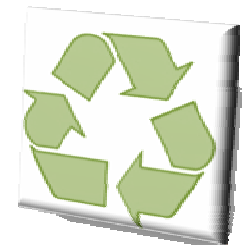


Decoupling of Environmental Degradation from Resource Use through Integrated Waste Management

*Second Meeting of the Regional 3R Forum in Asia
Kuala Lumpur, Malaysia, 4-6 October 2010*

Content

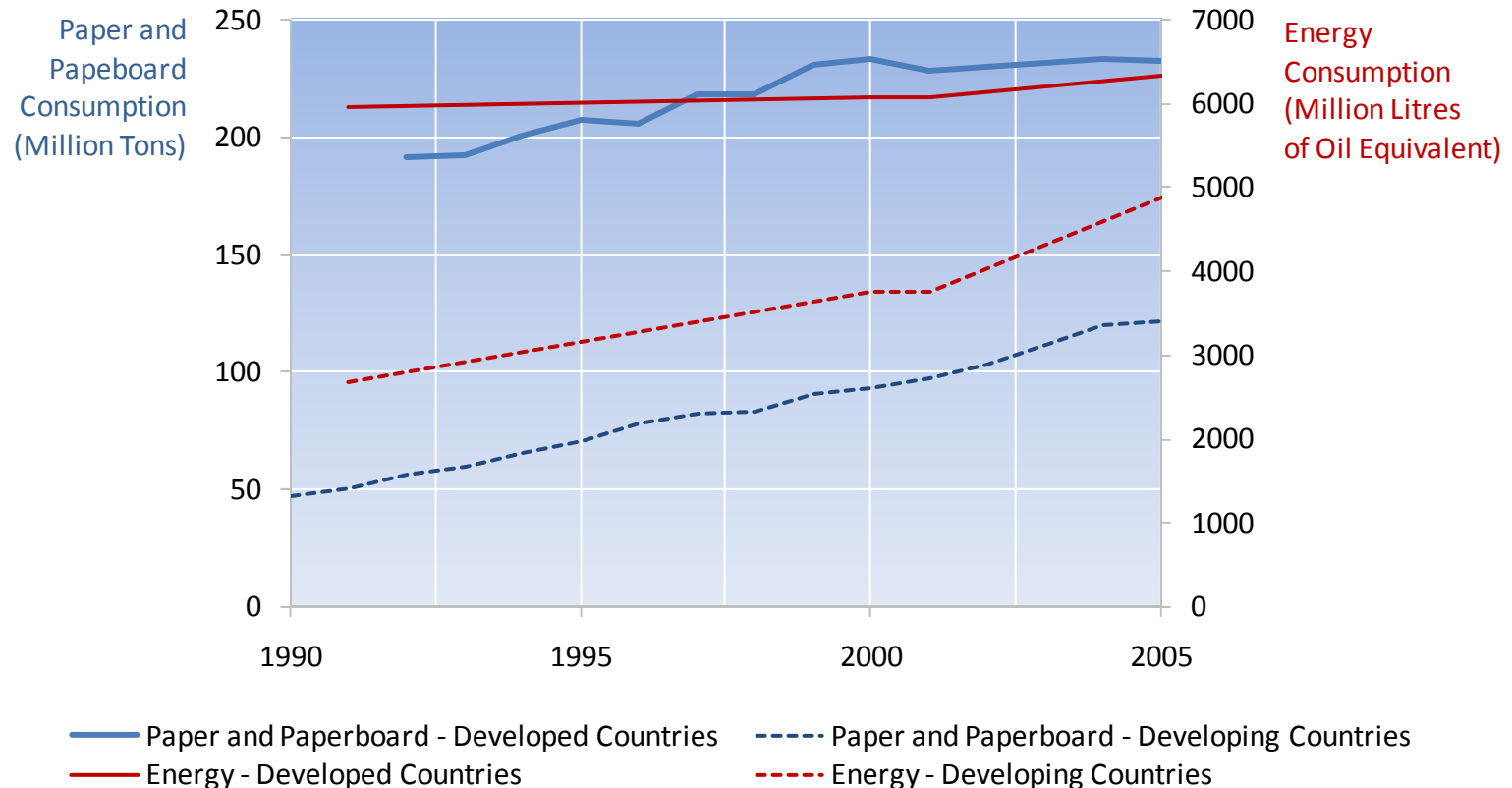
- Global Trends – Resource, Waste and Environmental Degradation
- Economic Development and Waste Generation – Evidence of Strong Coupling
- Integrated Solid Waste Management (ISWM)
- ISWM as a Decoupling Tool
- Enabling Policies and Economic Instruments – Some examples
- Economies Recognizing Decoupling Path – Some examples
- Decoupling Efforts by Communities and Industries
- Tracking Decoupling – Some Indicators
- Recommendations



Global Trends in Resource Use

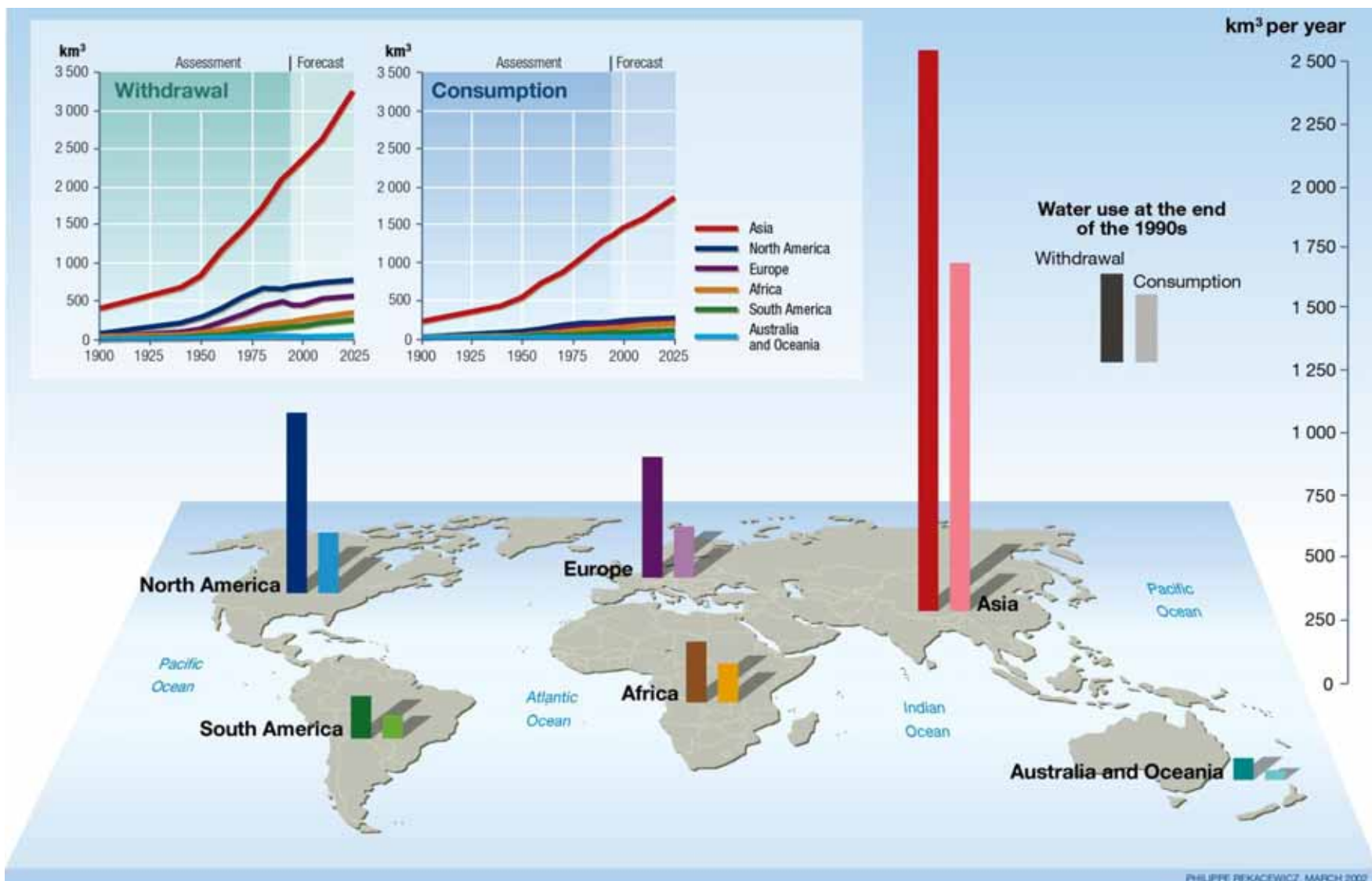
Estimates

- Population expected to increase by 1.4 times in 45 years from 6.5 billion in 2005 to 9.1 billion in 2050
- More than three quarters of world's population live in countries whose national resource consumption has exceeded the nation's resource availability
- Amount of global in-use metal stocks required would be 3-9 times those existing at present



Global Trends in Resource Use

Estimates for Water

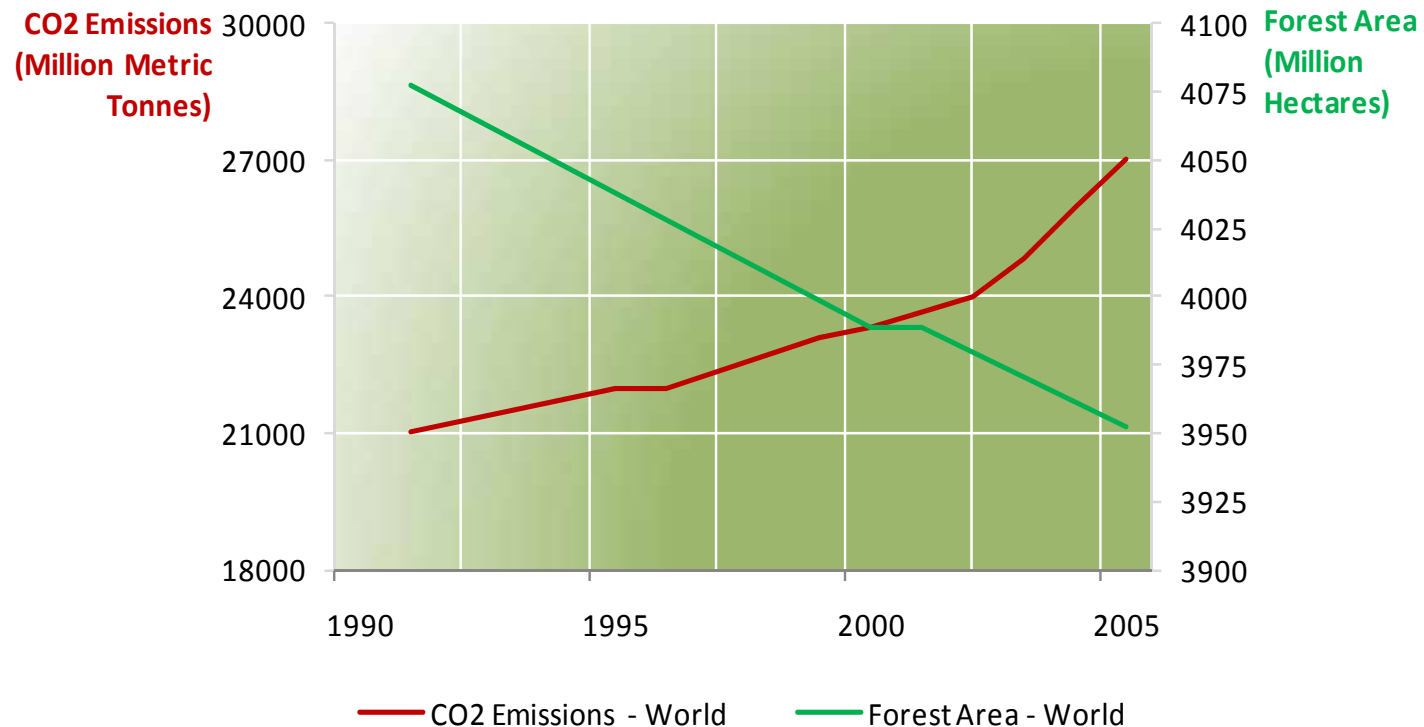


Source: Igor A. Shiklomanov, State Hydrological Institute (SHI, St. Petersburg) and United Nations Educational, Scientific and Cultural Organisation (UNESCO, Paris), 1999; *World Resources 2000-2001, People and Ecosystems: The Fraying Web of Life*, World Resources Institute (WRI), Washington DC, 2000; Paul Harrison and Fred Pearce, *AAAS Atlas of Population 2001*, American Association for the Advancement of Science, University of California Press, Berkeley.

Global Trends in Environmental Degradation

FAO Estimates

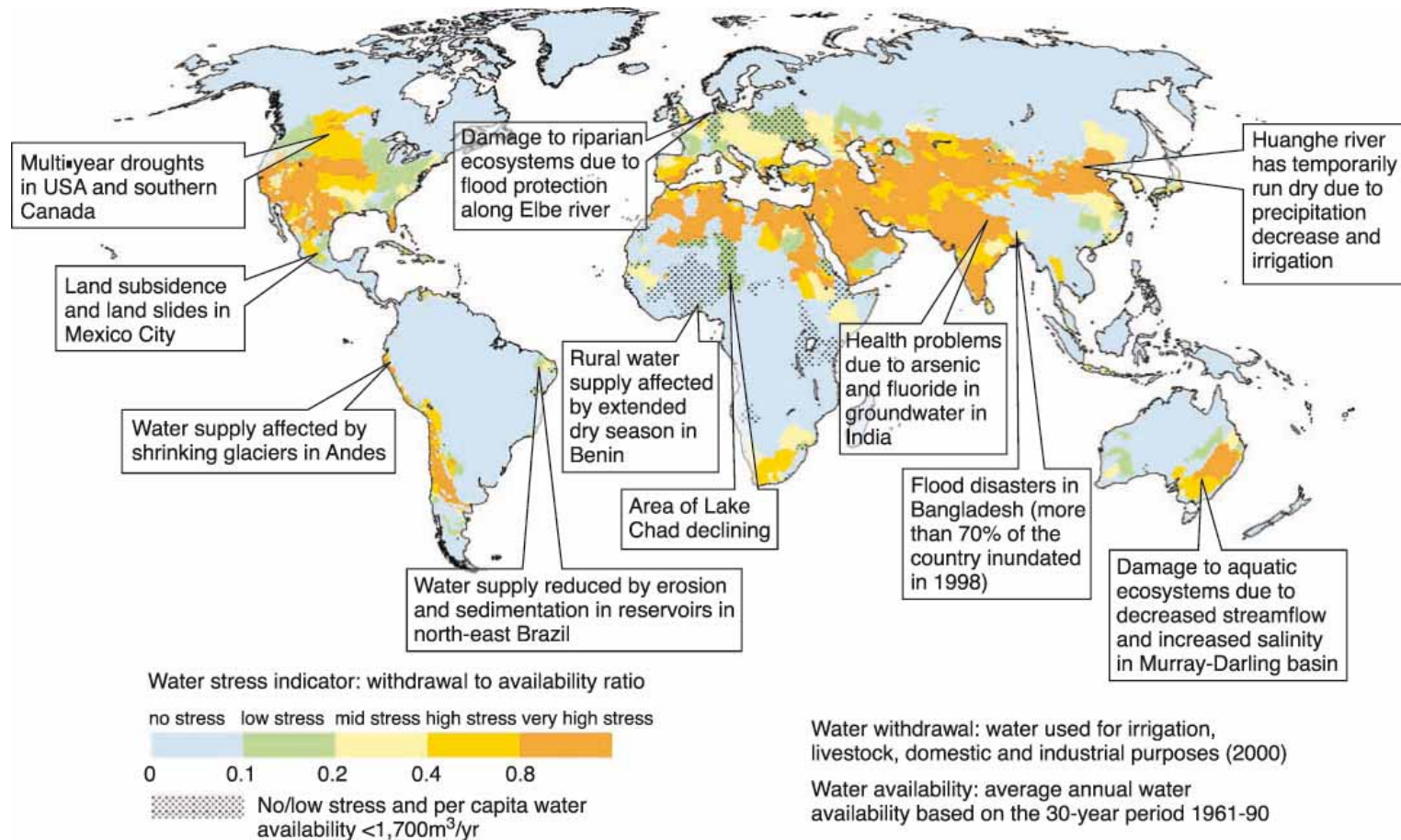
- 13 million hectares of the world's forests lost due to deforestation every year
- Carbon stored in forest biomass alone is about 283 Gigatonnes
- Carbon stored in forest biomass, deadwood, litter and soil together is roughly 50 % more than that in the atmosphere



Global Trends in Environmental Degradation

Degradation of Water Resources

By the year 2025, as much as two-thirds of the world population may be subject to moderate to high water stress.



Global Trends in Environmental Degradation

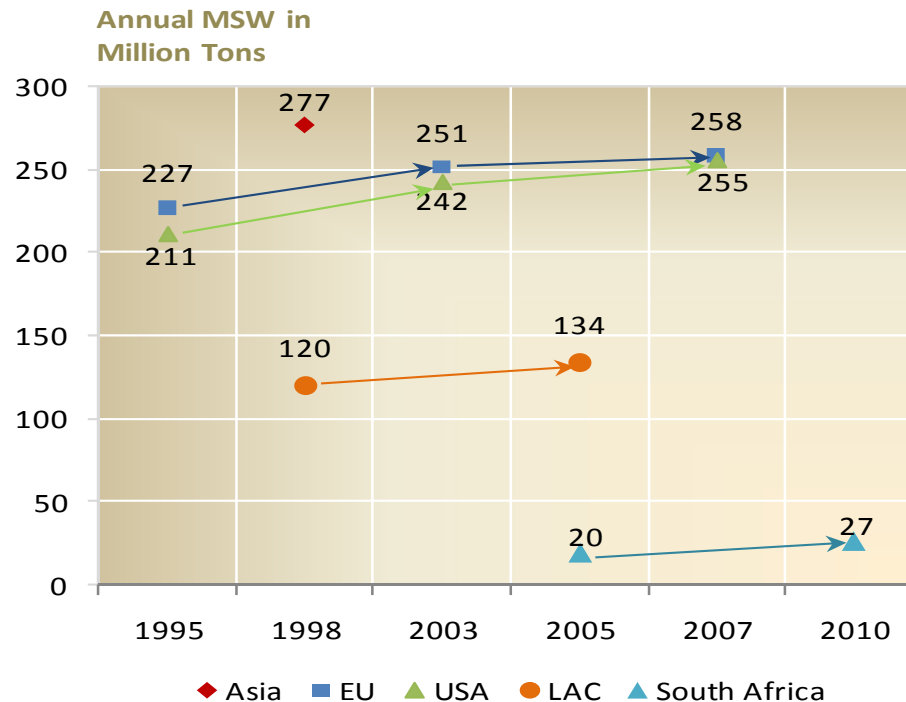
World's Pollution Hotspots



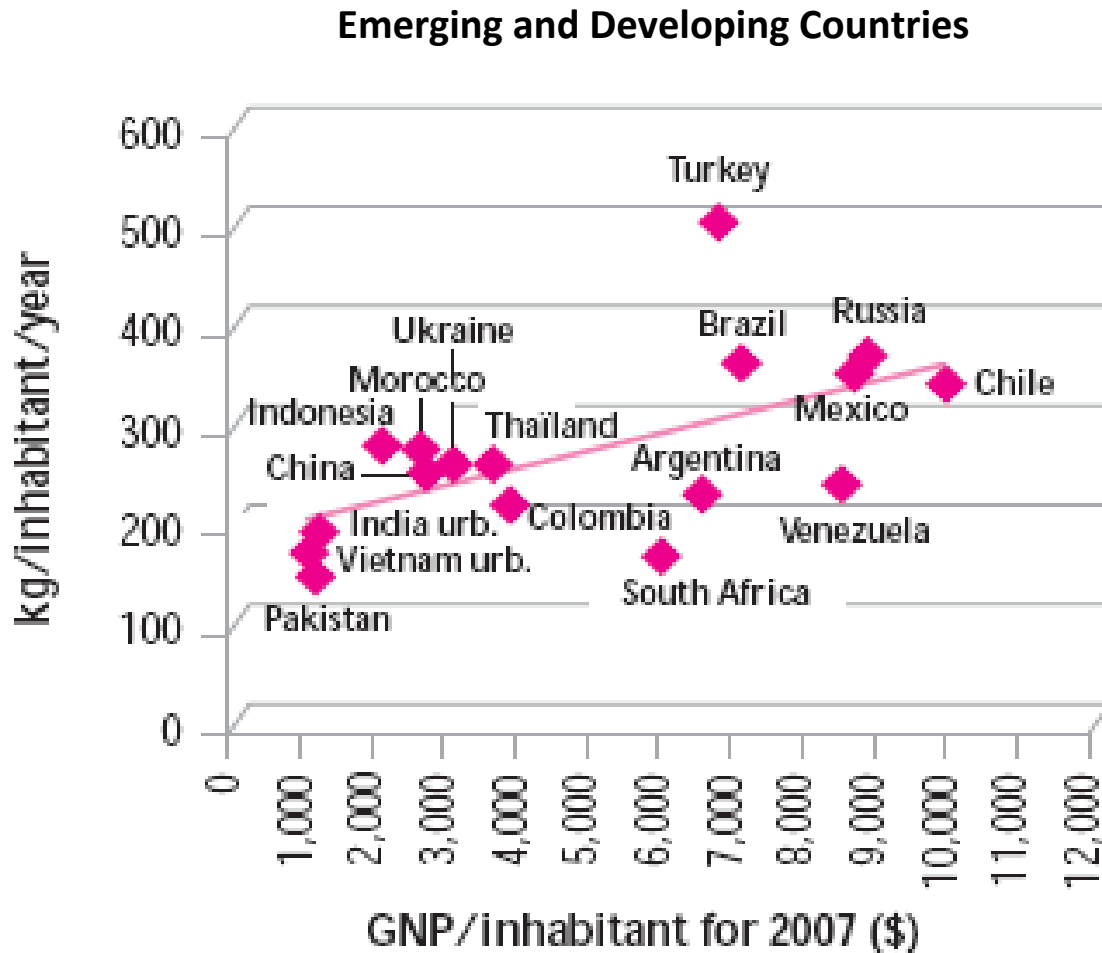
Global Trends in Waste Generation

Estimates

MSW	Worldwide: 1.84 billion tons (2004), 25 OECD countries: > 610 million tons (2006)
Hazardous waste	338 million tons (2001)
Industrial waste	Typically 1.1 – 1.8 billion tons in countries like EU, USA, China
C&D	10-15% of total waste in developed countries
Automobile	8 – 9 million tons in EU
E waste	20 – 50 million tons world wide



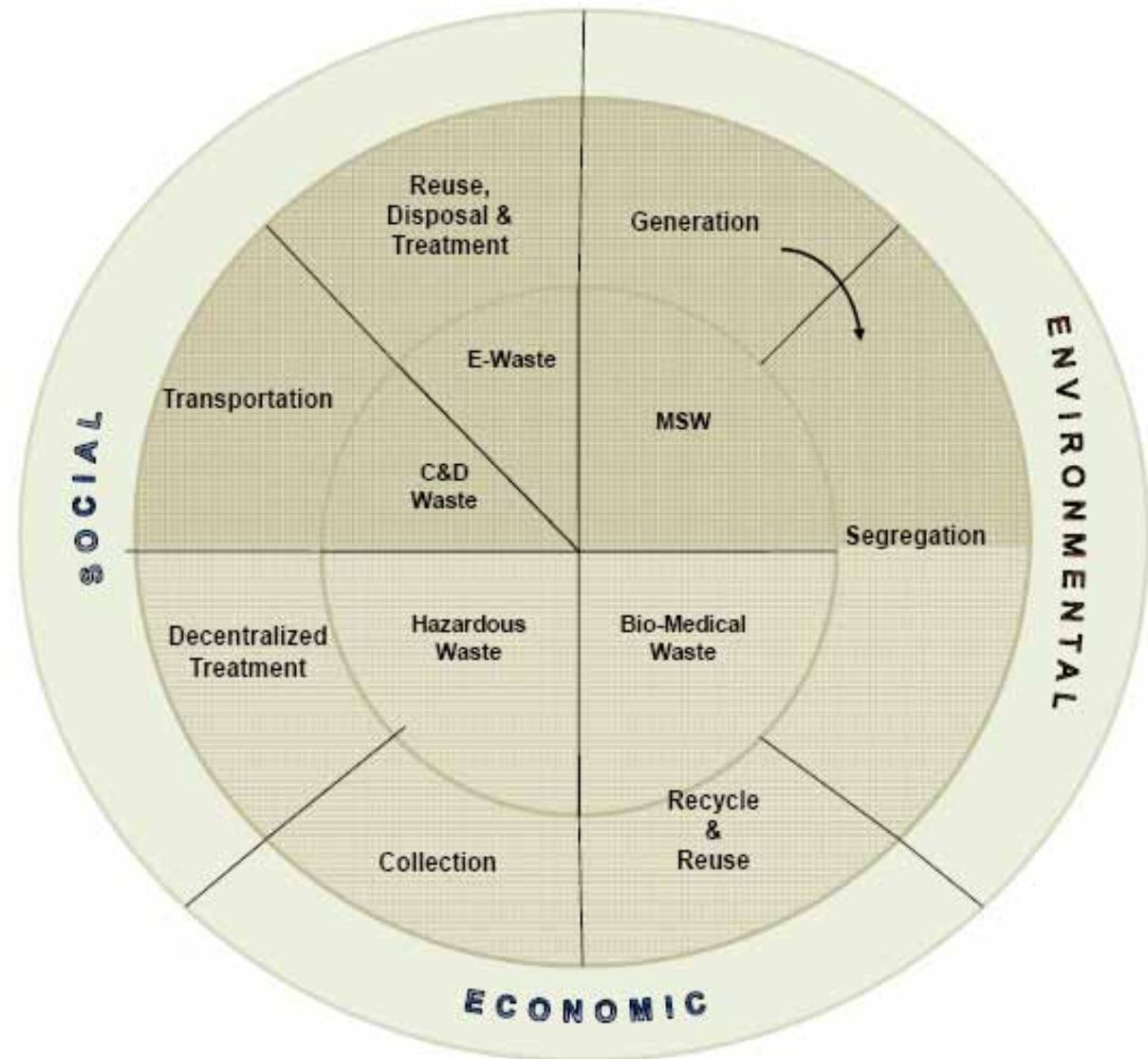
Economic Development and Waste Generation – Strong Coupling



Integrated Solid Waste Management

UNEP (2009)

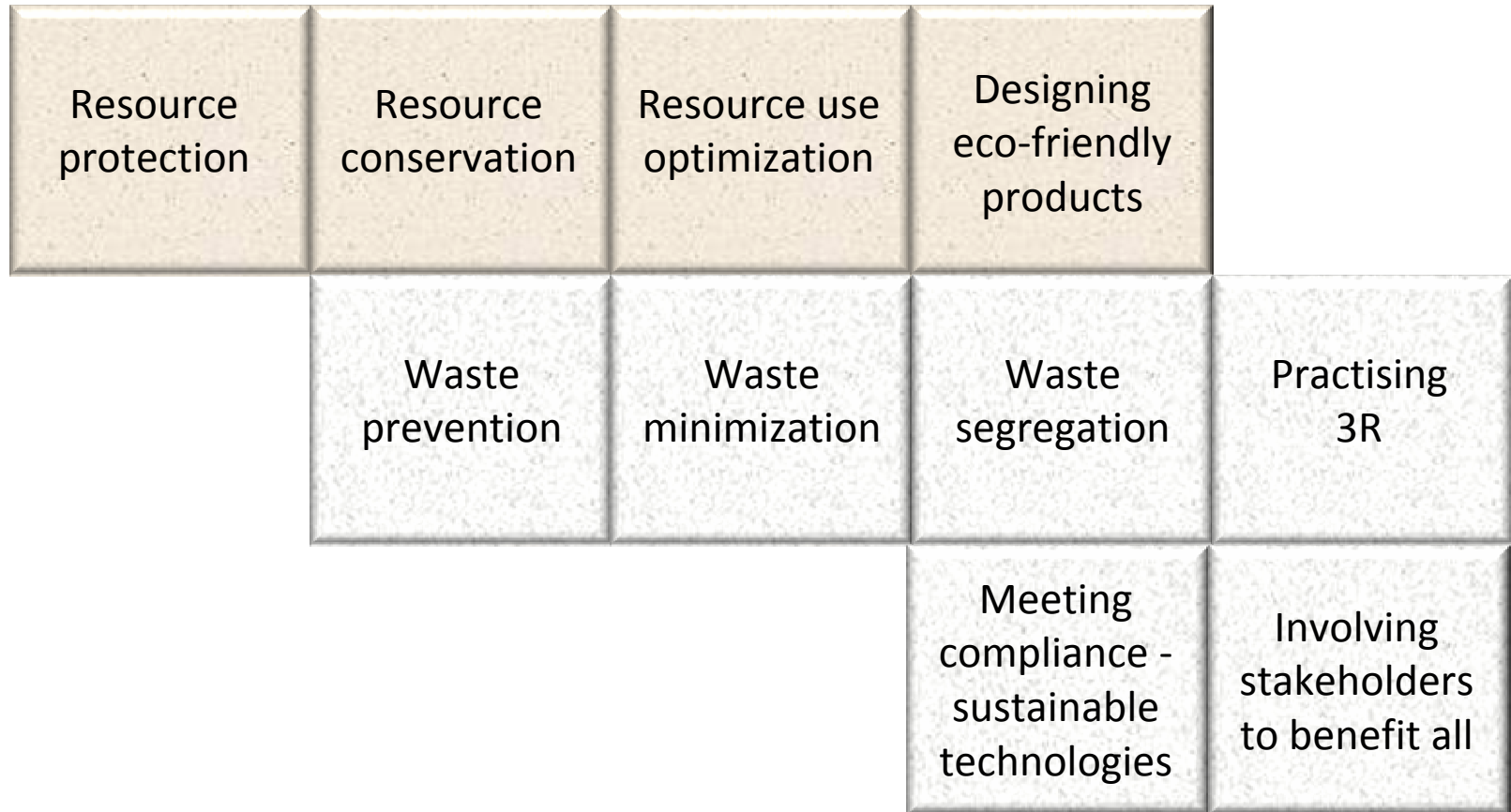
“...the strategic initiative for sustainable management of solid waste through use of a comprehensive integrated format generated through sustained preventive & consultative approach to the complementary use of a variety of practices to handle solid waste in a safe and effective manner.”



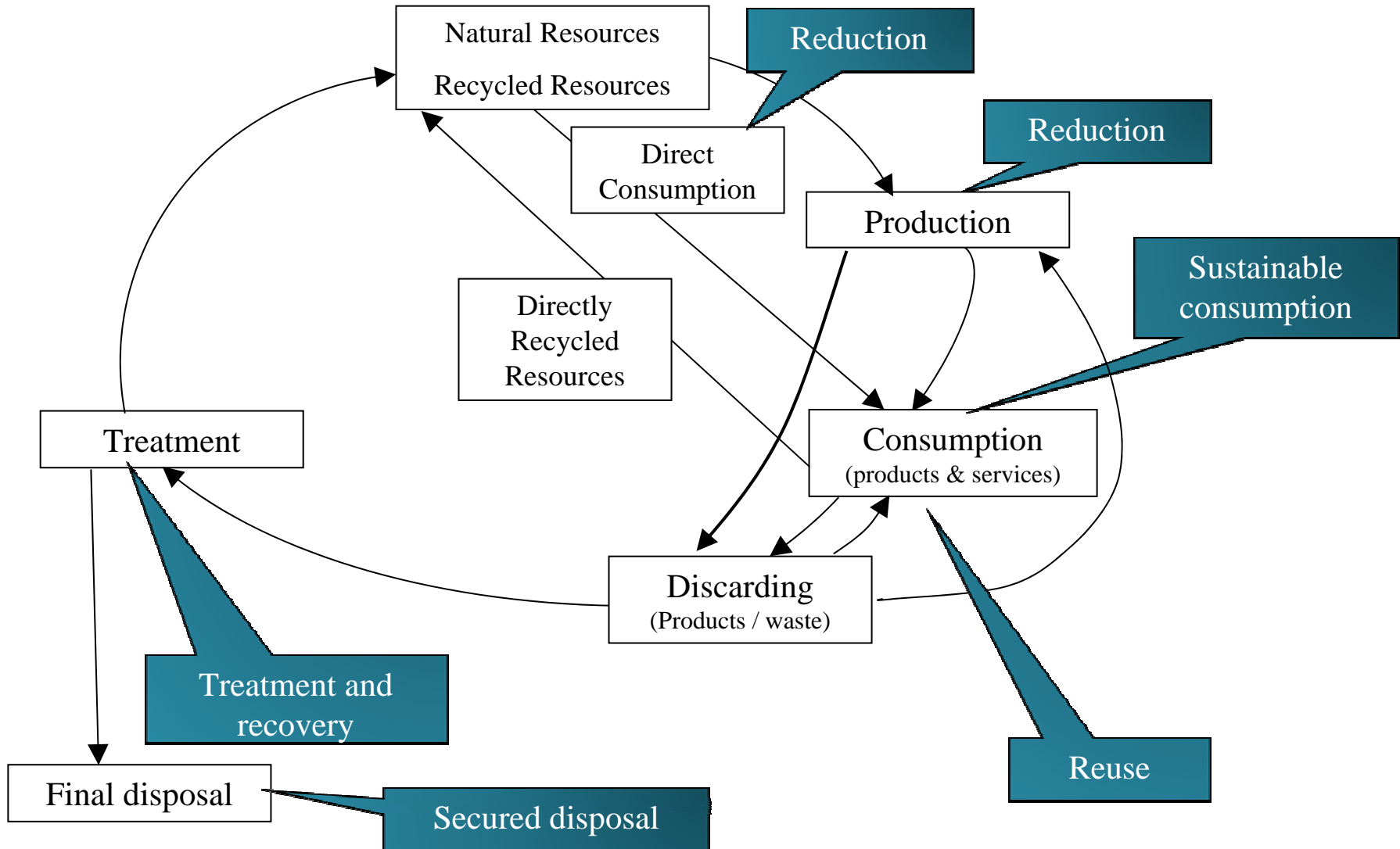
Why ISWM?

- Issues related to resource and waste management are intrinsically linked
- ISWM emphasizes the resource-waste link
- Involves various stakeholders
- Proposes a strategic approach
- Lifecycle perspective
- Not limited only to project intervention but to program, plan and policies

Key Principles of ISWM



ISWM as a Decoupling Tool Across Life Cycle



Enabling Policies – Some examples

- Resource Conservation and Recovery Act and Superfund in United States of America (1976)
- European Union
 - Packaging Directive (1994)
 - Waste Strategy Communication (1996)
 - Integrated Product Policy (1997)
 - End of Life Vehicle Directive (2000)
 - Directive on WEEE (2002)
 - Directive on batteries and accumulators (2006)
 - Thematic Strategy on Waste Prevention and Recycling (2005)
- Recycling Laws in Japan
 - The Law for Promotion of Effective Utilization of Resources in Japan (2001)
 - The recycling of packaging materials (2000)
 - The recycling of home appliances (1998)
 - Legislation on the re-utilization of construction materials (2000)
 - The Law for the Promotion of the Recycling of Food Stuffs (2000)
 - On the Resources and re-utilization of End of Life Automobiles (2002)
 - The Law for the Promotion of National Procurement of Environmentally Friendly Products (2001)
- Law on Prevention and Control of Solid Waste in People's Republic of China (1996)
- Municipal Waste Management and Handling Rules in India (2000)

Economic Instruments – Some Examples

Type of EI	Impacts
<p>Landfill tax, waste disposal tax & user fees</p> <ul style="list-style-type: none"> • Highly adopted in developed countries • Fixed user fee (Latin America) or Differentiated charges (Ecuador, Colombia, Venezuela and Chile) 	<ul style="list-style-type: none"> • Recycling increased from 33% to 45% in Norway • Landfilling of household waste dropped from 43% to 24% in Norway • 55 % of service cost saving in Greater Santiago
<p>Recycling credit scheme</p> <ul style="list-style-type: none"> • 50 to 100 US\$ per ton in UK 	<ul style="list-style-type: none"> • Promotes recycling and composting of household waste
<p>Deposit Refund Systems</p> <ul style="list-style-type: none"> • Voluntary system in Barbados, Brazil, Bolivia, Chile, Colombia, Ecuador, Jamaica, Mexico and Venezuela for products like paper, Cardboard, glass bottles, aluminium cans, tyres. • Mandatory for batteries in Mexico 	<ul style="list-style-type: none"> • Brazil recorded a return rate of 30% for soft drink bottles • In 2003, 99% of refillable and 80% of non-refillable beverage containers were returned in Denmark • In 2007, the average packaging return rate was 87% in Denmark
<p>Pay As You Throw</p> <ul style="list-style-type: none"> • Seattle, Washington and Portland, Oregon in United States - leaders in developing volume-based pricing systems for disposal of garden waste. 	<ul style="list-style-type: none"> • Reduction in waste generation - 25 % in High Bridge and New Jersey, 5 % in Seattle and 5 % in Washington • Reduction in landfilling by 28% (U.S. Ave.) • Encourages recycling

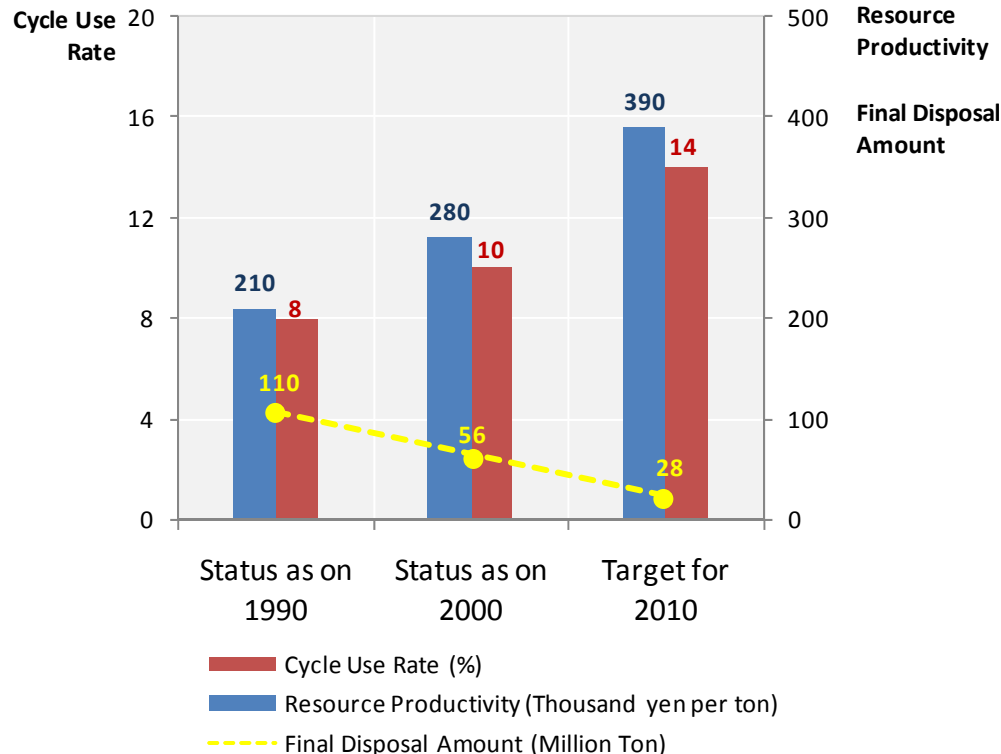
Economies Recognizing Decoupling Path – Japan

Sound Material Cycle Society in Japan

- One of the four goals of the country's Basic Environmental Plan
- Launched in 2003



Material Flow indicators of Japan's Sound Material Cycle Society



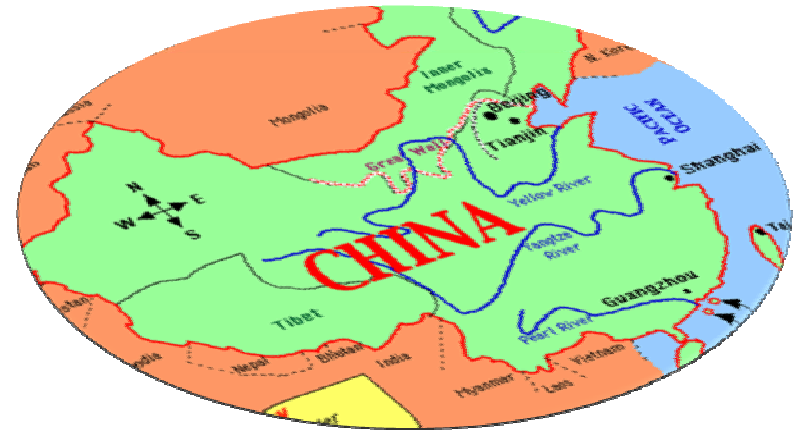
Indicator	Calculation
Resource Productivity (in yen per ton)	$GDP \div \text{amount of natural resources, etc., invested}$
Cycle Use Rate	$\text{Cyclical use amount} \div [\text{cyclical use amount} + \text{amount of natural resource input}]$
Final Disposal Amount (in tons)	Amount of waste land filled

Economies Recognizing Decoupling Path – China

Circular Economy approach in People's Republic of China (2008)

Two targets for IWM set by the 11th Five Year Plan

- Rate of comprehensive use of solid industrial waste up from 55.8 % in 2005 to 60 % in 2010.
- Total discharge of major pollutants down 10 % in 5 years



Indicators for Circular Economy

INPUT INDICATORS

1. Direct Material Input (DMI)
2. Total Material Requirement (TMR)

OUTPUT INDICATORS

1. Domestic Processed Output (DPO)

CONSUMPTION INDICATORS

1. Domestic Material Consumption (DMC)
2. Total Material Consumption (TMC)

BALANCE INDICATORS

1. Physical Trade Balance (PTB)
2. Net Addition to Stock (NAS)

Economies Recognizing Decoupling Path – Republic of Korea

Green Growth in Republic of Korea (2008)



- Vision for national development in the next 60 years
- Dedicating 80 % of the total (\$38 billion) fiscal stimulus package (3% of GDP) to green measures
- Actively formulating the National Strategy on Green Growth and a Five-year action plan
- Increasing the percentage of waste regeneration from 1.8% in 2007 to 31% in 2010

Community Level Decoupling Initiatives

Micro-enterprises in Mali

- Unemployed young graduates
- Neighbourhood committee of elderly people
- Women

D2D collection in Nagpur

- 100% D2D collection
- Livelihood for 1600 people
- Savings US\$ 1 million

SWM in Dhaka

- 200 neighbourhoods participated
- Decentralized composting
- 30% revenue from user charges

PPP & community cooperation

- 500 waste cooperatives
- 60,000 members

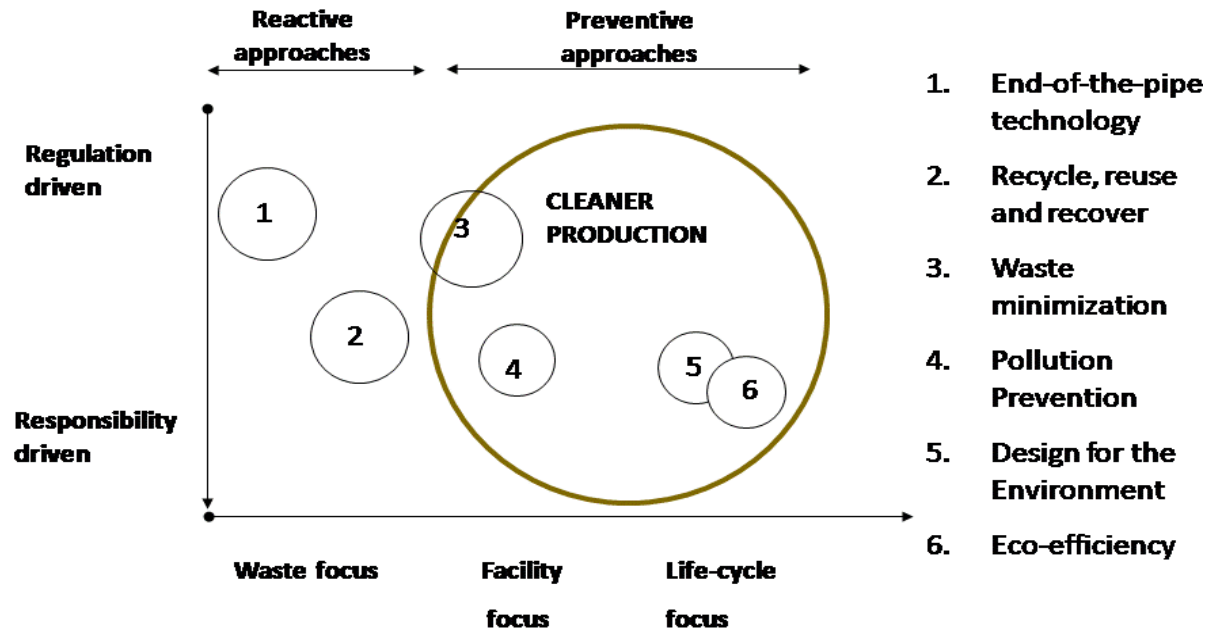
Garbage exchange in Curitiba

- 90% of residents recycle 66% of waste daily
- Recycling coordinated by ex-alcoholists & poor

- 400 micro enterprises
- >30,000 members

Decoupling Tools for Industries

Cleaner Production



Benefits

- Reduced waste generation
- Reduced resource use and improved resource efficiency
- Better compliance and quality improvement
- Better production efficiency
- Cost reduction and higher profits
- New market opportunities
- Risk avoidance and reduced liability
- Better working environment and increased staff motivation

Decoupling in Industries

Eco Industrial Parks

- Dalian Industrial Zone, People's Republic of China

- Spreading to 220 sq. km
- Programmatic Cleaner Production
- post-EMS development

- Kitakyushu Ecotown, Japan

- Comprehensive Environmental Industrial Complex
- Hibiki Recycling Area
- Practical Research Area with an Eco-Town Center

- Naroda Industrial Estate, India

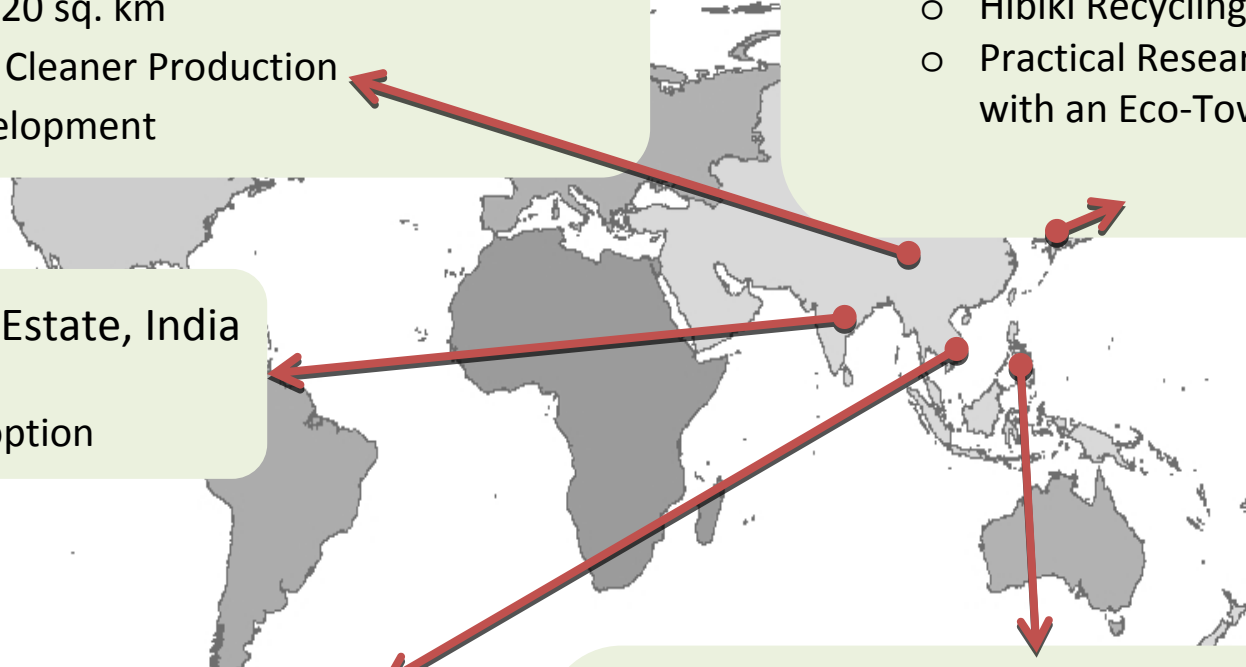
- Common ETP
- CP strategy adoption

- Map Ta Phut Industrial Park, Thailand

- Product exchange
- Integrated resource recovery system
- Community enhancement office

- Calabarzon & Bataan Industrial Estates, Philippines

- Intra- & inter-estate product exchange
- Integrated resource recovery system
- Programmatic EMS
- Green supply chain
- Common ETP



Decoupling in Industries

Extended Producer Responsibility

TAKE BACK PROGRAMS

- German Packaging Ordinance 1991 - Packaging waste recycled through Duales System Deutschland (DSD)
- British Columbia Recycling Regulation 2004 -
Left over paint returned at 100 depots operated by Product Care.
Eco-fees or eco-taxes collected



DEPOSIT REFUND SYSTEMS

- South Korea – Food containers, tires, batteries, lubricants, pesticide containers, and plastics
- Bottle bills in U.S

PACKAGING CRITERIA

- Finland – Reducing ratio of packaging waste to product by 6% from 1995 to 2001
- South Korea – Reducing empty space ratio
Limiting no. of layers in packaging



Decoupling in Industries

Design Innovations

Design for Disassembly

- Automobiles
- Household appliances
- Office equipments
- Airliner disassembly
- Cell phones that virtually disassemble themselves

Benefits



RX 600

Redesigning EPSON Printers

- 44% volume reduction to earlier models
- 34% packaging reduction



RX 690

Design for Environment

- Green buildings
- Lead-free solders
- Safer flame retardants



Old bottle:
23.5
grams
of PET plastic

New bottle:
18.6
grams
of PET plastic

International and Regional Cooperation for ISWM

- Agenda 21 of 1992
- Basel Convention on the Control of Transboundary Movements of Hazardous Waste, 1992
- International Declaration on Cleaner Production, 1999
- Marrakesh Process of 2002
- 3R Knowledge Hub in Asia of 2006
- UNEP International Environment Technology Centre – ISWM Programs in Pune City (India), Maseru City (Lesotho), Wuxi New District(China) and Matale (Sri Lanka)
- Regional 3R Forum in Asia in 2009
- UNEP's Global Programme for SIDS

Tracking Decoupling – Some Indicators

Decoupling Initiatives	Indicators
Resource Conservation	<ul style="list-style-type: none"> • Resource consumption rate (material use information in kg per capita, for fundamental materials) • Percentage of virgin material displacement in production
Waste Reduction	<ul style="list-style-type: none"> • Waste generation rates in households (kg per capita) • Waste generation rates in industries (kg per ton production, by economic sector)
Waste Collection and Segregation	<ul style="list-style-type: none"> • Percentage of waste being collected and segregated
Waste Reuse	<ul style="list-style-type: none"> • Percentage of materials in waste streams being
Waste Recycling	<ul style="list-style-type: none"> • Percentage of materials in waste streams being recycled
Energy Recovery	<ul style="list-style-type: none"> • Percentage of waste used for energy recovery
Landfill Avoidance	<ul style="list-style-type: none"> • Percentage of materials in waste streams diverted from landfill • Reduction in GHG emissions due to avoided landfilling

Recommendations

Asia

- Ensure compliance through strict enforcement of existing waste policies and regulations
- Inventorize waste generation including waste quantity and composition and establish linkages with economic growth
- Create Enabling Environment (Policies and Adopt Technologies, Institutional and Financing Frameworks) to
 - Promote waste reduction and segregation
 - Improve efficiency of collection and transport of waste
 - Set up community recycling facilities
 - Ensure participation of informal sector
 - Shift from open dumping to secured sanitary land filling

Recommendations

Asia (Contd...)

- Create Enabling Environment (Policies and Adopt Technologies, Institutional and Financing Frameworks) to
 - Promote recovery of energy from waste
 - Explore Public Private Partnerships (PPP)
 - Explore CDM Opportunities
 - Address new challenges related to changing and complex waste streams that are emerging such as C&D and e waste
 - Encourage industrial innovations across supply-chains

 - Monitor Decoupling by
 - Developing indicators and targets for decoupling economic growth and resource use
 - Developing indicators and targets for decoupling resource use and waste generation
-

Questions?