Visualising the Environment & the Politics of Representation

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EcoLabs | www.eco-labs.org | @ecolabs
The Earth's ability to provide an accommodating environment is undermined by our activities. The Earth is our life-supporting system. Despite this basic fact, measured in biophysical terms, the planet is shrinking due to human interventions. Over the past forty years, the Living Planet Index (an indicator of the state of biodiversity) has fallen by 30% in northern countries and fallen by 60% in the tropics. During this time there has been a doubling of demands on natural systems. Assessing the capacity of the ecological system to continue to provide favorable conditions for civilization must be part of an audit of development.

Ecological systems have thresholds that can lead to sudden collapse. Nine planetary boundaries are central to avoid crossing critical tipping points. Three boundaries have already been transgressed: climate change, the rate of biodiversity loss, and the global nitrogen cycle. The Anthropocene is a new geological age characterized by dynamics where our industrial patterns are a force dramatically affecting natural, biophysical and geological processes. The Earth is no longer in balance, and an ecological audit indicates that the model of development is now so dysfunctional that human survival is at stake.
Cheap energy made industrial development possible. One barrel of crude oil, in energy terms, the equivalent to the heavy manual labour of 12 people working for one year, was the energy invested in fossil fuel supplies. As easily accessible fossil fuel supplies diminish, the era of cheap energy is ending. One way to understand the consequences of energy scarcity is by measuring EROI, i.e. ‘Energy Return On Investment’. In the 1900s EROI was between 100:1 – 50:1. Energy from renewables and unconventional fossil fuels have much lower EROIs; for example the Tars Sands have an EROI of as little as only 3:1. An integrated audit of development that includes energy issues indicates that the current model of development has created dangerous vulnerabilities in its reliance on fossil fuel.

One barrel of crude oil, containing 159 litres, is equivalent to the heavy manual labour of 12 people for one year.

4 million wind turbines could replace fossil fuels usage globally – 20 million cars are produced every year so it is technically possible.

Global fossil fuel subsidies amounted to $523 billion in 2011, up almost 30% on 2010 - this is six times more than subsidies to renewables, and up 30% from 2010.

The Balance Sheet for Gross Global Prosperity

<table>
<thead>
<tr>
<th>Energy Return on Energy Investment</th>
<th>World</th>
<th>USA</th>
<th>EU</th>
<th>Low Income countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>EROI in the 1900s (x 100)</td>
<td>100</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>EROI in the twenty-first century (x 10)</td>
<td>3.1</td>
<td>3.1</td>
<td>3.1</td>
<td>3.1</td>
</tr>
<tr>
<td>Energy consumption vs. EROI is needed for ‘sustainability’</td>
<td>World = 30%</td>
<td>USA = 40%</td>
<td>EU = 70%</td>
<td>Low income countries = 20%</td>
</tr>
<tr>
<td>Percentage of total energy consumption that is based on fossil fuels</td>
<td>World = 80%</td>
<td>USA = 83%</td>
<td>EU = 75%</td>
<td>Low income countries = 29%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Energy use</th>
<th>World</th>
<th>USA</th>
<th>EU</th>
<th>Low Income countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>kg of oil equivalent per capita</td>
<td>1851</td>
<td>7069</td>
<td>3412</td>
<td>363</td>
</tr>
</tbody>
</table>

Design & Environmental Communication
This poster explores the social impact of the current model of development. Humans and the natural world provide essential “resources” for the purpose of creating products, profits and economic growth. Yet economic growth does not necessarily equate greater well-being. Research has demonstrated that only 1% of growth contributes to rising standards of living. Prosperity is increasingly concentrated, and over the past 30 years inequality has risen in over 90% of the countries Global North (OECD countries). The image below shows that only 30% of the food supply is enough to meet everyone’s needs, yet 30-50% of the food supply is simply wasted. It appears that the current model of development fails to provide prosperity for the majority.

1% of global food supply would eliminate hunger. Yet 30-50% of global food supply is simply wasted.
1. Introduction: Visualizing the Environment

2. Images & Communication Theory

3. Revealing with Images

4. Concealing with Images

5. Conclusion - A Role for Design
1. Introduction: Visualizing the Environment
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Navajo reservation adjacent to a Phoenix suburb. Photo by Edward Burtynsky.
1. Introduction: Visualizing the Environment

[Series of images and graphics related to visualizing the environment, including ice caps, glaciers, and environmental data visualizations.]
1. Introduction: Visualizing the Environment
2. Images & Communication Theory
2. Images & Communication Theory

The more visual the input becomes, the more likely it is to be recognized and recalled. One research study found that adding a picture to text improves comprehension and memory by over 50%. Showing a picture before text increases comprehension by over 100% than supplying text alone.*

Another study suggests that we typically remember about 10% of the information from an oral presentation when tested 72 hours after exposure. This figure goes up to 65% when a picture is added.*

“the pictorial superiority effect”**

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90% of all information that comes to our brain is visual.

Up to \textbf{36,000} visual messages per hour may be received by the brain.

Source: Eric Jensen, Brain-Based Learning: The New Paradigm of Teaching, 1996
2. Images & Communication Theory
Pictures and text follow very different rules
THIS IS A PICTURE OF A BLUE BIRD SITTING IN A TREE.

THE BIRD IS LOOKING TO THE RIGHT.

THE LEAVES OF THE TREE ARE ORANGE, RED, YELLOW AND GREEN.

IT IS AUTUMN.
2. Images & Communication Theory
“the effects of technology do not occur at the level of opinions or concepts, but alter sense ratios or patterns of perception steadily and without any resistance”

Marshall McLuhan 1967
Visual culture: a pictorial turn

What are the cognitive implications of an increasingly visual culture?
Visual language

‘...has the potential for increasing human “bandwidth” – the capacity to take in, comprehend, and more efficiently synthesize large amounts of new information’

Robert Horn 2001
What Is Visual Language?

- **Images & Communication Theory**

**Definition**

**visual language**

1. The integration of words, images, and shapes into a single communication tool. The use of words and images in words and shapes to form a single communication tool.

**Images**

- Images: Visual elements that convey information.

**Words**

- Words: Written language that communicates ideas.

**Shapes**

- Shapes: Geometric forms that can be used to enhance visual communication.

The integration creates visual language.
2. Images & Communication Theory
“It has often been said that our environmental crisis is a crisis of perception. We do not readily see the patterns that would reveal our dependence on the natural world, nor are we commonly aware of the systems within which we are deeply embedded. Our attention, entrained on objects and focused on flat screens, is far removed from the dynamic and animated nonhuman world.”

Laura Sewall, 2012
Relational Perception

A shift in focus (and thinking) from **objects** (in isolation) to **processes & relationships**.
Visual communications can support relational perception by focusing attention on:

- context
- comparison
- connections
- causality
- complexity
2. Images & Communication Theory

- **context** (where, what, when?)
- **comparison** (how much and when?)
- **connections** (with what or with whom?)
- **causality** (how, how much and when?)
- **complexity** (all of the above)

...& at various scales: micro, meso and macro.
3. Revealing with Images - CONTEXT

Global forest change
3. Revealing with Images - CONTEXT

The British Isles

THE BRITISH ISLES
JULY 2100

YORKSHIRE

Major Region

England Channel

Channel-Gulf

IRISH SEA

Sea-Ocean

- Edinburgh > 50,000 City
- Glasgow > 1,000,000 City
- London > 5,000,000 City
- Glasgow Capital City
- London Minor Sunken City
- Edinburgh Major Sunken City

Scale 1:240,000,000

Drawn by The966

"A map of the British Isles in the year 2100"
3. Revealing with Images - CONTEXT

biodiversity loss, as a ratio of species abundance before human impacts

Biodiversity, as ratio of species abundance before human impacts

- High impacts: 0 - 25
- High-medium impacts: 25 - 50
- Medium-low impacts: 50 - 75
- Low impacts: 75 - 100%

Mean species abundance (%)

Sources: Global Methadology for Mapping human impacts on the Biosphere (GLOBIO), IPCC for the IPCC-SRES A1 scenario.
Land purchased by government and private companies from each country, where areas are known.

<table>
<thead>
<tr>
<th>Country</th>
<th>Land Purchased (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phillipines</td>
<td>1,240,000</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1,600,000</td>
</tr>
<tr>
<td>Pakistan</td>
<td>900,000</td>
</tr>
<tr>
<td>Japan</td>
<td>324,262</td>
</tr>
<tr>
<td>S Korea</td>
<td>2,306,000</td>
</tr>
<tr>
<td>China</td>
<td>2,090,796</td>
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<tr>
<td>Saudi Arabia</td>
<td>80,400</td>
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<tr>
<td>UAE</td>
<td>7,000</td>
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<tr>
<td>US</td>
<td>216,862</td>
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<tr>
<td>Mexico</td>
<td>1,090</td>
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<tr>
<td>Cuba</td>
<td>5,000</td>
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<tr>
<td>Brazil</td>
<td>100,000</td>
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<tr>
<td>Paraguay</td>
<td>1,300,000</td>
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<tr>
<td>US</td>
<td>21,000</td>
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<td>Argentina</td>
<td>25,000</td>
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<tr>
<td>India</td>
<td>10,000</td>
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<tr>
<td>Japan</td>
<td>5,000</td>
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<tr>
<td>Mexico</td>
<td>43,000</td>
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<tr>
<td>Australia</td>
<td>100,000</td>
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<td>New Zealand</td>
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<tr>
<td>Australia</td>
<td>100,000</td>
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<td>New Zealand</td>
<td>3,000</td>
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<tr>
<td>Australia</td>
<td>700,000</td>
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<td>Laos</td>
<td>378,000</td>
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<td>Sudan</td>
<td>7,000</td>
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<tr>
<td>Sudan</td>
<td>270,000</td>
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<td>Brazil</td>
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<td>Paraguay</td>
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<td>Algeria</td>
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<td>Russia</td>
<td>80,400</td>
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<td>Kazakhstan</td>
<td>4,046</td>
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<td>Tanzania</td>
<td>43,000</td>
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<td>Cameroon</td>
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<td>Mexico</td>
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<td>Algeria</td>
<td>1,600</td>
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<tr>
<td>Egypt</td>
<td>300</td>
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<tr>
<td>Toscana</td>
<td>300</td>
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<td>Toscana</td>
<td>10,117</td>
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<td>Sudan</td>
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<td>690,000</td>
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<tr>
<td>Sudan</td>
<td>900,000</td>
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Source: GRAIN.ORG
3. Revealing with Images - COMPARISONS

An atlas of pollution: the world in carbon dioxide emissions

Latest data published by the US Energy Information Administration provides a unique picture of economic growth and decline. China has sped ahead of the US, as shown by this map, which ranks each country according to CO2 emissions. And, for the first time, world emissions have gone down.

**North America**
- **US**: 5,425 million tonnes (down 6.9%)
- **Mexico**: 1,122 million tonnes (up 3.1%)
- **Canada**: 714 million tonnes (down 6.9%)
- **Central & South America**: 1,273 million tonnes (down 3.1%)

**Europe**
- **Russia**: 1,572 million tonnes (down 6.9%)
- **Germany**: 766 million tonnes (down 6.9%)
- **UK**: 420 million tonnes (down 6.9%)
- **US**: 520 million tonnes (up 3.3%)

**Middle East**
- **Iran**: 537 million tonnes (up 3.3%)
- **Iraq**: 385 million tonnes (up 3.3%)
- **Saudi Arabia**: 291 million tonnes (up 3.3%)

**Asia & Oceania**
- **China**: 7,711 million tonnes (down 9.2%)
- **India**: 1,602 million tonnes (up 7.5%)
- **Australia**: 734 million tonnes (up 7.5%)

**World**
- **30,452 million tonnes** (down 0.1%)
3. Revealing with Images - COMPARISONS

**carbon emissions per nation**

**Tracking Carbon Emissions**

A footprint comparison of total carbon dioxide emissions by nation and per capita shows there's plenty of room for smaller countries to reduce their carbon footprints.

By Stanford Kay
3. Revealing with Images - COMPARISONS

carbon emissions per nation - CO2 per person + emission change
3. Revealing with Images - COMPARISONS

carbon emissions per nation

Looking at carbon emissions per capita tells a different story, with oil-producing states and highly developed countries gracing the top of the rankings. India, one of the biggest emitters with relatively low emissions per capita standing (60th), has said it would sign a climate change pact when per capita targets are used.
3. Revealing with Images - COMPARISONS

carbon emissions per nation

World of CO₂
Carbon emissions from 1980 to 2010, ranking based on levels in 2010

- Total emissions - millions of metric tons
- Emissions per capita - metric tons
- GDP (US$) per metric ton of emissions

Data for Russia was not available before 1990.
3. Revealing with Images - COMPARISONS

*carbon emissions per nation*
3. Revealing with Images - COMPARISONS

Estimated remaining non-renewable resources
3. Revealing with Images - COMPARISONS

estimated remaining non-renewable resources
3. Revealing with Images - COMPARISONS

ecological footprint per nation

Figure 2.6: Ecological Footprint per country, per person, 2008
This comparison includes all countries with populations greater than 1 million for which complete data are available (Global Footprint Network, 2014).

Key
- Built-up land
- Fishing
- Forest
- Grazing
- Cropland
- Carbon

World average Ecological Footprint per person was 2.7 gha in 2008.
3. Revealing with Images - COMPARISONS

ecological footprint relative to biocapacity
3. Revealing with Images - COMPARISONS

scale - large (oil spills)
3. Revealing with Images - COMPARISONS

scale - small (radiation doses)
3. Revealing with Images - COMPARISONS

networks in the climate denial industry

The Center for Public Integrity. Following the Donors Trust money trail. 2013.
3. Revealing with Images - CONNECTIONS

Human Disease Network

Supporting Information Figure S9

Kueang & Goh, Michael E. Cusick, David Valle, Burton Childs, Marc Vidal, Albert-László Barabási
3. Revealing with Images - CONNECTIONS

*early network visualization - Mark Lombardi*
3. Revealing with Images - CONNECTIONS

*Map of Science*

**Topic Map: How Scientific Paradigms Relate**
3. Revealing with Images - CONNECTIONS

Map of Science

Relationships among Scientific Paradigms
3. Revealing with Images - CONNECTIONS

Map of Science
3. Revealing with Images - CONNECTIONS

networks in the food system
3. Revealing with Images - CAUSALITY

*networks in the seed system*
3. Revealing with Images - CONNECTIONS

*network typology - Manual Lima*
3. Revealing with Images - CONNECTIONS

**Network Typology - Pew Research Center**

### Divided
- **Polarized Crowds**: This type illustrates different groups of Twitter users who discuss polarizing topics. They often rely on different sources of information and commonly do not interact with groups that disagree with them.
- **Groups**: 2 large
- **Examples**: Politics or divisive topics that display separate "echo chamber" structures

### Unified
- **Tight Crowds**: This type captures close communities, such as conferences, professional topics, and hobby groups, where participants strongly connect to one another for information, ideas, and opinions.
- **Groups**: 2-6 medium
- **Examples**: Hobbies, professional topics, conferences. No outsiders; all participants are members

### Fragmented
- **Brand Clusters**: This type is formed around products and celebrities. These popular topics attract large fragmented Twitter populations, generating mass interest but little connectivity.
- **Groups**: Many small
- **Examples**: Brands, public events, popular subjects

### Clustered
- **Community Clusters**: These groups are created around global news events and popular topics. Communities form around multiple news sources. These community clusters are mostly disconnected from one another.
- **Groups**: Many small and medium
- **Examples**: Global news events

### In-Hub & Spoke
- **Broadcast Network**: This type is often triggered by news media outlets and pundits who have loyal followers who retweet them. These communities are often star-shaped, as little interaction exists among members of the audience.
- **Groups**: 1 large, some secondary
- **Examples**: News pundits and media outlets, famous individuals

### Out-Hub & Spoke
- **Support Network**: This type is created when companies, government agencies, or organizations respond to complaints and customer requests. The company, or hub, account replies to many disconnected users, creating outward spokes.
- **Groups**: 1 large, some secondary
- **Examples**: Companies and services with customer support
3. Revealing with Images - CONNECTIONS

*climate discourse visualization using Twitter hashtags*

EMAPS (Electronic Maps to Assist Public Science). Created as part of the 7th annual DMI Summer School 24th June to 5th July 2013. Twitter hashtag clusters around the hashtag global warming/climate change. Depicted as network graph. DMI Twitter Capture and Analysis Tool (TCAT).
3. Revealing with Images - CONNECTIONS

Exxon Secrets network visualization - by Greenpeace
3. Revealing with Images - CONNECTIONS

The Big Six - UK Energy companies, lobbyists and MPs
3. Revealing with Images - CONNECTIONS

Koch network visualization + flow diagram - by OpenSecrets.org, Center for Responsive Politics

Inside the network

TC4 TRUST, a new direct Alexandra-based group, sent its funds to LLCs affiliated with the nonprofit groups in the network.

FREEDOM PARTNERS, an Arlington County-based group newer than the others, kept the money from Koch Industries officials, now plays a role similar to that of TC4 Trust, funding many of the same groups.

CENTER TO PROTECT PATIENT RIGHTS served as an intermediary group, passing along millions from TC4 Trust and Freedom Partners to groups in the network.

By OpenSecrets.org
3. Revealing with Images - CAUSALITY

*Global risks, WEF*

![Global Risks Map 2013](image)

*Source: World Economic Forum*
3. Revealing with Images - CAUSALITY

Artic ice caps
3. Revealing with Images - CAUSALITY

Arctic ice caps

1982

2007

National Snow and Ice Data Center, 2007

2010 - 2030

2040 - 2060

2070 - 2090

Arctic Climate Impact Assessment, 2004
Geophysical events
(earthquake, tsunami, volcanic activity)

Meteorological events
(storm)

Hydrological events
(flood, mass movement)

Climatological events
(extreme temperature, drought, wildfire)

Selection of significant loss events

Number of events: 820

© 2012 Münchener Rückversicherungs-Gesellschaft, Geo Risks Research, NatCatSERVICE
3. Revealing with Images - CAUSALITY

Human and economic cost of disasters + natural disasters in the USA

NATURAL DISASTERS HUMAN AND ECONOMIC COSTS


Figure 5: Natural Disasters in the United States, 1980 - 2011, Number of Events, Annual Totals

3. Revealing with Images - CAUSALITY

*US weather fatalities, National Weather Service*
January-December 2013 Statewide Ranks

National Climatic Data Center/NESDIS/NOAA

Precipitation

1 = Driest
119 = Wettest

Record Driest
Much Below Normal
Below Normal
Near Normal
Above Normal
Much Above Normal
Record Wettest

precipitation
3. Revealing with Images - CAUSALITY

*number of disasters, UNISDR*
3. Revealing with Images - CAUSALITY

Impact of Disasters since the 1992 Rio de Janeiro Earth Summit

In 1992, the United Nations organized a conference on environment and development in Rio de Janeiro, called the Earth Summit. The purpose of the conference was to rethink economic growth, advance social equity and ensure environmental protection.

Twenty years later, the UN is organizing Rio+20, a chance to move away from business-as-usual and to end poverty, address environmental destruction and build a bridge to the future. Disaster risk reduction (DRR) plays an important part in this future of sustainable development.

Here’s a look at the impact of disasters since the Earth Summit (1992-2012).

Impact by disasters

Impact by top 10 countries

China 2.5 BILLION people affected

USA 560 BILLION in damage USD

Haiti 230675 people killed
3. Revealing with Images - COMPLEXITY

*Mapping impacts, IPCC 2014*
The perception of the environment.

To define the relation between people and environment means to define a complex system which involves different actors and several factors: economical, political, social, cultural. Assuming the Stura Park as our environmental context, firstly it’s useful to describe it using quantitative parameters, which objectively relates its level of pollution. The map of the area shows the localization of the main pollution agents, measured using pH testing kits. Furthermore, quantitative information has been collected from official administration database. Then, the environment can be described not only through real data, but also relating the perception of the place by the different actors involved, using other means such as interviews to people and personal impression. What emerges is that the three main actors—people, media, government—are basically affected by two main issues—the pollution and the insecurity, but with different levels of intensity for each one: people come out really concerned about their own safety, media results to make a lot of pressure on the insecurity issue, government seems not to effectively act for solving the existing matters. After analyzing the causes of each argument, the focus on the existing connections among them reveals relations of different kind: contrast, coexistence, cause-effect. Showing the internal rules of the system, it’s clear how the insecurity issue is the main topic which affects every actor, who can have an active or passive role toward it; this leads to a lack of communication between the different actors, which explains the reciprocal relation between them.
3. Revealing with Images - COMPLEXITY

the “great acceleration” - post-ww2 industrialization

THE ANTHROPOCENE

The Anthropocene is a new geological epoch in which human activities have become a dominant influence on global processes and ecosystems. It is characterized by significant environmental changes caused by human actions, leading to what some scientists call a new geological age.

The line corresponding to 1950 marks the start of the Anthropocene, with the post-World War II era witnessing industrialization, technological advancements, and increased human impact on the environment.

*These graphics were compiled in a publication of the International Geosphere-Biosphere Programme (IGBP).*
3. Revealing with Images - COMPLEXITY

*Climate change discourses - Bubble matrix visualization using keywords from book titles*

Emaps Group. Climate change formats and keyword uptake. Depicted as bubble matrix. The visualization includes on the right side the keywords captured from book titles, and below the year that corresponds to each of the books from which the keywords were captured. Queries performed on 30 June 2013.
Fox News is suggesting that scientists were “wrong” about global warming by using misleading graphics to obscure the long-term global temperature rise.

On his Fox News show, Neil Cavuto suggested that the recent cold weather invalidates concerns about global warming, asking weather forecaster and climate misinformer Joe Bastardi, “How did we get this so wrong?” Cavuto aired a graphic which at first glance appears to show that temperatures are dramatically cooler now than they were last March. But the graphic compares apples to oranges: the map on the left shows whether temperatures were above or below average for the month of March, while the map on the right shows absolute minimum temperatures for last Wednesday, March 20.

If the temperature scale for the map on the right were applied to the map on the left, it would mean that temperatures were over 100 degrees Fahrenheit in the upper Midwest in March 2012.

A more honest comparison would look at the same day in March 2012, showing a far less stark contrast:
4. Concealing with Images - Climate denial

I still believe in Global Warming. Do you?

www.heartland.org
4. Concealing with Images - Environmental crisis as spectacle

Vogue Italia response to Deepwater Horizon
4. Concealing with Images

The Green Economy
World Forum on Natural Capital

HERE'S THE BUSINESS VALUE OF WOOD

$0.4 Trillion
Global value of timber industry. 2

...BUT WE'RE IN THE BUSINESS OF VALUING TREES

$3.7 Trillion
Value of conserving forests just to cut greenhouse gas emissions. 3

Can't see the TREES for the WOOD?

Natural capital explained...

It's time to start valuing nature's capital

Nature Capital
Investments that aim to generate economic, social and ecological benefits to people, while improving the long-term health of nature and ecosystems.

www.naturecapital.org
4. Concealing with Images - The Green Economy

Costing the Earth [Information is Beautiful Studio] (2011)
$63,000 bn
Global Gross Domestic Product

Value provided by the Earth to the global economy

Concealing with Images - The Green Economy
Costing the Earth Revised (2013)
4. Concealing with Images - The Green Economy

Economic worldwide benefits coming from biodiversity

Estimated ecosystem service value
Thousand US dollars


Service provided
- Recreation
- Medicine production
- Carbon storage
- Forest products

Average value from both
United Kingdom and Namibia
In the future, the food chain and the supply chain will merge.

In tomorrow’s global economy, every resource will be counted. HSBC is one of the world’s leading supply chain organisations. We help companies keep tabs on stock across six continents – and five oceans. The future starts today.

There’s more on world trade at www.hsbc.com/inthefuture

Issued by HSBC Holdings plc... AC2987
4. Concealing with Images

Whose interests are being served?

Companies want your attention, and they’re willing to pay for it. In the first three quarters of 2010 (January through September), businesses spent more than $94 billion in advertising fees. These are the companies that paid the most for your attention in that time.

- News Corporation: $984,800,000 +8%
- AT&T: $1,510,700,000 +15.7%
- Pfizer: $895,700,000 +0.2%
- Time Warner: $863,300,000 -1%
- GM: $1,480,500,000 +20.6%
- Verizon: $1,406,800,000
- Disney: $776,300,000 +4%
- Johnson & Johnson: $950,400,000 -7.3%

Source: Kantar Media; A collaboration between Good and Bradley R. Hughes
5. Conclusion: A Role for Design

*Mapping the design for a circular economy, The Four Design Models - by The Great Recovery at the RSA*