Are we slowly **Harming** ourselves and the future generations in the name of progress and convenience?

What is **sustainability**?

What does sustainability mean to us?

- What do we try to sustain?
  - Environment?
  - Workers?
  - Consumers?
    - Physical and emotional need
    - The need to express oneself

- What consumer, marketer, designers and product developers and the manufacturer must know and do to **move toward sustainability**?
The Environment

The Human Influence

The environment is not a component of our lives. We are a component of the environment.

There is a direct correlation between the health of the environment and our health.

Dave Edwards
Structure of Chlorophyll and Hemoglobin
Asthma

- Exact cause is unknown
- More than 17 million people in U.S. are affected (1/3 are children)
- In 2002 there were 478,000 hospitalizations due to asthma attacks
- 5,000 deaths each year
- When air quality is poor, people suffer

Source: emedicine.com
EPA Added Three Hazardous Waste Sites to Superfund’s National Priorities List (11/4/09)

- 1,270 sites currently on the National Priority List.
“We have not inherited this land. We have borrowed it from our children. We can’t take our mess to our graves, so we have to be good stewards of our resources.”

Majid Sarmadi
UN Millennium Development Goals

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
8. Develop a global partnership for development
Why Should We Be Concerned?

11.8 million tons of textile material are land-filled annually (5 fold since 1950s)

Textiles: Ecological Foot-print and Impact

- Hazardous materials
- Water use/Waste
- Wastewater effluent
- Air emissions
- Energy use
- Solid waste

Contamination of Planet!

Helen Louise Allen Textile Collection-UW-Madison
Sustainability

“The ability to use the universe’s resources (including human resource) without significantly depleting or hampering its future use”

Majid Sarmadi

“Development that meets the needs of the present without compromising the ability of future generations to meet their own needs”

Source: Word Commission on development and Environment, 1987 (Brundtland Report)
http://en.wikipedia.org/wiki/Sustainable_Development
http://en.wikipedia.org/wiki/Sustainable_Development
The 10 Million Dollar Question!

Natural Raw Materials
VS
Synthetics
Natural fibers

- Farm land to cultivate food or fibers
- Pesticide and herbicide
- Long season to grow
- Cleaning/bleaching
  - 1.2 billion cubic meters of water per year; 2.4 billion tones in detergents and chemicals per year; and 4.5 billion kilowatts/hr per year of electricity.
- Farm equipment
  - Transportation, maintenance, energy use
- Lack of certain properties
Natural fibers

- Wool and methane gas (a greenhouse gas that is more than 20 times as potent as CO₂)
- Sheep and other fiber producing animals need care and medication
- The runoff from farms to lakes and rivers

Advantages:
- Renewable and biodegradable
Natural Fibers and Water

- **2900** Gallons for one pair of blue jeans
- **2,800** Gallons for one cotton Bed-sheet
- **766** Gallons for one cotton T-shirt

- National Geographic April 2010
ATRAZINE - herbicide
1997 estimated annual agricultural use

Average annual use of active ingredient
(pounds per square mile of agricultural land in county)

<table>
<thead>
<tr>
<th>Crops</th>
<th>Total pounds applied</th>
<th>Percent national use</th>
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<tbody>
<tr>
<td>corn</td>
<td>62,381,038</td>
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<td>summer fallow</td>
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<td>sweet corn</td>
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<td>sod harvested</td>
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<tr>
<td>other hay</td>
<td>13,224</td>
<td>0.02</td>
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<tr>
<td>seed crops</td>
<td>5,833</td>
<td>0.01</td>
</tr>
</tbody>
</table>
Synthetic Fibers

- **Depleting oil reserves**
  - Not biodegradable

- **Advantages of synthetic fibers**
  - **Reduces:**
    - Drying time
    - Need for ironing
    - Cost
    - Shrinkage
    - No need for pesticide and herbicide
    - Transportation
    - Color fading
Natural Dyes

- Farm Land to cultivate
- Farm equipment
  - Transportation, maintenance, energy use, etc.
- Water
- Pesticide and herbicide
- Low yield
- Transportation
- Limited color range, colorfastness problem
Natural Dyes

- Mordant is used to bind the dye molecule to fibers
  - Iron
  - Tin,
  - Chrome
  - Copper
Yields of Natural Dyes

- Vary widely
- Indigo, the most widely used natural dye, might yield **26 lb/acre** annually
- All other natural dyes yield less
- China used **598,000 ton** of synthetic dye in 2004
  - Need **492,353,333** Acre Farm Land
  - Even 2/3 of the world’s Farm land is not enough to produce dye for the current volume of textiles

Ecotextile News (April 2009)
Extremely Low Fixation Rate

An example:

2 yards of upholstery fabric can be dyed by 0.7 oz of synthetic dye, while the same area needs between 160-320 ounces of freshly picked leaves to dye.

Ecotextiles 2009/09/08
The Big Ethical Question: Farm Land for Textiles or Food?

- By 2050 the Earth's population will explode by almost 50%, from 6.6 billion today to 9.3 billion (United Nations).
- More people require more food, space, water, energy, and other resources ...
- U.N. calls the global food crisis a "silent tsunami."
- Increase in the Food Prices has a devastating effect on the 2.7 billion people living below poverty levels (on $2 a day). (United Nations).
WOOD,

Trees are the lung of the planet

- Are we designing with or purchasing wood from well managed forest?
- Do we use certified wood?
- How fiberboard and plywood are made?
- Are they made with ureaformaldehyde binding agents?
- Sustainable harvesting of wood to prevent:
  - Soil erosion, deterioration of watersheds and loss of biodiversity
EPA has released action plans to address the potential health risks of:

- methylene diphenyl diisocyanate (MDI), toluene diisocyanate (TDI), and related compounds

They are used in certain applications such as foams, spray foam insulation, sealing concrete or wood floor finishing.
Metal Coating/Plating for Furniture, etc.

- Cr (VI) over copper/nickel is most used

**Advantages:**
- Produces corrosion resistance
- Bright and shiny coat
- Eye appeal

**Disadvantages:**
- Release of Heavy Metals from electroplating
  - Toxic and carcinogen
Safer Metal Coating

- Trivalent Chromium (Cr III)
- Cobalt alloy
- Nickel alloy
Adhesives, Paints and Finishes

- Select VOC free or very low VOC glues, adhesives, paints and finishes

- VOC can be emitted during application and the life of the products creating indoor air pollution

- Powder coating, and water based finishes are more Environmental Friendly
Remove paint, adhesives and finishes with a more environmentally friendly **Benzyl Alcohol** (BnOH)
Innovation & Design: Sustainable Maintenance - Coatings

- **Anti-Graffiti Sealer**
  - Paint washes off
  - Helps building weathering

- **Green Horizons TiO₂**
  - Spray on windows
  - Titanium Dioxide creates hydroxyl radicals (OH-) by sunlight
  - No need to clean windows!

**Bottom Line:**
Cost Savings / Productivity
Sustainability is about Longevity and Fashion is about Change! Oxymoron??

- Fashion and sustainability are not necessarily oxymoron!

- Innovative technologies can produce sustainable:
  - Fibers, and fabrics
  - Dyes and finishes
  - New printing techniques,
  - Smart clothing, etc.
The Role of Technology

- **Technology is GOOD** when it increases the efficiency of production processes or decreases consumption activities or when it substitutes abundant for scarce resources.

- **It is BAD** when it increases total resource consumption.
Solar Cells - Expanding Photovoltaic Horizons
Atomic Battery generates 1,000,000 times more electricity (BBC 10/10/09)
Biomimicry

The nose cone of Japan's 500 Series Shinkansen bullet train is modeled after a kingfisher's beak.

As a result of consumer's demand, the sustainable design has become a core sustainability strategy for many companies, resulting in creation of efficient and elegant innovations.
Our Carbon Footprint
(Printed Press to Digital)

44,000 pounds of CO₂ Per Year/Person
Conclusion

- It is not possible to do business as usual
- Designers must design for the Global Health
- They need to study and rethink the theoretical, technical and practical aspects of the design
- Sustainability must be in the forefront of every single decision from conception to the final execution and production
- All aspects of the production, and operation, shipping and installation of the final product must be reevaluated
Conclusion Cont……

- Use nature as a design guide
- Understand the theoretical, technical and practical considerations of the entire production processes of the designed product
- Collaborate with technologists, scientists, growers, manufacturers and marketing departments to understand the performance and aesthetic qualities that are desired by consumers
- Understand how consumers will use the product
Conclusion Cont.

- Designers need to consider maintenance of the products during use and their disposal or recycling after use.
- Fair wages and safe working conditions.
- Reduce, Reuse, Recycle and Reinvent.
What is the *Biggest Threat* to The *Environment*?

OUR ATTITUDES!

Dave Edwards
Think Globally, Act Locally

I’m sure glad the hole isn’t in our end...
Thank you