Debunking Myths about Packaging & the Environment

Kenneth S. Marsh, Ph.D., CPP

Kenneth S. Marsh & Associates, Ltd.

&

Woodstock Institute for Science in Service to Humanity

PaperCon '09

St. Louis, Missouri
May 31 - June 3, 2009

TAPPI people resources solutions®

PIMA Building Leadership Excellence

Gateway to Success:
People, Planet and Innovation

Packaging has a Myth-Demeanor

Kenneth S. Marsh, Ph.D., CPP

Kenneth S. Marsh & Associates, Ltd.

&

Woodstock Institute for Science in Service to Humanity

PaperCon '09

St. Louis, Missouri
May 31 - June 3, 2009

TAPPI people resources solutions®

PIMA Building Leadership Excellence

Gateway to Success:
People, Planet and Innovation

Abstract

- Packaging is often perceived as the filler of landfills, cause for litter, and an item that retailers love to force onto consumers in volume far beyond requirements. None of these statements is true, but a typical consumer does not notice packaging materials until they are discarded. ”Debunking Myths about Packaging and the Environment” will demonstrate how packaging is a key (I say the key) to economic development, necessity for health, and even reduces municipal solid waste. You will leave this session with a clearer perspective on the impact of packaging in the US and around the world.

Myth 1: Packaging is the major component of landfills

- Packaging materials make up approximately 31% of landfill. 2005 EPA data has containers and packaging at 76.7 million tons, 31.2% by weight and 27.7% by volume.

Myth 2: Packaging is the major cause for litter

- Cans and bottles on the side of the road are packaging, so packaging gets blamed.

- Responses to this litter range from attacks against packaging ("No packaging is best"), to bottle bills (tax on packaging) to restrictions on packaging materials (*e.g.* ban on plastic bags).

- People cause litter - solution should be to enforce litter laws.

Myth 3: Manufacturers & Retailers want to force more packaging on us

- Manufacturers seek the least expensive packaging that will suffice, complicated by legal requirements and corporate influences.
- Purchasing usually wants cheapest packaging
- Marketing typically wants glitziest packaging
- Production prefers loose packaging
- Distribution benefits from tight packaging
- Cost reductions strive for least that works

Myth 4: Goods are intentionally over-packaged

- Not true by design
- Arguably true because testing stops if requirements (shelf life, protection) are met without knowledge if it is really excessive
- Cost reduction programs then commence to save money/packaging
- Cost reduction programs cease when least cost package has been demonstrated

Myth 5: Polystryene is not recyclable

- Polystyrene, and any other thermoplastic, is technically recyclable, and recycled at the plant level (which makes plastics cost-effective)
- Recycling may or may not be cost-effective
- Recycled plastics must be cleaned, sorted
- Inexpensive plastics are beneficial because of cost, but that low value often makes virgin resin attractive

Myth 6: McDonald's switched to a more environmentally-friendly package

- Expanded polystyrene was perceived to be non-recyclable, but in fact was recyclable
- PE coated paper is perceived to be recyclable, but in fact is not (reasonably cost-effective) recycled
- McDonald's saved cost with the switch and was perceived as being environmentally responsive

  Issue is misconceptions about packaging & the environment

Myth 7: Plastic bags are a waste

- They serve a purpose
- They can serve additional purposes
- They could be recycled
- They possess same energy value as oil

but

People litter them - Paper is less of a problem &

Reusable cloth bags can save resources and can be used for an advertising message

Reusable cloth bags are therefore encouraged

Myth 8: Laminates are bad for the environment

- Laminates/coextrusions allow for tailored materials that are more efficient for packaging
- Often Cheaper than homopolymer alternative
- Less material than homopolymer alternative
- More effective than homopolymer alternative
- May be safer than homopolymer alternative (*e.g.* buried reverse printing)
- Can possibly be separated for recycling

Paper vs. Plastic

- Complex issue technically (materials, energy, cost, volume) & politically, but perception is reality
- Litter is a problem - on land and sea - so plastic bags are controversial, difficult (LDPE vs. HDPE) to recycle, and being taxed or banned in many countries - and these laws are increasing.
- Alternatives are paper and reusables
- Reusable -> cloth or paper (*e.g.* shopping bags)

Myth 10: Packaging is bad for the environment

- Waste is bad for the environment
- Packaging reduces waste of food, products
- Packaging allows product movement
- Food, drug delivery not possible without packaging
- Early 1900s - little packaging, major cause of death was infectious diseases - less packaging, less health-> reduce population, so packaging could be bad for environment (tongue-in-cheek)

Myth 11: “No packaging is best”

- Actually proposed by Council of North Eastern Governors (CONEG)- but later removed
- No packaging promotes food spoilage
- No packaging promotes disease transmission
- No packaging precludes sterile drugs
- No packaging promotes product damage
- No packaging promotes more waste

Packaging is essential

- Hard to carry milk without it
- How could you keep track of goods?
- Protection
  - Physical (crushing, bruising, shock, vibration)
  - Chemical (oxidation, moisture gain or loss, other)
  - Biological (insects, microbes, rats, birds, senescence)
- Quantity assurance (*e.g.* IV bag maintains dose)
- Brand identification (marketing is important)

Paper Carbon Footprint

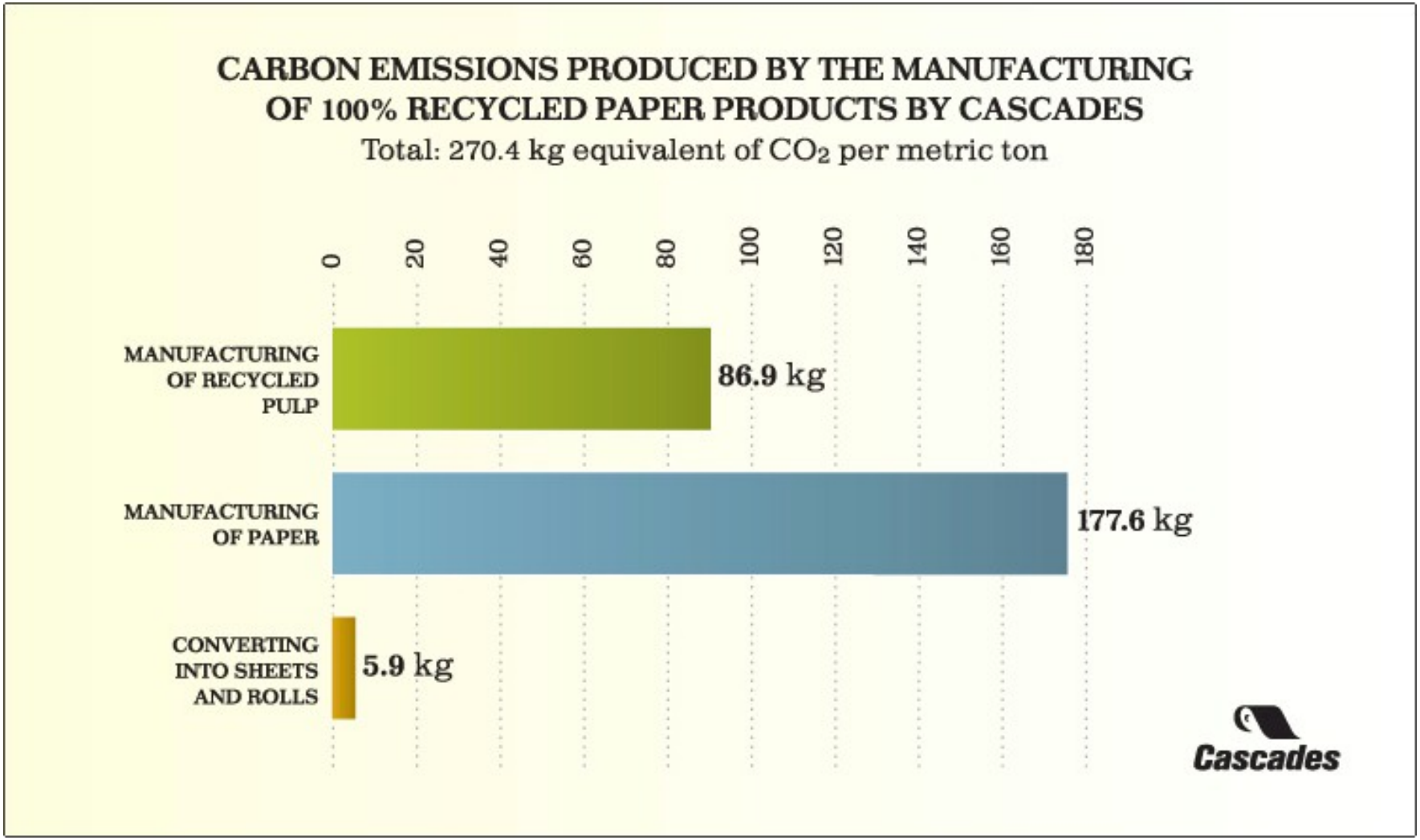
- Depends upon
  - Carbon sequestering in forests
  - Carbon in products
  - Greenhouse gas emissions from:
    - manufacture
    - Associated with producing fibre
    - Associated with purchased electricity, heat, steam, water
    - Associated with transport
    - Associated with product use and end-of-life
    - Avoided emissions

    Source: Confederation of European Paper Industries (CEPI)

Renewable and Recycled Carbon

- Forests are the origin of fibers used for paper and board making
- Forests bind CO_2 while growing and therefore mitigate climate change, if (and only if) forests are managed sustainably
- Managed forests are therefore carbon neutral, at least in terms of the amount of atmospheric CO_2.

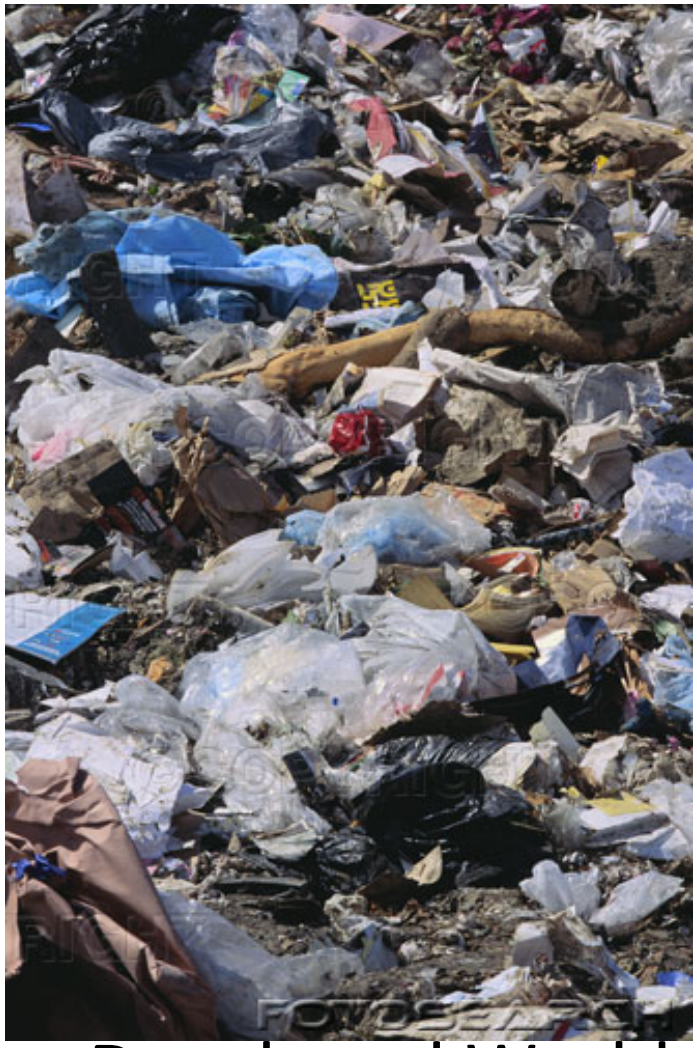
Recycling Paper Saves Energy



Composting of Waste Paper

- Study found 74.3% by weight/ 35.8% by volume of the total refuse generated by the household was removed from the waste stream by recycling + composting kitchen waste
- Non-recycled paper products made up 50% of what was left after recycling and composting
- Composting can be used for non-recyclable waste paper products - near complete decomposition within 17.5 weeks
- Mechanical shredder - home or neighborhood - helps

Thoughts About Waste



- Developed World

- Developing World

Dr. William Rathje, Garbologist

- **US City Landfill**
- More packaging waste
- Less food waste
- Less per capita waste

- **Mexico City Landfill**
- Less packaging waste
- More food waste
- More per capita waste

More packaging waste per capita in the US is not a surprise, nor is more food waste in Mexico. What is a surprise is household waste per capita in Mexico was about 40% higher. Next slide offers an explanation.

Corny example

- **1 can corn Niblets**
- Food -> corn kernals
- Waste:
  - can

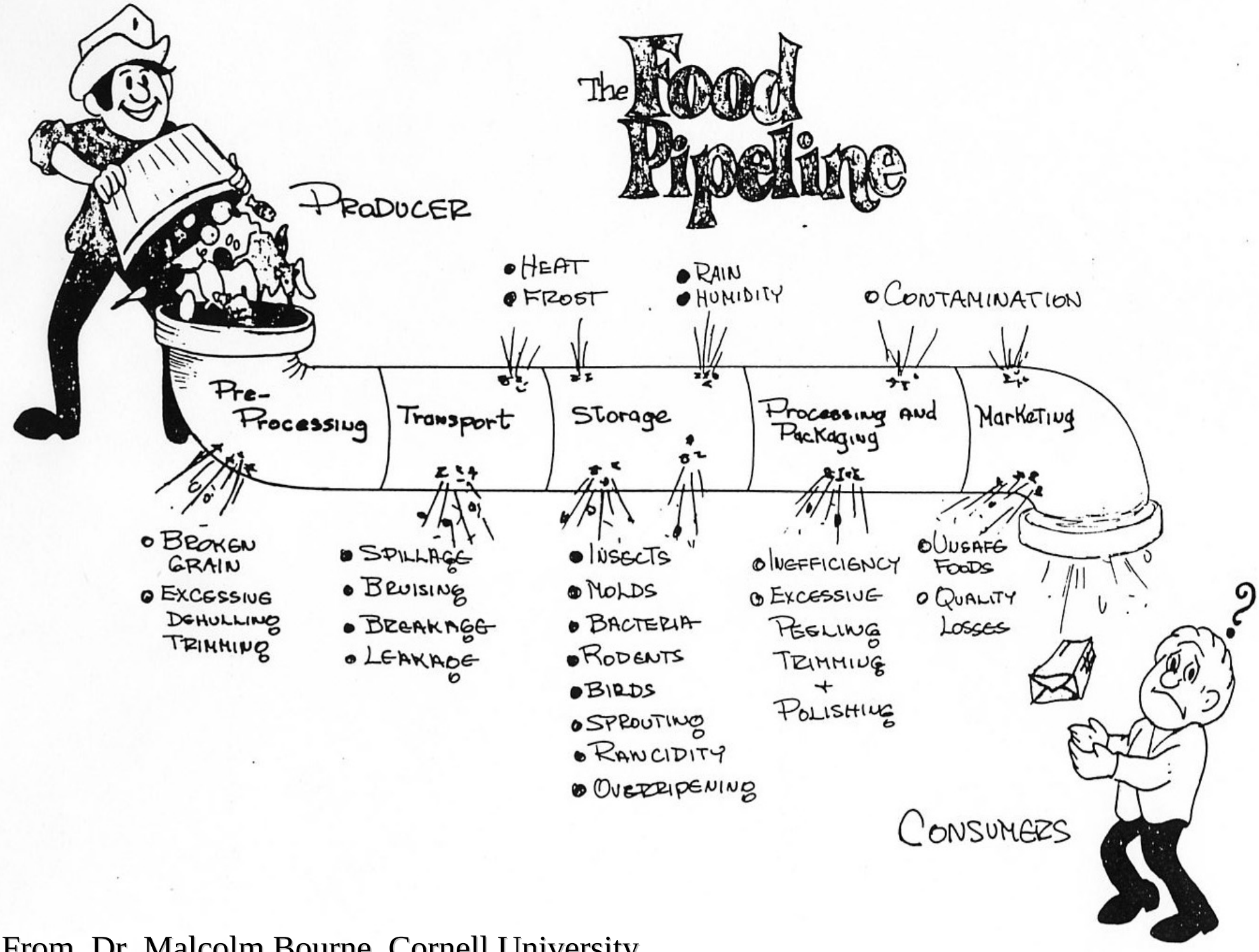
- **Corn on the cob**
- Food -> corn kernals
- Waste:
  - Ear or Cob
  - Husk
  - silk
  - Tassel
  - stalk

QuickTime™ and a
decompressor
are needed to see this picture.

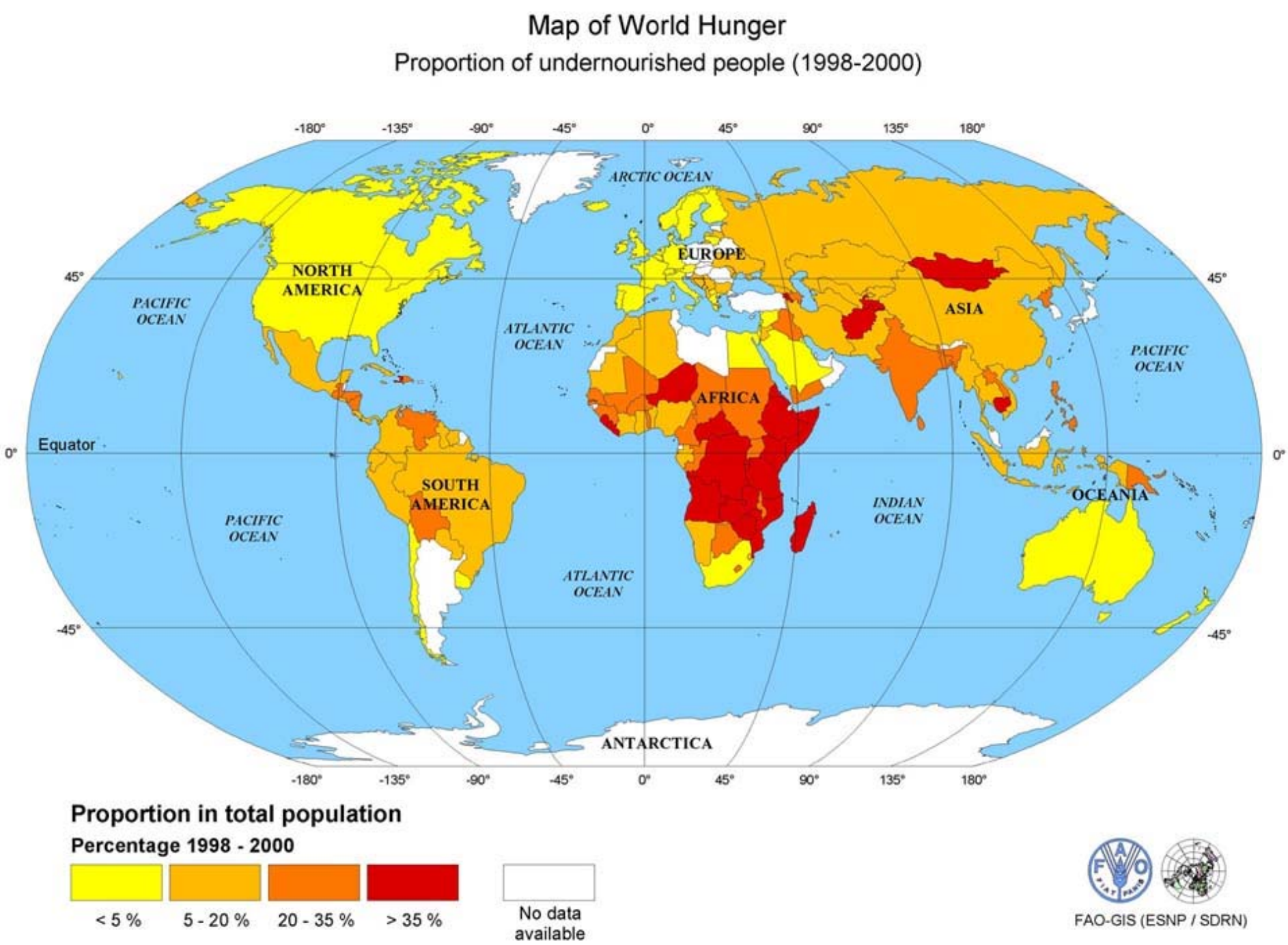
Slightly Oversimplified World

World	First	Second	Third
Economy	Developed	Developing	Undeveloped
Packaging	Over	Under	Almost none
Food Available	Plentiful	Marginal to Adequate	Inadequate
Food Losses	Acceptable	Troublesome	Unacceptable

Inspired by William C. Pflaum



From Dr. Malcolm Bourne, Cornell University

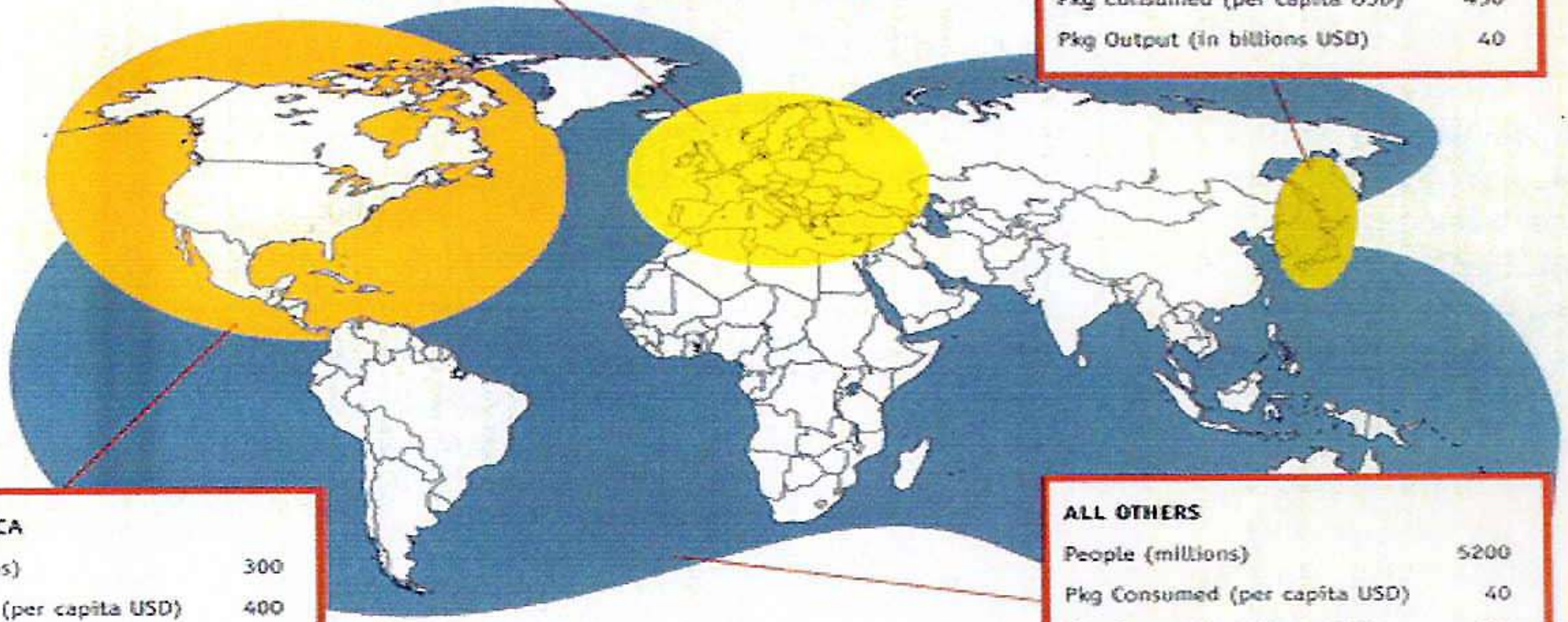


Per capita packaging costs could use the same chart

Source: Food & Agricultural Organization of the United Nations

CHART II. Populations, estimated per capita packaging consumption and total packaging output.

Source: WPO.



EUROPE	
People (millions)	350
Pkg Consumed (per capita USD)	385
Pkg Output (in billions USD)	135

JAPAN	
People (millions)	90
Pkg Consumed (per capita USD)	450
Pkg Output (in billions USD)	40

NORTH AMERICA	
People (millions)	300
Pkg Consumed (per capita USD)	400
Pkg Output (in billions USD)	120

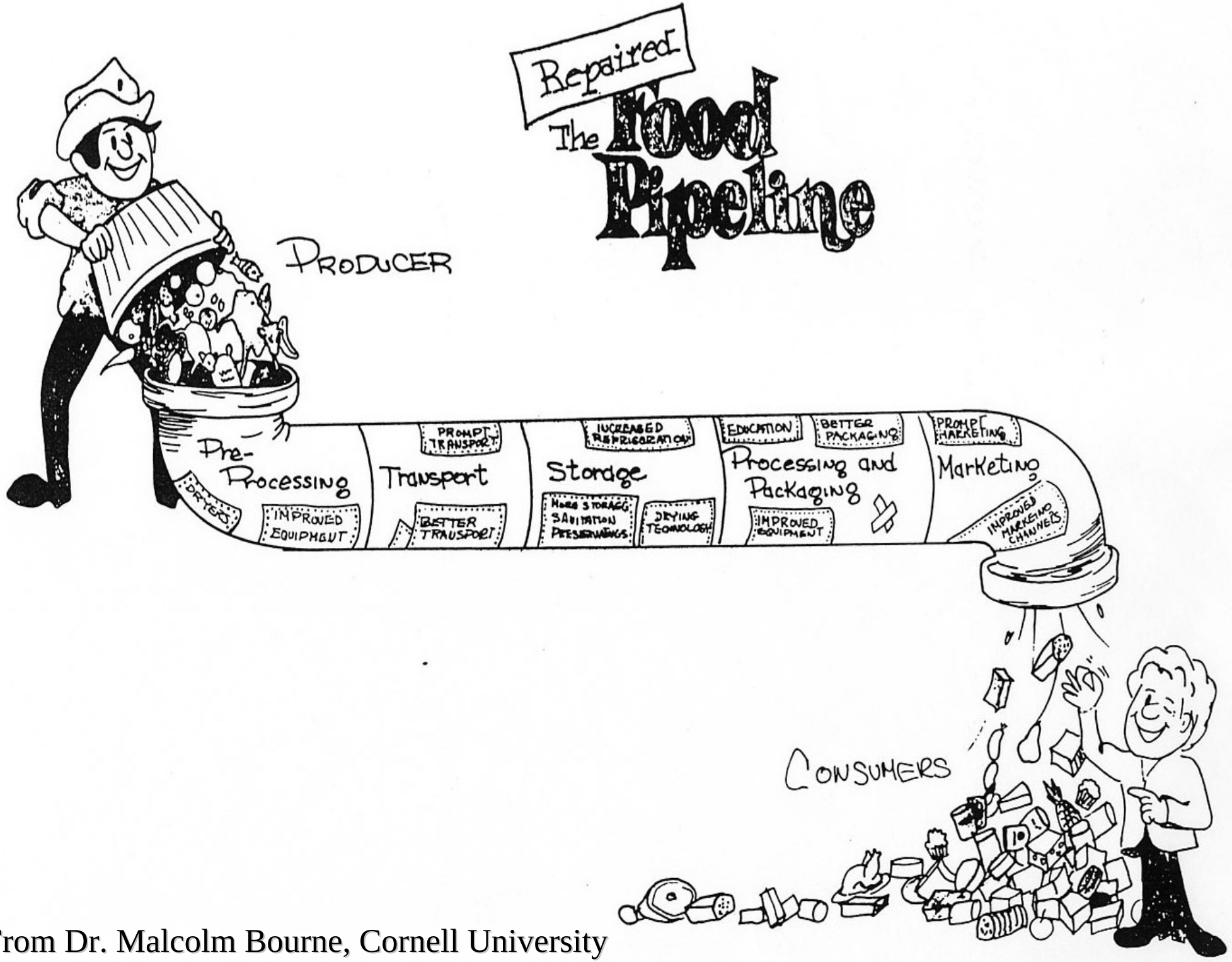
ALL OTHERS	
People (millions)	5200
Pkg Consumed (per capita USD)	40
Pkg Output (in billions USD)	205

TOTALS	
People (millions)	5900
Pkg Consumed (per capita USD)	85
Pkg Output (in billions USD)	500

It is not coincidental that countries with higher Packaging consumption have less hunger.

Food Packaging

- I concentrate on food packaging
- Food uses approximately 50% of packaging materials
- Only “product” we typically use 3 times per day, every day
- Maltheus prediction - mass famine - not realized because of advances in food production & packaging



From Dr. Malcolm Bourne, Cornell University

Other Packaging

- Packaging is important for delivery of pharmaceuticals, medical supplies
- Packaging is essential for most goods
- Economic development is impossible (or very difficult) without packaging
- Packaging allows cities to exist (brings food and goods) which are centers for culture and health (hospitals and facilities)

Scientific Status Summary published by IFT

Food Packaging - Roles, Materials, and Environmental Issues

Kenneth Marsh, Ph.D. and Betty Bugusu, Ph.D

Food Science, April 2007

Available through IFT website

(www.IFT.org) or through

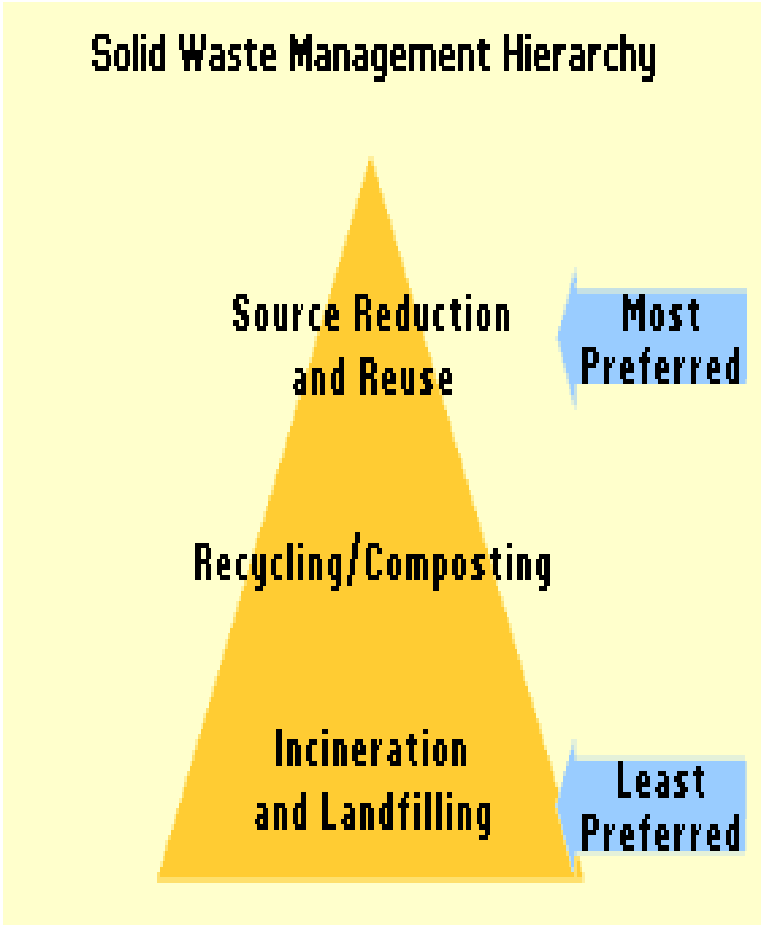
www.drkenmarsh.com -> publications-> Environment & Sustainability

Environmental Considerations

- Previous approach “cradle to grave”
  - Recovery of resources & energy from discarded materials
  - Safe handling, management and disposal (RCRA)
- Current focus is on sustainability – “cradle to cradle”
  - Cyclic materials flow – eliminate waste
  - Make goods more durable, recyclable, and less hazardous
- Sustainability suggests that use of resources now has no negative impact on future generations
  - full recovery of materials and/or energy

EPA Guidelines - Hierarchy

- Source Reduction/Waste Prevention
- Recycling/Composting
- Combustion/Incineration – controlled burning
- Landfilling



Other Disposal Approaches

- Biodegradability – natural, ongoing biological process (microbial) in both man-made and natural environments
- Anaerobic degradation
- Improper disposal
  - Litter
  - Dumping

Source Reduction

- Prevent waste generation - Reduction of amount and toxicity; re-use
- Examples:
  - Light weighting
  - purchase of durable goods, larger sizes
  - refillable containers
  - selecting toxic-free products
- Advantages:
  - Lower waste removal cost
  - conserve resources
  - protect environment (reduce toxicity/pollution)

Recycling

- Divert items from waste stream
  - Glass, metal, plastic, paper
- Process of recycling
  - Collection, sorting and processing
  - Manufacturing
  - Sale
- Reuse is container; recycling is material
- Advantages:
  - Reduce reliance on landfills
  - Multiple use of materials, saved resources

EPA's Models for Recycling

- Extended producer responsibility (product stewardship)
  - Shared responsibility to reduce product impact on environment (manufacturer, retailer, user, disposer)
- WasteWise
- Bulk purchasing
  - Bulk = less packaging

Composting

- Composting: controlled biological decomposition of organic matter
  - Food scraps, yard trimmings (23% MSW in USA)
- Advantages:
  - Suppress plant pests and diseases
  - Reduce need for chemical fertilizers

Combustion

- Reduces waste volume - 90%; weight – 75%
- Energy generation
  - 2500 megawatts (0.3% national power generation in US)
- Destroy harmful chemicals and bacteria (ash tested regularly)
- Reduce creation of new landfills
- Comply with air pollution regulations - 40 CFR Part 60 (Subchapter C - Air Programs)

Combustion – Municipal Waste Combustors

- Mass Burn – MSW introduced to chamber “as is”
- Refuse Derived Fuel (RDF) facilities
  - Recyclables recovered (glass, metal, cans)
  - Pre-processed uniform fuel - shredding
  - Types: dedicated, co-fired, fluid-bed
- Modular Combustors
  - Similar to mass burn, fabricated, small size
  - Types: “starved/controlled air” and “excess air”
- In 2004: 94 MWC , 89 waste to energy

Landfills

- Compacted – limited biodegradation
- Modern landfills well engineered to comply with Code of Federal Regulations, Parts 239-259 (Subchapter I - Solid Wastes).
- Types:
  - Municipal Solid Waste – household waste 40 CFR Part 258 (Subtitle D of RCRA)
  - Others: Bioreactors, Construction and Demolition debris, industrial waste

My Future Predictions

- Sustainability will remain a guiding concept
- Composting will grow as will biodegradability
- Bio sources will move away from food sources
- Cloth & paper grocery/product bags will grow
- Reusable crates/pallets/etc. will grow
- EU Take Back programs will expand iff economical
- RFID will grow for inventory control and be used for shelf life monitoring in real time

Conclusions

- Packaging is required to protect virtually all goods from physical, chemical and biological damage
- Packaging is required to ship goods - domestically and internationally
- Packaging is required to keep track of goods
- We will (must) package more sustainably
- Without packaging our economy could not exist & developing economies cannot expand

Contact Information
Kenneth S. Marsh, Ph.D., CPP
Consultants on Packaging, Protection, Shelf Life & International trade

Ken@drkenmarsh.com

www.drkenmarsh.com

www.wissh.org

Phone: 1-864-888-0011

130 Cane Creek Harbor Road
Seneca, SC 29672 USA

Any questions?