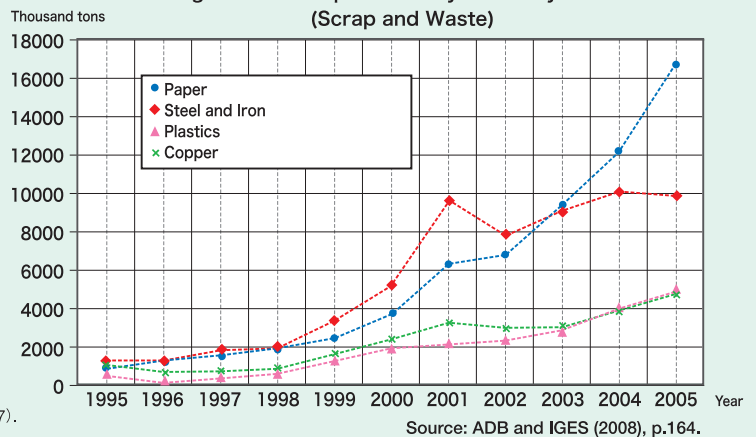
## 1 The Transboundary Movement of Secondary Materials

The patterns of material reuse and recycling in Asia is heavily influenced by the increasing transboundary movement of secondary materials.<sup>13</sup> For instance, imports of recyclable materials by the People's Republic of China (PRC) are rapidly increasing because of the high demand for resources due to rapid economic growth. It is now one of the most important material flow destinations of the world. The size of the global secondary materials market in 2004 was estimated to be 600 million metric tons (Mt), exceeding \$100 billion in value (see Lacoste and Chalmin, 2006).

Secondary materials traded internationally include paper, plastics, ferrous and nonferrous metals, and textiles. Home appliances, computers, construction equipment, and used automobiles or buses are also traded internationally as second-hand goods. Most of them are exported from developed to developing countries.

<sup>13</sup> Secondary materials are defined as materials or goods that have been manufactured and used at least once and are to be reused (ADB and IGES, 2007).

Figure 2-7-1: Import of Recyclables by the PRC (Scrap and Waste)



### Factors contributing to increasing transboundary movement of secondary materials include:

- 1 Increase of secondary material recovery in developed countries in line with the associated legislation;
- 2 Inability of developed countries to consume domestically all the recyclable resources they generate; and
- 3 Increasing demand for resources in Asian countries that cannot be met by domestically generated volumes of recyclable waste.

Source: ADB and IGES (2007).



The positive aspect of trade in secondary materials is that it improves the resource efficiency of the region, as recyclable resources generated in one country can be utilized as resources in other countries. However, the problem with such a trade is that it also results in pollution in low-income countries unless properly handled. There are cases where second-hand electronic appliances and computers exported to developing countries are not used as products for long. They are dismantled by hand, releasing toxic materials into the environment while exposing workers to great health risks (see 2-3 3Rs for E-Waste). While valuable material and components are recovered, less valuable materials are discarded which causes contamination and pollution to water bodies and soils.



## 2 Best Practices of Asia

### Controlling Shipments of Outdated Secondhand Goods

In order to prevent imports of second-hand goods that are likely to become waste shortly after being imported, some countries have adopted import regulations for second-hand goods based on the year of manufacture.

In Thailand, imports of used computers and household appliances that are more than 3 years old and copy machines more than 5 years old have been banned since 2003. Imports of second-hand equipment more than 10 years old are prohibited in India. There also are countries that impose restrictions on imports of used refrigerators operating on a Chlorofluorocarbon (CFC) coolant system due to its risk to ozone layer destruction.

Source: ADB and IGES (2007).

### What is the Basel Convention?

The "Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal" provides an international framework on the restriction of transboundary movement of hazardous wastes. It regulates the procedures and contents of imports and exports of hazardous wastes.

In the 1980s, various environmental issues arose from the hazardous waste exported from developed countries (e.g., Europe), which ended up being discarded at their destinations (e.g., developing countries of Africa). Hazardous waste was moved across borders with neither prior consent nor communication. In such a situation, it was not clear who should be held responsible. With such a background, Organisation for Economic Co-operation and Development (OECD) and United Nations Environment Programme (UNEP) discussed the problem and the Basel Convention was drafted and adopted in 1989. As of February 2009, the Convention has 172 Parties.

#### Regulations in the Convention include:

- It is mandatory to receive the written consent of the importing country when exporting hazardous waste determined in the Convention and other wastes;
- Signatory states should take measures to minimize waste generation and create waste disposal facilities for appropriate waste disposal domestically;
- Signatory states should view the illegal trade of waste as a criminal act, prevent actions that violate this treaty, and punish those who violate it.



#### Initiatives in Japan

Japan is introducing strategies such as the following in order to prevent illegal importing and exporting.

- Briefing sessions on the necessary procedures for importing and exporting as well as overview sessions on relevant laws, such as the Basel Convention, are being held for importing and exporting businesses.
- Preliminary consultation services have been set up in which businesses can verify whether the cargo they are attempting to import or export falls under the category of controlled materials.
- Japan Customs and the Ministry of the Environment (MOE) are cooperating to carry out cargo inspections in order to curtail illegal importing or exporting at Japan's borders. Furthermore, the MOE is holding meetings for exchanging ideas with the customs offices from every region, thus facilitating information exchange and deepening the knowledge base of customs officials.
- The MOE has also established the Asian Network involving the participation of eleven Asian countries. This Network conducts workshops and provides information on waste importing and exporting through its website (see [http://www.env.go.jp/en/recycle/asian\\_net/](http://www.env.go.jp/en/recycle/asian_net/)).

Source: MOE.



#### Suggestions to Policymakers

- Ratify and enforce the Basel Convention;
- Improve the tracking system of secondary material shipment; and
- Strengthen compliance monitoring for hazardous chemicals.



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# Small 3R Steps for a Big Difference

## Best Practice of the 3R Concept in Action:

### A Case of Community-Based Solid Waste Management and Composting Demonstrating Practical Application of the 3Rs in Bangladesh by Waste Concern.

A successful model of solid waste management and composting has been established by the non-profit organization, Waste Concern, in Bangladesh. Waste Concern was founded in 1995, with the motto "Waste is a Resource". This section features the small-scale community-based composting system that Waste Concern promotes. This case illustrates how the 3R concept is being practiced on the ground in a comprehensive way, and thereby recycling organic waste to organic compost, and generating income and employment opportunities for the urban poor. It serves as a good example in that all sectors, including the public and private sectors, NGOs, and citizens work in good cooperation with each sector playing their respective roles, resulting in a win-win situation that benefits all parties involved.

#### Situation of waste generation, collection, and recycling in Dhaka City (2005):

- Amount of solid waste generated in Dhaka City: 4,635 tons/day.
- 74% of the generated waste is organic, which was previously unutilized.
- Only 37% of generated waste was collected by the city corporation.
- 15% of the inorganic waste was recycled by the informal sector.



Source: Enayetullah et al. (2005).

→ 80% of organic waste converted into resources through community-based composting

## Overview of the Community-based Composting Project:

### 1. Community mobilization and training



Awareness-raising and training sessions are offered to the target communities, including slum and low-income households.

Communities are trained so that they can actively participate in the source segregation of waste, monitor house-to-house waste collection, and pay for the service. They also appoint staff to engage in waste collection and composting.

Photos: Courtesy of Waste Concern  
Sources: Waste Concern (2005), (2008a), and (2008b).

### 2. House-to-house collection

Organic waste generated by households are collected in communities that are deprived of regular waste collection and removal services, and often live in an environment with low hygiene. Such a waste collection system contributes to improving the hygienic condition of communities. It also provides a sustainable waste management system to the communities, as it is organized in partnership with the private and public sectors and citizens. Below are some figures from the Dholpur Composting Project in Dhaka City:

- Serves 800 families (approx. 4,800 persons).
- For house-to-house waste collection service, the community pays between Tk.5-10, depending on income level.



### 3. Composting and marketing

High quality compost is made from the organic waste collected from households. Private companies purchase the compost and market the product through their country-wide rural distribution network. This set-up enables compost products to be distributed widely even though it is produced at small-scale community-based composting plants.

- Raw compost is purchased by private companies at Tk.2500 per ton.



## 3R Project's Implications to the Millennium Development Goals

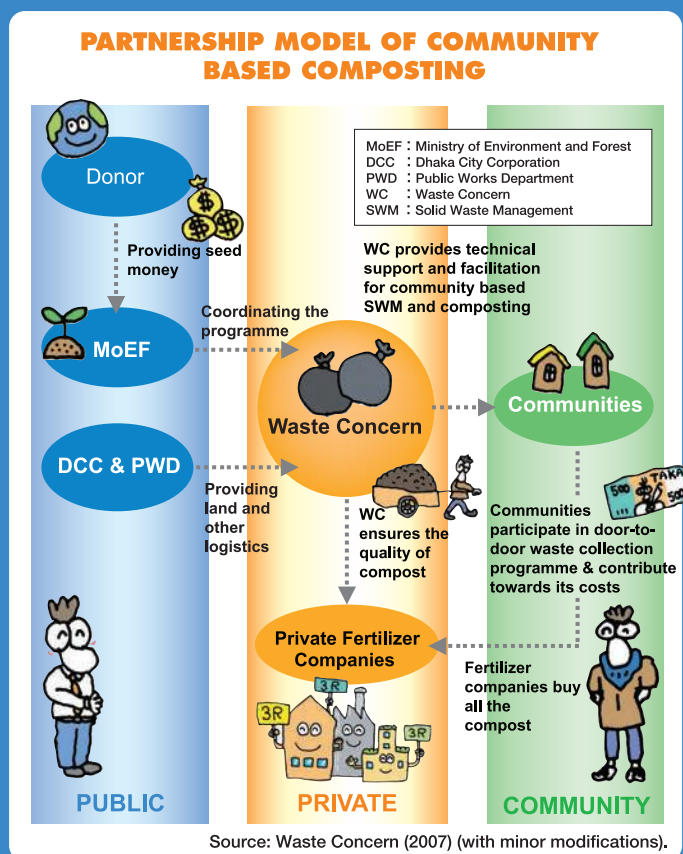
This project contributes to various aspects of the MDGs; for example, it generates employment and contributes toward a cleaner environment for low-income communities. It also promotes gender equality by providing employment for women. Organic farming contributes to ensuring environmental sustainability.



### Further Application of the Composting Model: Promotion of organic farming

Using the compost produced from the urban organic waste, Waste Concern promotes organic farming that is safer and environmentally friendly and can increase its economic value to the producers. For example, as part of a feasibility study, organic cotton was successfully produced in Bogra, Bangladesh, in cooperation with the fair trade fashion industry and agriculture training institute.

This cooperation project has the purpose of showing that organic cotton can create more opportunities for poor farmers to get the premium price by creating an organic market for international buyers using the Fair Trade concept. Organic farming is a sustainable farming method that replenishes and maintains soil fertility, reduces the use of toxic and persistent pesticides and fertilizers, and creates biologically diverse agriculture.



### Important Points for Success:

- Community-based programme with a firm support system that has the cooperation of various stakeholders such as the public and private sectors, NGOs, citizens, and international organizations.
- Initial cost of starting up the project was provided by international organizations such as UNDP and UNCRD; the project was then developed on a self-sustaining scheme.
- Income source of the projects are the waste collection fee and sales of organic fertilizer.
- Started as a pilot project, and then developed into larger-scale programmes implemented at different sites in Bangladesh.



# Annex: Tokyo 3R Statement

## Towards the Establishment of the Regional 3R (Reduce, Reuse and Recycle) Forum in Asia

The participants, who are representatives of Asian countries (Bangladesh, Brunei Darussalam, Cambodia, People's Republic of China, Indonesia, Japan, Republic of Korea, Lao PDR, Malaysia, Mongolia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam), international organizations and aid agencies (Asian Development



Bank (ADB), Asian Institute of Technology (AIT), Asia-Pacific Forum for Environment and Development (APFED), Asian Productivity Organization (APO), Basel Convention Regional Coordinating Centre for Asia and the Pacific (BCRC China), Global Environment Facility (GEF), German Agency for Technical Cooperation (GTZ), Institute for Global Environmental Strategies (IGES), International Labour Organization (ILO), Organisation for Economic Co-operation and Development (OECD), Japan International Cooperation Agency (JICA), Secretariat of the Basel Convention (SBC), United Nations Centre for Regional Development (UNCRD), United Nations Department of Economic and Social Affairs (UN DESA), United Nations Environment Programme (UNEP), United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP), and United Nations Industrial Development Organization (UNIDO)), and experts in the area of 3R/waste management, having met in Tokyo, Japan on 11-12 November 2009, for the Inaugural Meeting of the Regional 3R Forum in Asia, to agree on a statement on the establishment of the Forum, for the promotion of the 3Rs in the Asia region,

**Reaffirming and building upon** the international agendas and processes such as the Agenda 21, the Johannesburg Declaration on Sustainable Development, and the Johannesburg Plan of Implementation (JPOI), in which the need for reorienting production and consumption patterns at all levels towards sustainability have been highlighted, with emphasis on waste management and giving the highest priority to waste prevention and minimization by encouraging the production of reusable consumer goods and biodegradable products and developing the infrastructure required to reduce, reuse, recycle, and dispose in an environmentally sound manner, in line with the goals and objectives of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, in particular capacity building on prevention of illegal transboundary movement of hazardous wastes,

**Reconfirming** the important linkages between the beneficial aspects of the 3Rs and the Millennium Development Goals (MDGs) and the significant contributions that could be made in achieving the MDGs by promoting the 3Rs and sound waste management, while being mindful of, and striving to eliminate, the negative consequences of improper waste management and recycling practices,

**Recognizing** the 3R Initiative launched at the G8 Sea Island Summit in June 2004, and the subsequent processes including the Ministerial Conference on the 3R Initiative held in April 2005, the senior officials meetings held in March 2006 and October 2007, the 1st and 2nd Asia 3R Conferences held in November 2006 and March 2008, and the Kobe 3R Action Plan agreed at the G8 Environment Ministers Meeting in Kobe, Japan in May 2008,

**Acknowledging** themes of sustainable consumption and production and waste management, among others, that will be addressed at the 18th and 19th sessions of the UN Commission on Sustainable Development (CSD) in 2010-2011, and

noting that the 3Rs can make significant contribution to shifting Asia towards patterns of sustainable consumption and production by improving resource productivity and efficiency as well as by decoupling economic growth from resource consumption and environmental degradation,

**Reaffirming and building upon** the Decision GC 25/8 of UNEP's Governing Council, which in paragraph 7, specifically recognizes the need for more intensive awareness-raising designed to change the attitude of waste generators, particularly industries, consumers, and the informal sector with regard to the "3Rs" concept, environmentally sound waste management and, where appropriate, the need for final disposal of wastes in the countries in which they are generated,

**Understanding** both the main benefits of the 3Rs and the co-benefits in the forms of improvement of environmental management and competitiveness in the industrial sector, achieving resource and energy efficiency, and climate change mitigation,

**Recognizing** the importance of comprehensive and integrated national 3R strategies and also noting that the development of such strategies can be a positive step towards mainstreaming the 3Rs in overall policy, planning, and development at the local, sub-national, and national levels,

**Underscoring the importance of** cooperation and partnership with international organizations, and bilateral and multilateral donor communities towards training and capacity development, research networking, development and implementation of 3R-related projects, including CDM, and transfer of environmentally sound technologies on various aspects of the 3Rs,

**Recognizing** that improved awareness in civil society on the social, economic, and environmental benefits of the 3Rs is critical to realizing its effective promotion and implementation towards establishing a sound material-cycle society,

hereby announce the following as their common intention:

1. Unanimously endorse and welcome the inauguration of the *Regional 3R Forum in Asia*, with the overriding objectives to:
  - (a) Facilitate high-level policy dialogues on 3R issues, challenges, and opportunities;
  - (b) Facilitate improved dialogue and cooperation with international organizations and donor communities for materializing and implementing 3R projects, including 3R and waste management-related projects and programmes at the local and national levels identified through national 3R strategies;
  - (c) Provide a strategic and knowledge platform for sharing experiences and disseminating among Asian countries best practices, tools, technologies, and policy instruments on various aspects of the 3Rs;
  - (d) Provide a platform to develop multilayered networks of stakeholders such as national and local governments, academia, scientific and research community, the private sector, media community, NGOs, and the informal sector;
  - (e) Generate regional consensus and understanding on the beneficial aspects of the 3Rs in the context of achieving the MDGs, resource and energy efficiency, resource-efficient economy, and climate change mitigation;
  - (f) Provide a platform for the proliferation of national 3R strategies; and
  - (g) Promote awareness among the general public, including schoolchildren, on the beneficial aspects of the 3Rs.
2. Agree on the following long- and short-term priorities of the Regional 3R Forum in Asia in consideration of the current situation in Asia (socioeconomic conditions and culture, etc.).

- (a) **Mainstreaming the 3Rs** in the national development agenda, including environmental and economic policies and programmes;
- (b) **Mobilizing financial resources in cooperation with bilateral and multilateral aid agencies for the implementation of 3R measures and activities** at both the national and local levels, involving key stakeholders including the **private sector**, in particular, exploring how to promote 3Rs through pilot projects towards achieving more sustainable production and consumption patterns, resource conservation and environmentally friendly society,
- (c) Developing **human resources** to overcome waste management issues, including technical barriers and technological gaps, to achieve **waste prevention, minimization, and reduction** at the source of waste;
- (d) Promoting better understanding on the overall benefits of the 3Rs, including the **co-benefits**, which will lead to better implementation of the 3Rs with the broader scope of **achieving resource efficiency, energy efficiency, and climate change mitigation**;
- (e) **Developing and implementing effective policy mechanisms** such as EPR, which will help provide the incentive to minimize waste and redesign products for easier recycling. **Experience and knowledge accumulated** in the countries implementing such mechanisms **shall be transferred and shared among participating countries**;
- (f) Building adequate **capacity for collection and safe treatment of hazardous waste**, including those from household waste and **e-waste**;
- (g) Developing, where appropriate, **industrial capacity for sound recycling**, including the formation of **eco-industrial zones** and clusters, with support from source segregation activities, efficient collection systems, and upgrading of existing facilities;
- (h) Developing the necessary organizational framework and support to deal with the **informal sector**, which plays an important role in the waste chain, but generally operates without proper health care and labour policies;
- (i) Developing and **transferring environmentally sound technologies**, including cost-effective and feasible technologies that meet the needs of the developing countries, for waste management and the 3Rs;
- (j) **Empowering cities** to build themselves into becoming core clients for financing and investment towards implementation of the 3Rs as well as to enable them to **cope with critical and emerging issues** such as open dumping and burning, hazardous wastes, diversification of waste streams, and climate change; and
- (k) **Information sharing and research networking** focusing on generation of data, technical capacity development, and policy analysis towards achieving **sustainable resource management**.

3. Accept the following as an initial possible set of activities that will be implemented under the umbrella framework of the Regional 3R Forum in Asia, in order to address the priorities agreed to above.

- (a) **Hold high-level policy dialogue on a regular basis**, to promote participating countries' efforts to achieve the common objectives of the 3Rs by sharing and discussing a wide range of policies and activities on the 3Rs, with a focus on material and solid waste flow as well as on regional cooperation. National government representatives, being the most important constituent of the high-level policy dialogue, will actively participate and play a central role;
- (b) **Facilitate implementation, replication, and scaling up of 3R-related pilot and demonstration projects and other good practices** in close collaboration with donor agencies. Pilot interventions will be identified and will be supported in collaboration with the existing and newly mobilized financial mechanisms. The forum will provide a platform for consultations among governments and bilateral and multilateral development banks and agencies and enlist their support for the implementation of 3R projects;

- (c) ***Collaborate with the existing 3R information/research networks at both the national and international levels***, so that they will serve as strategic and knowledge platforms for sharing experiences and for disseminating among Asian countries best practices, tools, technologies, and policy instruments on various aspects of the 3Rs. Collaboration will be extended to a wide range of existing information/research networks related to the 3Rs such as, but not limited to, the 3R Knowledge Hub, the Thematic Working Group on Solid and Hazardous Waste (Waste TWG) of the Regional Forum on Environment and Health in Southeast and East Asian countries and similar forums in other parts of Asia, the Basel Convention Regional Coordinating Centres (BCRCs), Society of Solid Waste Management Experts in Asia and Pacific Islands (SWAPI), and Economic Research Institute for ASEAN and East Asia (ERIA) working group on the 3R Policy. Dissemination of scientific knowledge will be regionally promoted through international academic journals and conferences in particular;
  - (d) ***Promote 3R business feasibility studies*** involving both public and private sector financing and participation, keeping in mind the needs of developing countries, by facilitating mutual and bilateral consultation among countries;
  - (e) ***Conduct international collaborative, advanced policy-relevant scientific research on sound material cycles in Asia*** on a continuous basis, for better data gathering, which evaluates the economic and environmental impacts of the 3Rs and the effectiveness of 3R policies, and examines available policy options and their combination for strategic implementation of the 3Rs; and
  - (f) ***Capacity building*** through means such as international training programmes focusing on the 3Rs for human resource development, which targets government officials. Such programmes may be initiated as part of the international cooperation activities of relevant donor agencies such as JICA and others.
4. Welcome other countries and organizations to join the Regional 3R Forum in Asia for greater proliferation of the 3Rs as well as stronger networking in the region.
  5. Welcome the establishment of the Subsidiary Expert Group (SEG) under the Regional 3R Forum in Asia. The SEG members will support the high-level policy dialogue by providing substantive technical input, and by sharing opinions, ideas, and information on best practices and effective policy instruments among the participating countries in the area of the 3Rs. The SEG members will provide policy and technical advice to international collaborative research undertaken, as mentioned in 3 (e) above. They will also provide relevant policy and technical advice and practical suggestions to the developing countries during the implementation of various 3R activities.
  6. Request UNCRD, in cooperation with other relevant organizations and initiatives, to take the lead role in: (a) facilitating intergovernmental and interagency coordination for the implementation of the Forum; and (b) facilitating an interface or platform between the Governments and the expert group for active policy consultations and dialogues.
  7. Welcome Japan's initiative to launch the international collaborative research activity, coordinated by IGES, in line with 3 (e) stated above.
  8. Recognize the progress in various 3R-related projects and programmes being undertaken by international organizations and aid agencies participating in this Forum, and request bilateral and multilateral development banks and donor agencies to facilitate the use of their financial and technical assistance programmes, and to consider, as appropriate, the development of new funding mechanisms for 3R-related project implementation and/or investment.
  9. Request UNCRD, in consultation with other relevant organizations, to explore and identify suitable modalities for facilitating multilayered networks of stakeholders such as governments, academia, scientific and research community, private sector, and NGOs, under the umbrella framework of the Regional 3R Forum in Asia (as mentioned in 1 (d)).

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## Acronyms

3Rs	Reduce, Reuse, and Recycle	MOE	Ministry of the Environment, Government of Japan
ADB	Asian Development Bank	NGO	Non-Governmental Organization
CFC	Chlorofluorocarbon	OECD	Organisation for Economic Co-operation and Development
CRT	Cathode Ray Tube	PRC	People's Republic of China
CSD	Commission on Sustainable Development	PVC	Polyvinyl Chloride
CSR	Corporate Social Responsibility	SCP	Sustainable Consumption and Production
FAO	Food and Agriculture Organization of the United Nations	UN	United Nations
ICLEI	International Council for Local Environmental Initiatives	UNCRD	United Nations Centre for Regional Development
IGES	Institute for Global Environmental Strategies, Japan	UN DESA	UN Department of Economic and Social Affairs
IREDA	Indian Renewable Energy Development Agency Limited	UNEP	United Nations Environment Programme
JICA	Japan International Cooperation Agency	UN ESCAP	UN Economic and Social Commission for Asia and the Pacific
JPOI	Johannesburg Plan of Implementation	WHO	World Health Organization
MDGs	The United Nations Millennium Development Goals	WTO	World Trade Organization



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# Environment 3R

