6th Regional 3R Forum in Asia and the Pacific, 16-19 August 2015, Maldives

# Need for Science-Policy Interface for 3R implementation

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# Need for Science-Policy Interface for 3R implementation

1. 3R Approach for Sustainable Resource Management (3RRM)
2. Science-based Developments in Policy Fields for 3RRM
3. Science Communities and Activities in Asian region

# 1. 3R Approach for Sustainable Resource Management (3RRM)

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Material Cycles &
Waste Management

# Hierarchy of Waste Management: 3R, "Reduce, Reuse, and Recycling"

- With the development and spread of the waste management policy,
  Hierarchical priority is given to "reduce, reuse, recycling, treatment and final disposal" in this order. We call the first three measures of 3R, "Reduce, Reuse, and Recycling".

- The idea of hierarchy is regarded as the basis on regulations, policy discussions and voluntary plans.

# 3R Concept for Sustainable Resource Management (3RRM)

1. 3R approach as countermeasures on waste management
2. Static utilization of renewable resources and controlled utilization of non-renewable resources
3. Artificial stocks utilization and disaster waste management

# Renewable and Non-Renewable Resources

| Type of Resource | Note | Specific example |
|---|---|---|
| Non-renewable resources | Resources that cannot be replenished on the human timescale. | **Fossil fuels**: Never returns to the original hydrocarbon forms on the human timescale.<br>**Mineral resources**: Exhaustible because soon-to-be unavailable with current technology and economic level. |
| Renewable resources | Resources that can be considered as no depletion depending on their usage amounts | **Sunlight**: Energy emitted from the sun to the earth will last for over billions of years. |
| | Resources with actually no depletion considering usage amount and renewable amount. | **Biomass**: Plants produced through photosynthesis process using solar energy; i.e., non-depletable on the human time scale. |

*Ref.: Global Environmental Problem (3) – Transition from resource restriction and waste problem to recyclable society, Shinichi Sakai, Environmental Education, The Japanese Society for Environmental Education (2012)*

# The Great Hanshin-Awaji Earthquake, January 17, 1995

Material Cycles & Waste Management

# The tsunami which swallows Sendai plains at 2011/03/11 about 15:50

Photo : From the helicopter of the Sendai fire department

# Amount of disaster waste generated

| Year | Disaster | Amount of waste |
|---|---|---|
| 2011 | The Great East Japan Earthquake | 25 million t |
| 2010 | 2010 Haiti earthquake | Around 23 - 60 million t |
| 2009 | Terremoto dell'Aquila (Italy) | Around 1- 3 million t |
| 2008 | 2008 Sichuan earthquake (China) | 20 million t |
| 2005 | Hurricane Katrina (U.S.) | 76 million $m^3$ |
| 2004 | Hurricane Frances & Jeanne (U.S.) | 3 million $m^3$ |
| 2004 | 2004 Indian Ocean earthquake and tsunami | 10 million $m^3$ (only in Indonesia) |
| 2004 | Hurricane Charley (U.S.) | 2 million $m^3$ |
| 1999 | Marmara earthquake (Turkey) | 13 million t |
| 1995 | The Great Hanshin-Awaji Earthquake (JPN) | 15 million t |

*Note :Some modification was made on review article by Brown et al.[4)]*

# Meaning of Disaster Waste Unit of " 1 ton/$m^2$"

Average unit of potential waste generated from collapsed building: 1 ton/$m^2$

→ Building of 100 $m^2$ generates 100 tons of waste

Amount of daily waste generation:

1 kg/ person per day ⇒ 1 ton/ year (family of three)

→ The amount of disaster waste generated by the earthquake equivalent to 100 years of daily domestic waste

# Towards the Establishment of a Cycle-Oriented Society and Chemical Substances Control


* We have no choice except pursuing these two ways to save livings and this planet.

# “Clean/ Cycle/ Control”, 3C Concept

- Basic concept for technologies and society systems with the control of hazardous wastes and persistent chemicals
- Avoid the use of hazardous chemicals and the use of alternatives.（Clean）
- In case there is no appropriate alternative substances and the use of specified material is essential because of its crucial effect, recycling should be the principle.（Cycle）
- Emission control to the environment, and the decomposition and stabilization of stock substances and wastes which have been used in the past.（Control）

*Sakai, S. Environ. Sci. & Pollut. Res. 7(4) 225-232 (2000)*

# 2. Science-based Developments in Policy Fields

# 3R Initiative & International resource circulation

## Basic ideas for establishing Sound Material-Cycle Society around the world

- Prevention of environmental pollution is precondition for efficient use of resources
- Top priority: Promotion of 3R and proper waste disposal in each country
- Necessity: Prevention of illegal export and import of circulative resources
- Important point: Smooth circulation of resources among country to country for efficient use

*Ref: Interim report of MOE's Expert Meeting on International Resources Recycling (2006)*

# Resources and Environmental Issues in the Early 21st Century – Policy Direction

- Investment and efforts towards increase in resources production
- Developing alternative energies and resources
- Capital investment, R&D, system development for establishing energy-saving/ eco-friendly society
- Promoting active usage of circulative resources while controlling environmental pollution
- Necessity for new growth model on the premise of high resource price

# Examples of the Expected Science-based Policies for 3R Activities/ Promotion

1. Reduction: **Life-cycle effect** of food loss reduction on energy & GHG emission, e.g. Food loss issue
2. Recycling: Available metal potential and technologies by recycling metals from E-waste/ELVs by **substance flow analysis**
3. Waste Management: Regulations for POPs & heavy metals, and their effectiveness
   - **Dioxin Control**: Measurement of dioxins in environmental media and human body, and their transport phenomena in local and global scales
   - **PCB Decomposition**: Development of PCB destruction technologies & verification of their effects on environmental load

# Untouched Food


Picture (2013-October-31)

# Time series of untouched food

- **Continuous survey tells us**

  **the relationship between society and waste.**

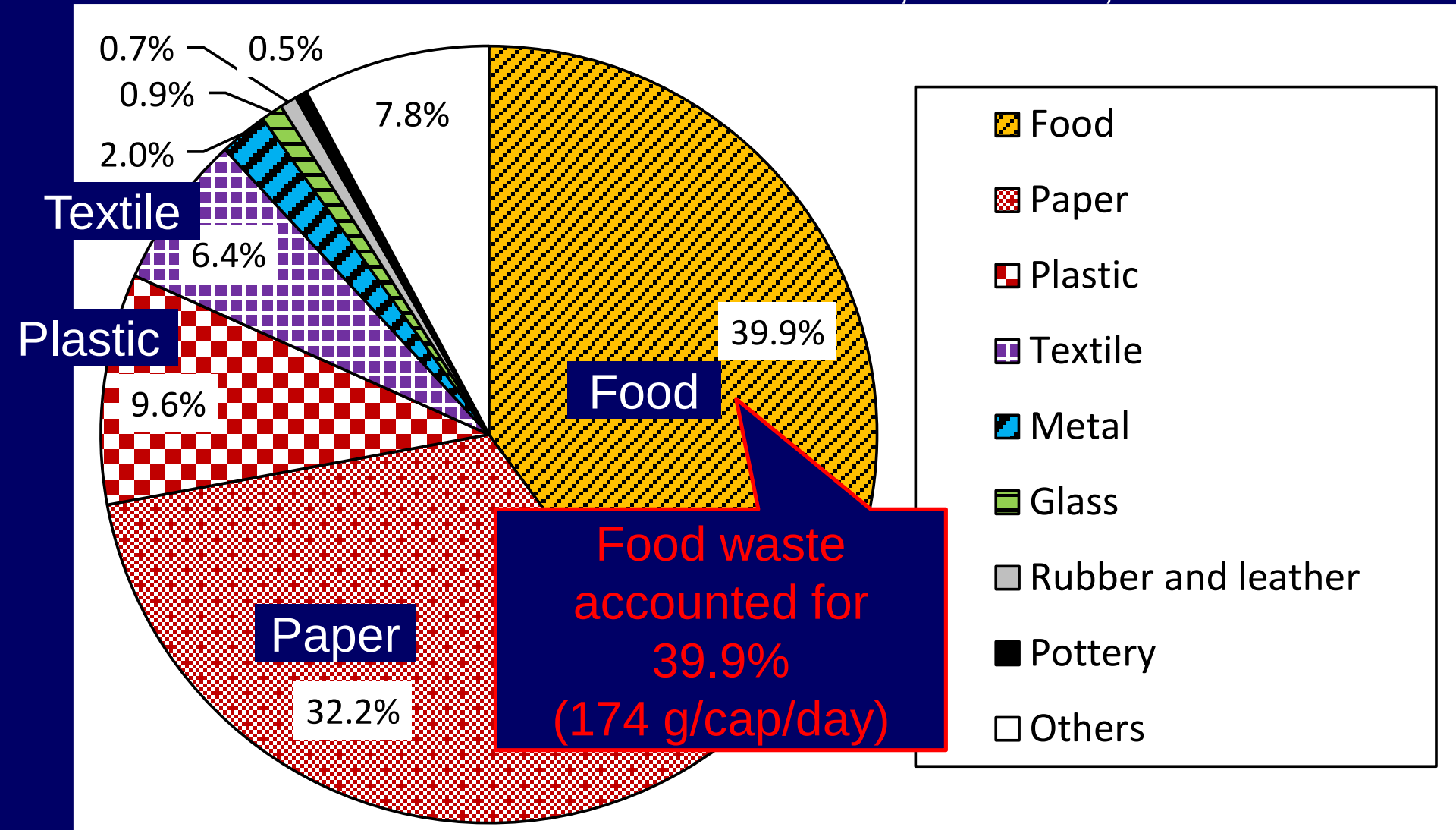
  - Packed food, processed food have been increasing.


(Ref. ) もったいないを考えるごみ図鑑編集委員会:ごみ図鑑 1979-2009　ー私たちはどこから来たのー、2009

# Household waste composition as of 2012

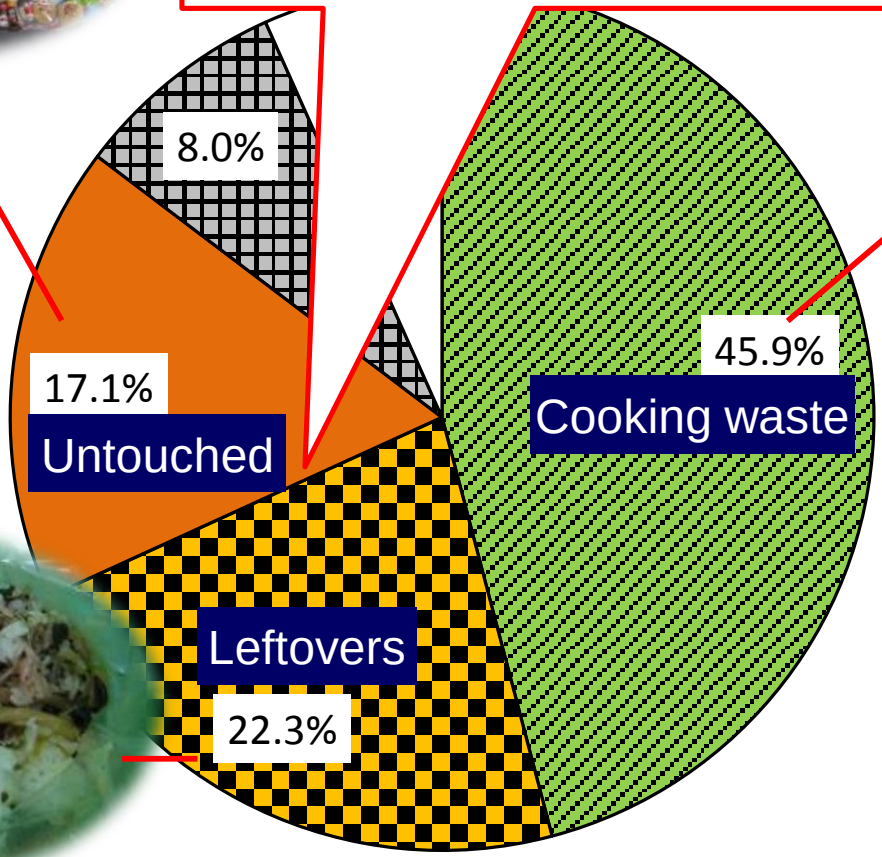
Unit Amount: 437 g/cap/day

After source-separation of:
- Plastic containers and packaging
- PET bottles, steel cans, and aluminum



# Household food waste composition as of 2012

Food loss (untouched food and leftovers) accounted for about 40% of food waste
→These are avoidable!

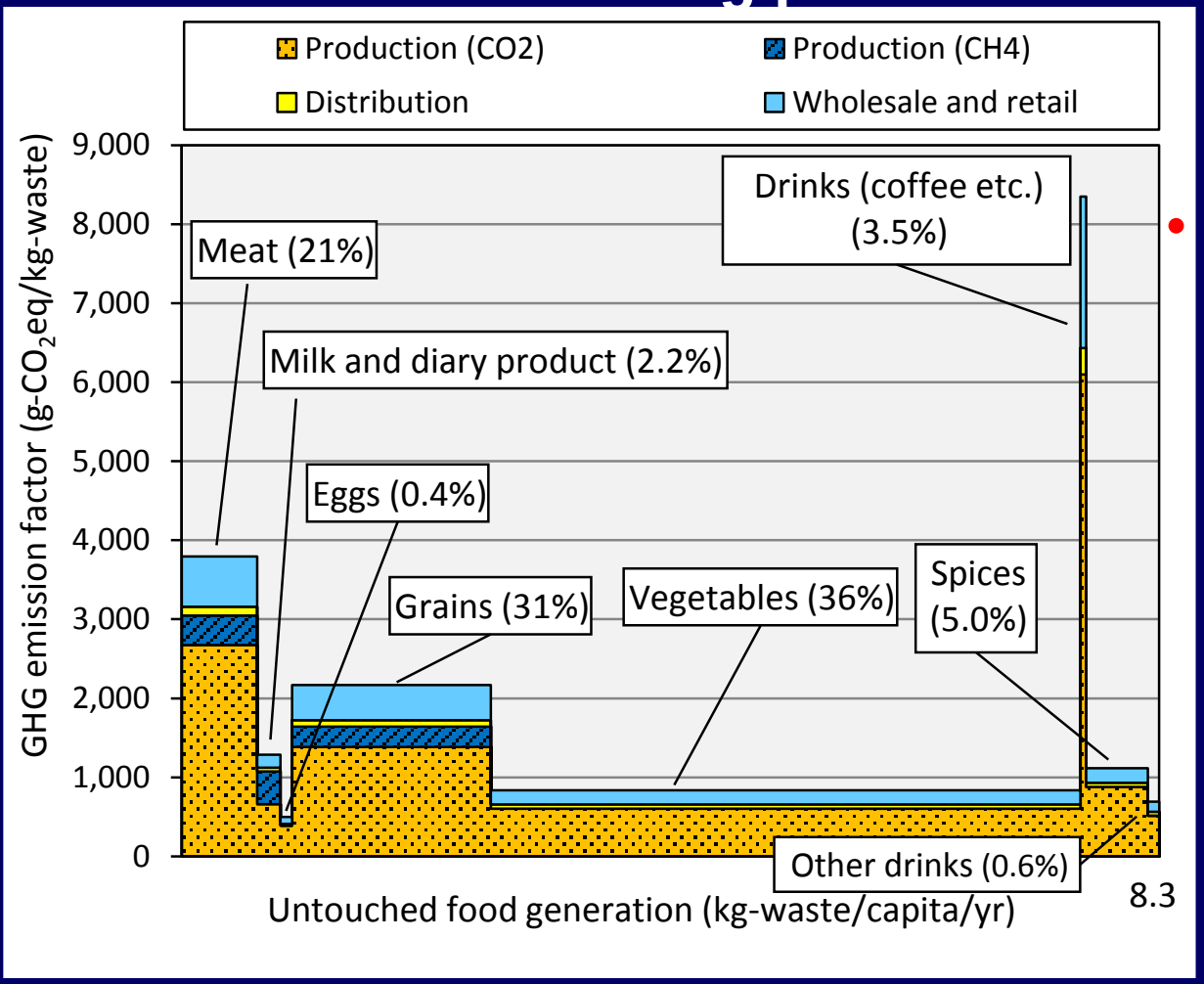



- Cooking waste
- Leftovers
- Untouched food
- Leaves and coffee residue
- Water sink

# Relationship between food loss generated and GHG emission factors of each food category

## Untouched food

❖ **GHG emissions during production-cooking: approx.**




**12 kg-$CO_2$eq/cap/yr.**

- Meat accounted for less than 10% on food waste composition basis.

But, on GHG emission basis it accounted for larger proportion, 21%.

*(Ref. ) Matsuda, Yano, Hira, Sakai (2010) Life cycle analysis of household waste management considering trade-off between food waste reduction and recycling, Journal of LCA 6 (4): 280 ─287.*

# Indicators for 3Rs in Municipal Solid Waste

| Indicator | Overview | Related Goals of Hanoi 3R Declaration |
|---|---|---|
| **Indicators for 3Rs in municipal solid waste** | | |
| **1. Total MSW Generated and Disposed and MSW Generation Per Capita (by weight)(Primary Indicator)** | • MSW generation is a fundamental indicator.<br>• The use of total MSW generation and MSW generation per capita indicators would enhance governmental planning and decision-making capacity in MSW management. | Goal 1: Significant reduction in the quantity of municipal solid waste generated. |
| **II. Overall Recycling Rate and Target (%) and Recycling Rate of Individual Components of MSW (Primary Indicator)** | •Recycling rate is one of the representative indicators of 3R policy performance<br>•Many countries in Asia have incorporated it into national 3R targets.<br>•Can show how recycling activities can contribute to reduce waste going to final disposal sites. | Goal 3: Significant increase in recycling rate of recyclables |

*Ref: Asia Resource Circulation Policy Research Group, 3R Policy Indicator Factsheets, Vol.1 (2014)*

# 3. Science Communities and Activities in Asian region

# The 30th anniversary of KSWM in 2013

- **Korean Society of Waste Management (KSWM) was founded in 1983 and is holding a special annual meeting at Jeju International Convention Center on November 14- 16, 2013.**
- **Sincere congratulation on the 30th anniversary of KSWM to all KSWM members on behalf of the members of JSMCWM and am very proud of attending the celebration meeting of KSWM together.**

Korea Society of Waste Management

# History of the Japan Society of Material Cycles and Waste Management (JSMCWM)

- JSMCWM was established in March 27, 1990
- The purpose is to have academic contributions of developments of proper waste management and recycling activities through the academic researches and their information exchanges
- Members in 1990
  - Individuals: 1222, Students: 3, Supporting: 143, Public: 54
- Members in 2015
  - Individuals: 2266, Students: 189,
  - Supporting: 115 Public: 85

# 3RINCs 2014

## - 3R International Scientific Conference on Material Cycles and Waste Management

**ORGANIZER:** Japan Society of Material Cycles and Waste Management (JSMCWM)

**CO-ORGANIZERS:** Korean Society of Waste Management (KSWM), Society for Solid Waste, Chinese Society for Environmental Sciences (SSW-CSES) and other regional and global academic networks

**SUPPORTERS:** Ministry of the Environment Government of Japan, UNEP-IETC, UNCRD, JICA Kansai, IGES, Kyoto Prefecture, Kyoto City

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JESC NIPPON STEEL & SUMIKIN ENGINEERING TAIHEIYO CEMENT TAKUMA TOWA Technology Corporation Hitz Hitachi Zosen plantec REMATEC

# 3RINCs Plenary Lectures

**Japanese Challenges for Material Cycles and Waste Management (TBD)**
Dr. R. Yatsu
Administrative Vice-Minister of the Environment of Japan

**The Application of MFA/SFA for Decision Making in Resource and Waste Management**
Prof. Dr. P. H. Brunner
Vienna University of Technology

**Waste Management and Resource Recycling in Asia**
Prof. Dr. P. Agamuthu
University of Malaya

**Past, Present and Future of Waste Management in Korea**
Prof. Dr. YC. Seo
Yonsei University, President of KSWM

**Development and Policy of Solid Waste Treatment Industry in China**
Prof. Dr. H. Hu
Ministry of Environmental Protection, Director of SSW-CSES

**Integrated Approach for Sustainable Material Cycles and Waste Management**
Prof. Dr. S. Sakai
Kyoto University

CALL FOR ABSTRACTS

# 3R International

The 3R International Scientific Conference on Material Cycles and Waste Management

and

# SWAPI

13th Expert Meeting on Solid Waste Management in Asia and Pacific Islands

at Kyoto University
(Clock Tower Centennial Hall)

**Kyoto, Japan, 10–12 March 2014**

# Special Sessions in 3RINCs (2)

1. **3R Policy Issues in Asia and the Pacific** and Needs for **Scientific Cooperation** -Plastics in Coastal & Marine Environment by **UNCRD** (United Nations Centre for Regional Development)
2. **3R Indicator** in Asia and the Pacific by **IGES** (Institute for Global Environmental Strategies) & Asia Resource Circulation Policy Research Group
3. **Biomass Utilization Challenges** by **ASTEM** (Advanced Scientific Technology & Management Research Institute of KYOTO)

# Special Sessions in 3RINCs (2)

4. **Disaster waste & Japan's experience in industrial waste management by UNEP-IETC (United Nations Environment Programme/ International Environmental Technology Centre)**
5. **Appropriate Leachate Management in Tropical Asia by Dr. Tomonori ISHIGAKI, NIES (National Institute for Environmental Studies)**



# Journal of Material Cycles and Waste Management (JMCWM)

- First issue was published in 1999 as an academic international journal of Springer-Verlag Tokyo edited by JSMCWM
- JMCWM has been followed by quarterly publication
- JMCWM has been registered in the Web of Science, and SCI (Scientific Citation Index) was also given in 2010.
- Electric submission and reviewing system has started in 2011

# 2nd 3RINCs in Daejeon, Korea 2015


- Extended Abstract Submission: 150
- Participants: 400
- Organizer: Korean Society of Waste Management (KSWM), Daejeon Metropolitan City, Korea MOE
- Co-Organizers: Japan Society of Material Cycles and Waste Management (JSMCWM)・・・
- Sponsors: 25

# CALL FOR ABSTRACTS

The 3rd 3RINCs (3R International Scientific Conference on Material Cycles and Waste Management) will be held at Hanoi, Viet Nam, 9–11 March 2016.

Hurry Up !

http://3rincs.org

**IMPORTANT DATES**

Deadline for abstracts: 10 December 2015

Deadline for early registration: 29 January 2016

Conference: 9–11 March 2016


# CALL FOR ABSTRACTS

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**ORGANIZATION**

ORGANIZER: Institute of Strategy, Policy on Natural Resources and Environment (ISPONRE)
Viet Nam Environment Administration (VEA)
International Cooperation Department (ICD) under Ministry of Natural Resources and Environment (MONRE)
CO-ORGANIZERS: Japan Society of Material Cycles and Waste Management (JSMCWM)
Korean Society of Waste Management (KSWM)
Society for Solid Waste, Chinese Society for Environmental Sciences (SSW-CSES)
and other regional and global academic networks
SUPPORTERS: Ministries, local and international organizations

# END

Thank you for your attention!