

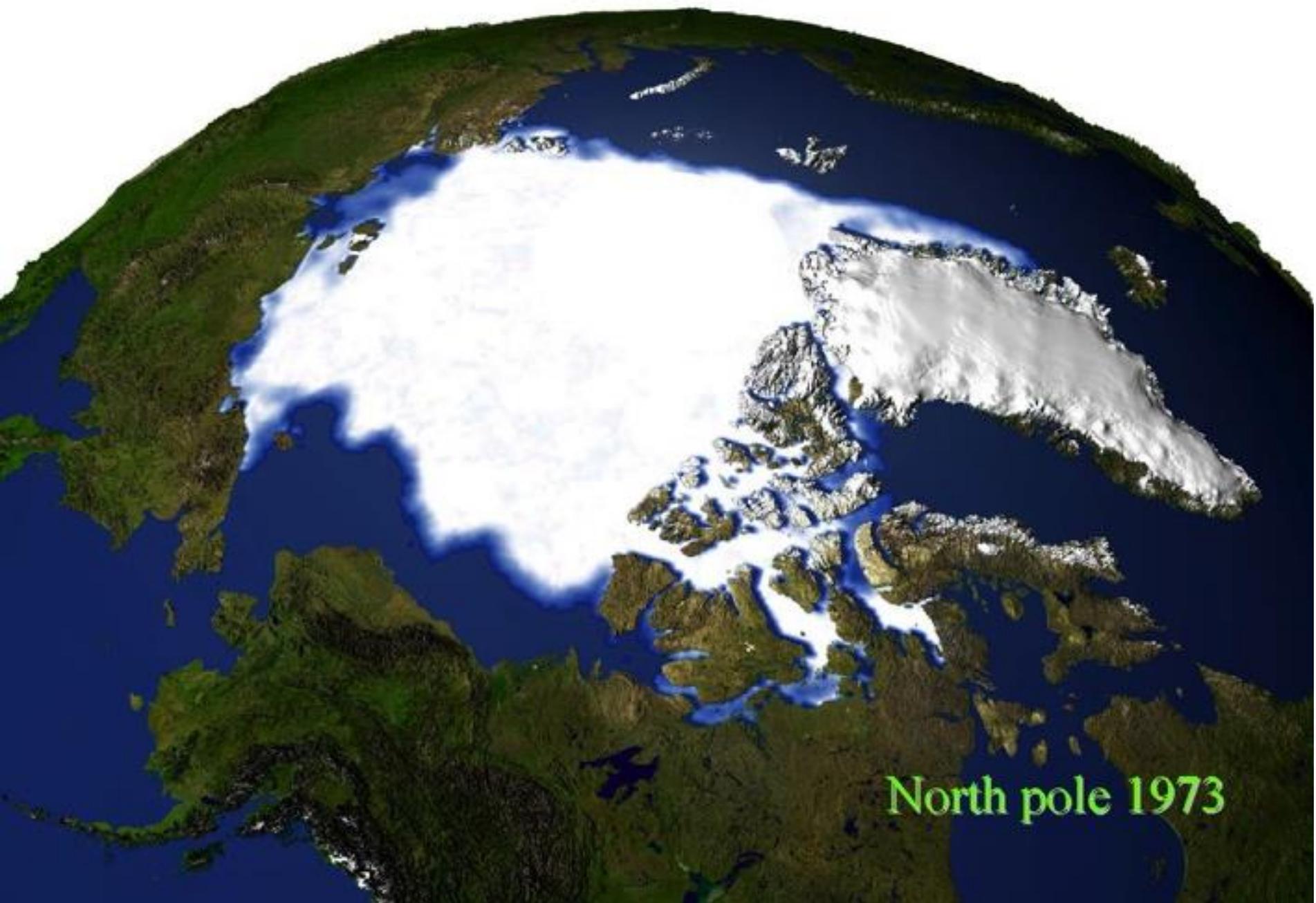
The River in Which We Are Swimming:
making sense of the global renaissance in education

Reflections

Peter M. Senge, MIT

IB Heads World Conference
The Hague
30 October 2015

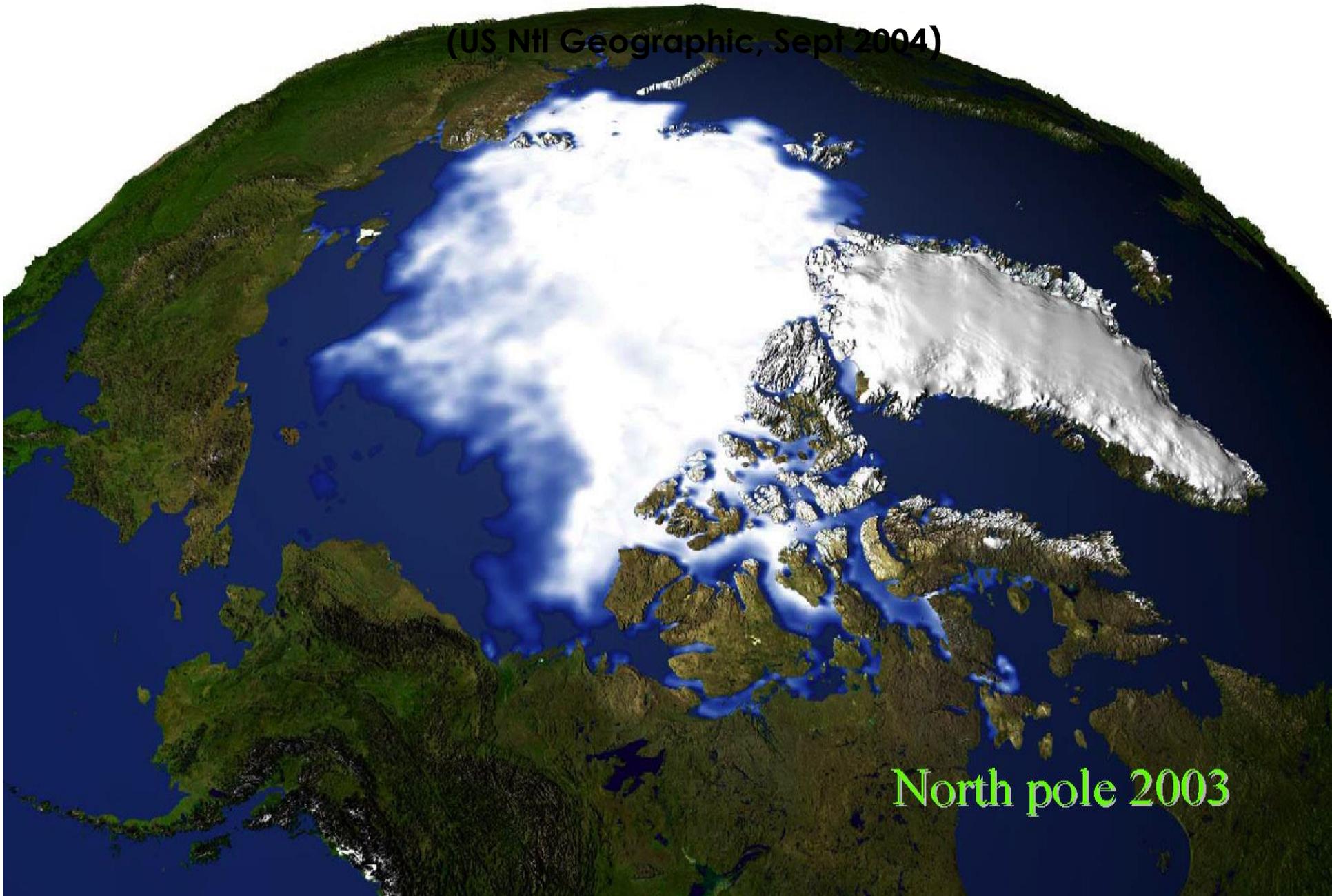
Polar Sea Ice in summer



North pole 1973

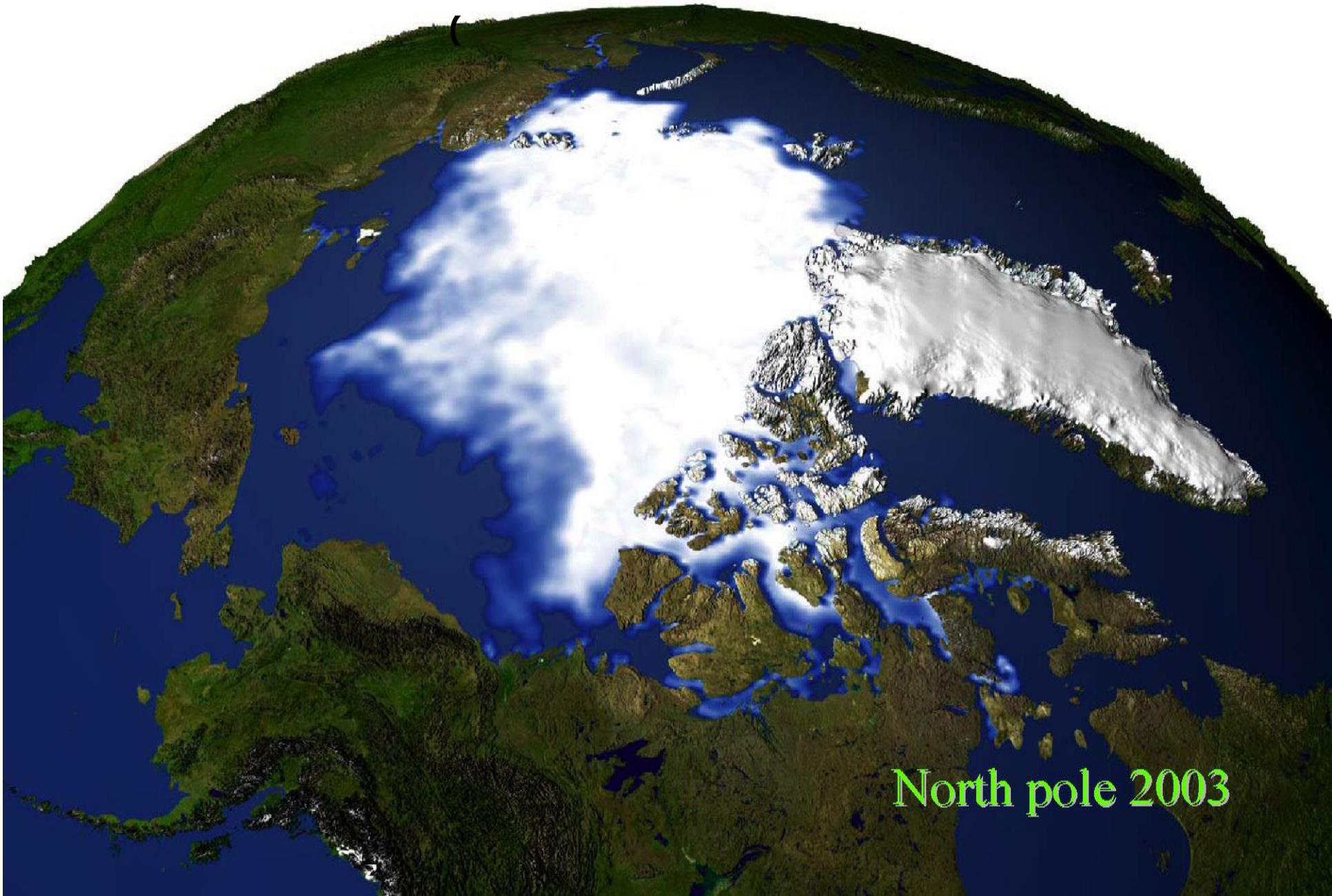
Polar ice in summer - reduced 40% in 30 years

(US NII Geographic, Sept 2004)



North pole 2003

What does this have to do with the Future of Education?



North pole 2003

To see arctic sea ice for more recent years go to

<http://earthobservatory.nasa.gov/>

Features: arctic sea ice

The New York Times

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NEW YORK, MONDAY, SEPTEMBER 28, 2015



Progress Seen On Warming, With a Caveat

*Nations' Goals Still Fall
Short, Scientists Say*

By **JUSTIN GILLIS**
and **SOMINI SENGUPTA**

The pledges that countries are making to battle climate change would still allow the world to heat up by more than 6 degrees Fahrenheit, a new analysis shows, a level that scientists say is likely to produce catastrophes ranging from food shortages to widespread extinctions of plant and animal life.

Yet, in the world of global climate politics, that counts as progress.

The new figures will be re-

The New York Times

Progress Seen On Warming, With a Caveat

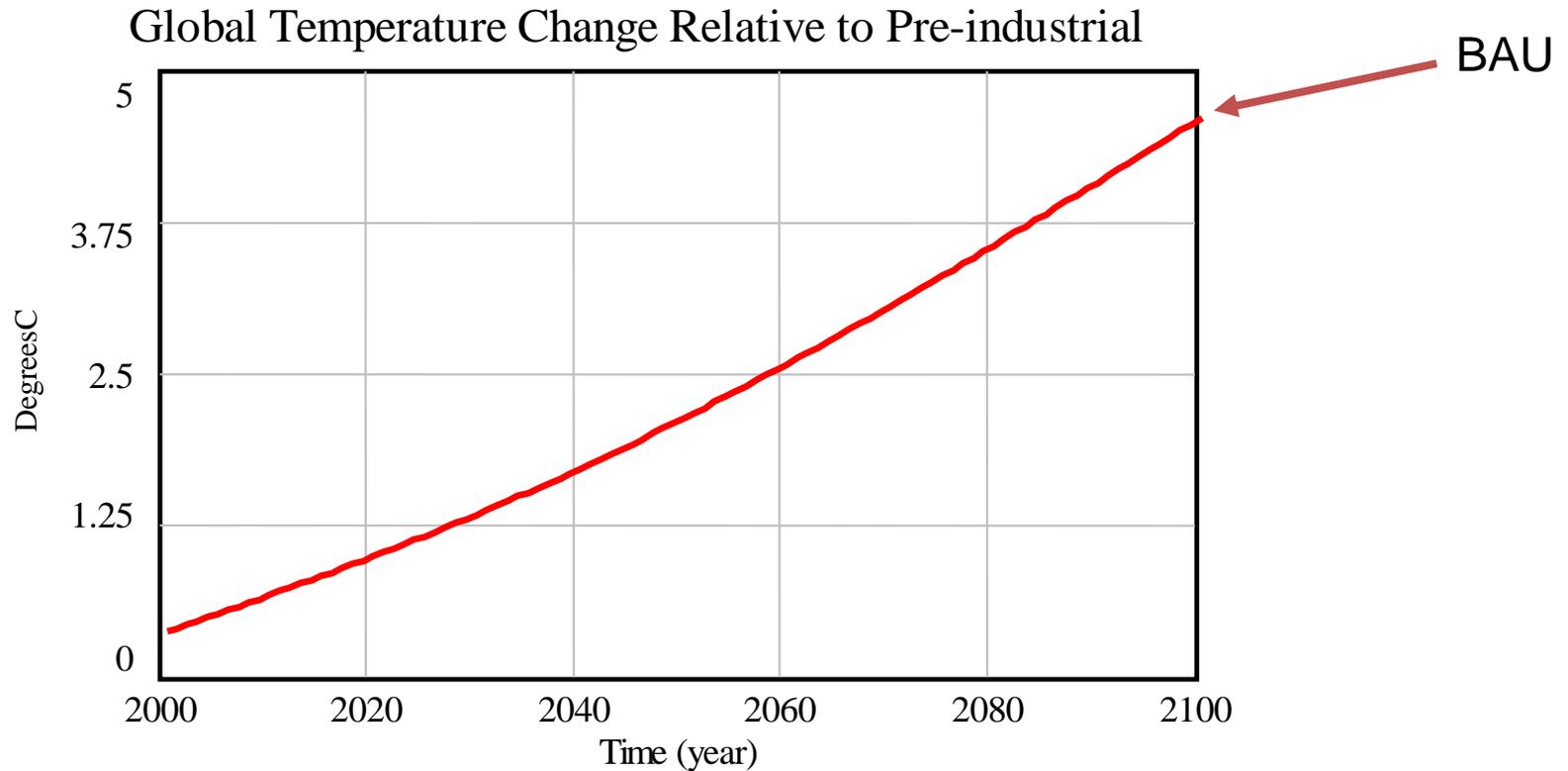
By JUSTIN GILLIS and SOMINI SENGUPTA SEPT. 28, 2015

That would be the biggest reduction in the history of global climate politics, and a sign that 20 years of disappointing negotiations may be giving way to an era when countries start to move the needle on the projected global temperature.

(But, as article says, all agreements taken together would still be far short of the target of a 2 degree C increase in global temperature by the end of the 21st century, as estimated by the “C-Roads” simulation model developed at MIT)

– see www.climateinteractive.org

Global Temperature Change

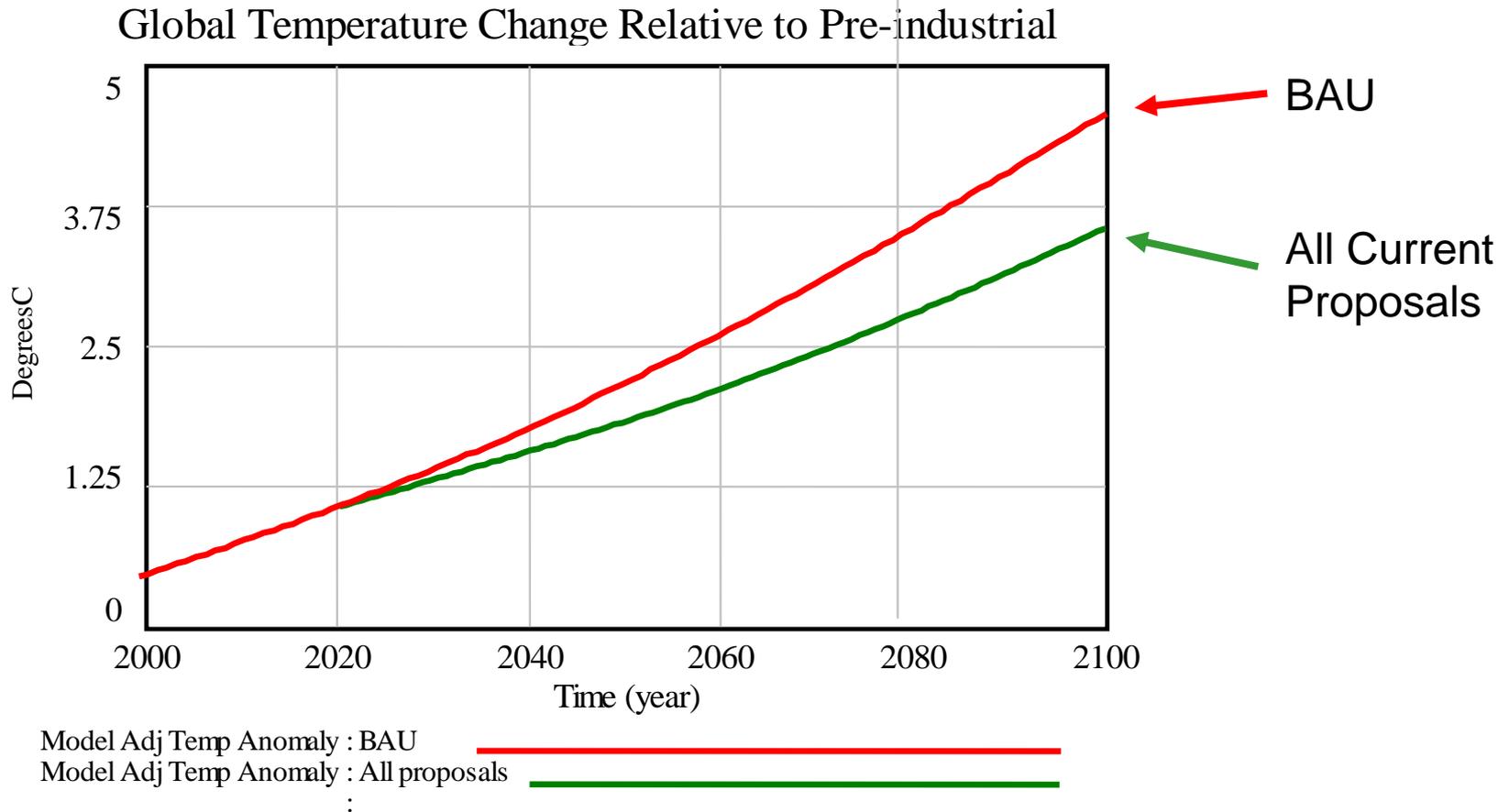


Model Adj Temp Anomaly : BAU(Business as Usual)

de Adj Temp Anomaly : All rop sal

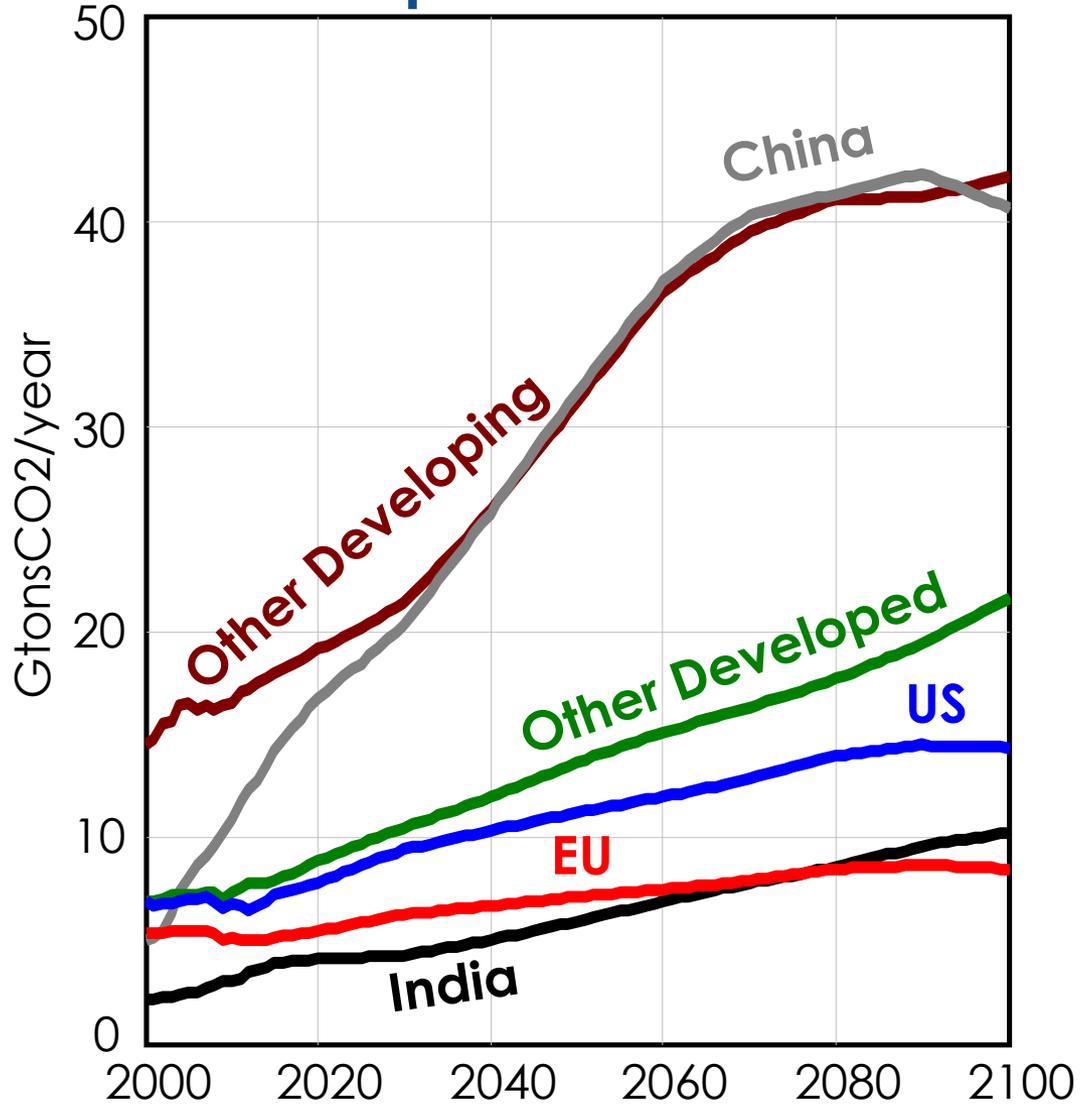
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Global Temperature Change



Business As Usual

CO2 Equivalent Emissions

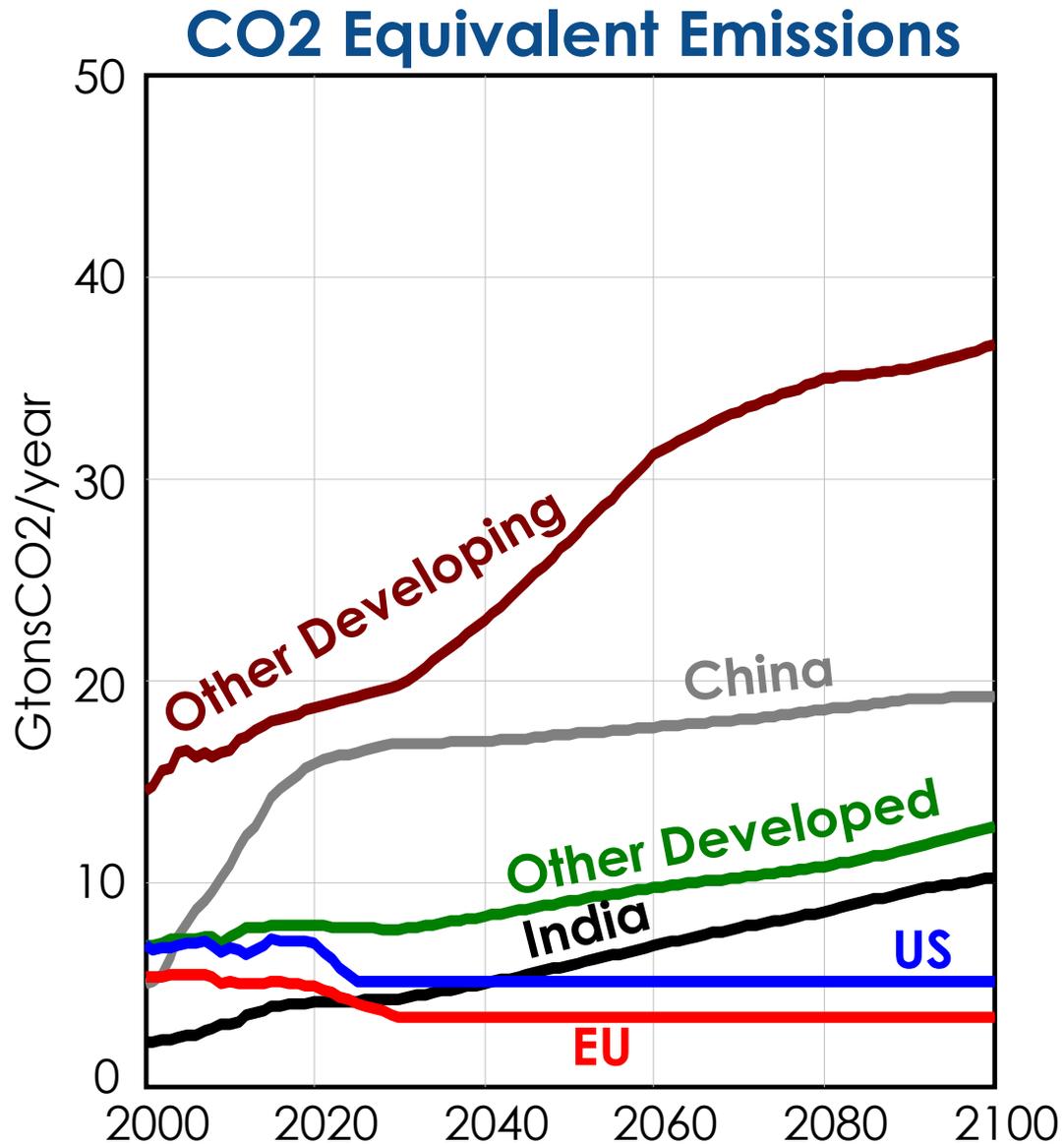


4.5° C
in 2100

Scenario 1

Based on
IPCC's
RCP 8.5
scenario

Current Proposals - October, 2015



3.5° C
in 2100

Scenario 2

RFP

Circular Economy Conference

October 2015

Univ of California & Grenoble University

- The current “linear” growth models that both companies and countries have adopted are heavily based on using up resources.
- Countries rely on consumption to grow their GDP, while many firms depend on cost-cutting and end-users buying new replacements to sustain profitability.
- In Europe 90% of the raw materials used in manufacturing become waste before the product leaves the factory
- 80% of products made get thrown away within the first six months of their lives

- (Because this cannot continue) the concept of circular economy has been gaining a great deal of attention in both business and political discussions

.

RFP

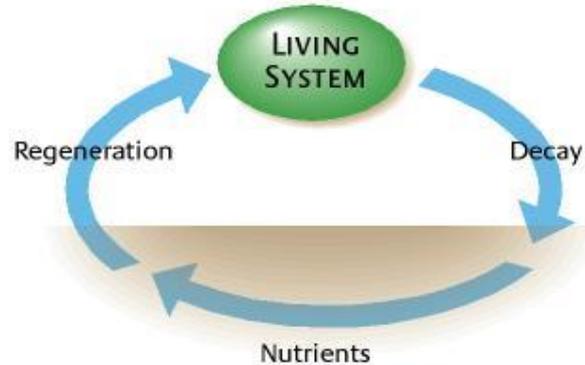
Circular Economy Conference

October 2015

- The circular economy is not (just) about corporate social responsibility or green strategies
- The circular model requires firms to come up with disruptive technology and business models that are based on longevity, renewability, reuse, repair, upgrade, refurbishment, servitization, capacity sharing and dematerialization

Why Industry Produces Waste

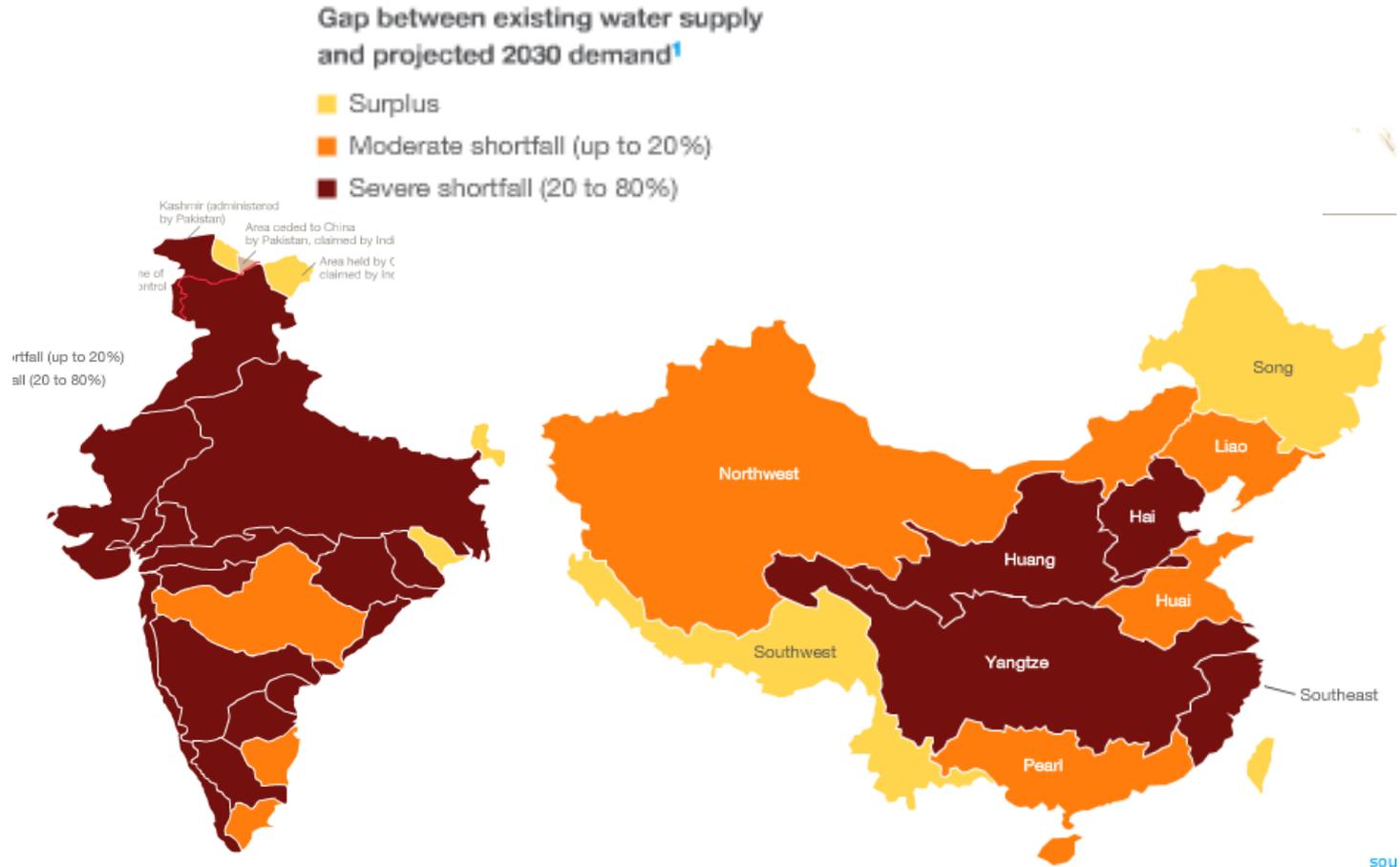
LIVING SYSTEMS FOLLOW CYCLES



INDUSTRIAL-AGE SYSTEMS DO NOT



China, India will meet only 50% of water demand by 2030



Food

- *Fisheries*: over 70% are “chronically overfished,” worldwide
- *Topsoil*: over 1 billion hectares lost in last 50 years, more than size of India and China combined
- *Ecosystems* that provide for clean water, breathable air, fertile soil, pollination: 1/3 are in “significant decline;” 1/3 “in danger” (UN Millenium Ecosystem Assessment)

“We use about 1 1/4 Earths today. Soon it will be more.”

Jason Clay, VP of World Wildlife Fund, 2006

Inequity

- *Gap between rich and poor*
- *Income*: Between 1975 and 2000, the poorest quartile saw their share of global income fall from 2.5% to 1.2% (WorldBank)
- *Migration*: about 50 million/yr migrate from rural to urban, often with little economic prospects; 500 million live in slums and shantytowns

“Climate change represents the biggest threat to poor people in the 21st century”

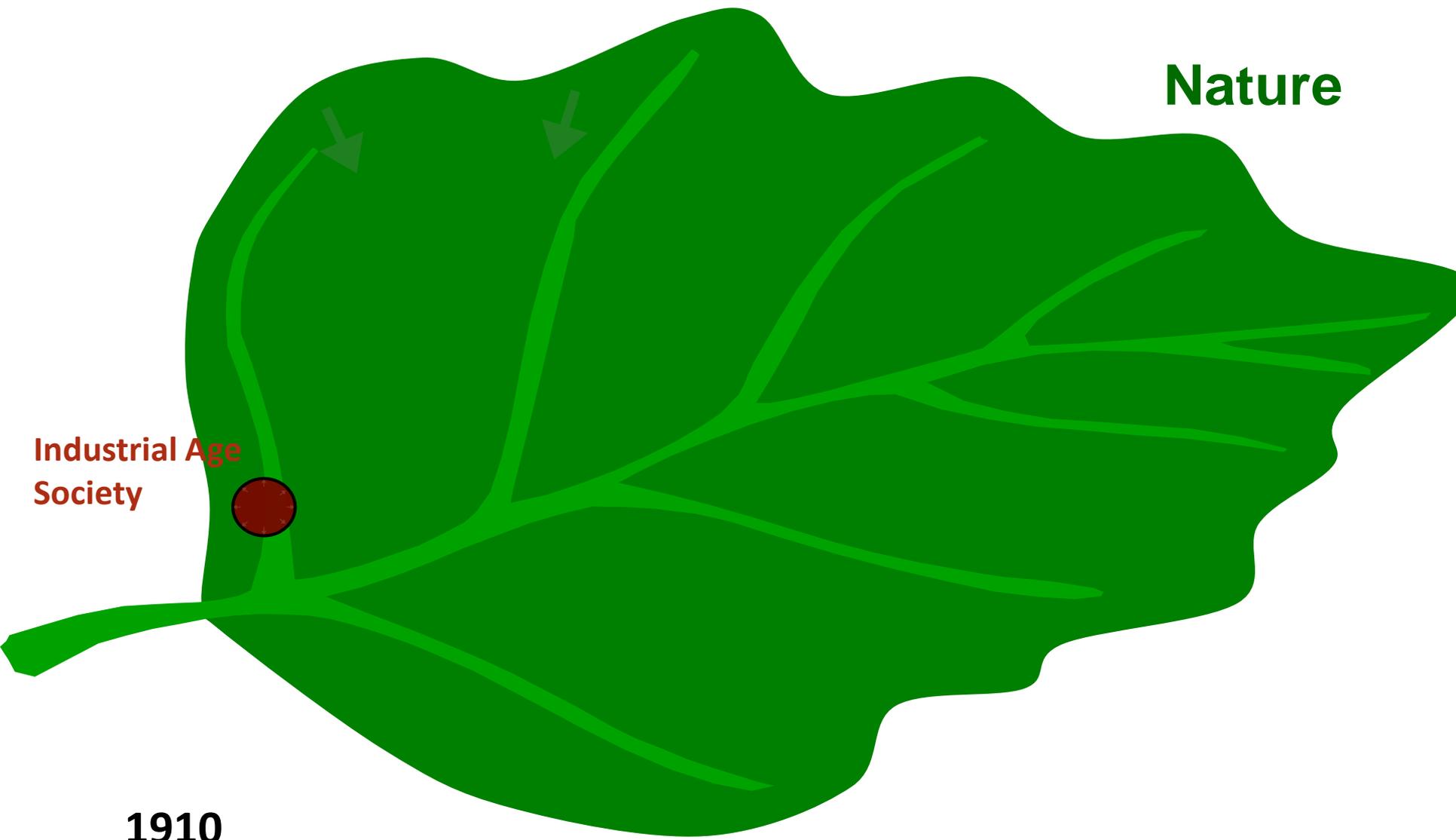
Oxfam, 2007

Seeing Systems

The “Big Three”

**Global systems we have created
that shape today’s world:**

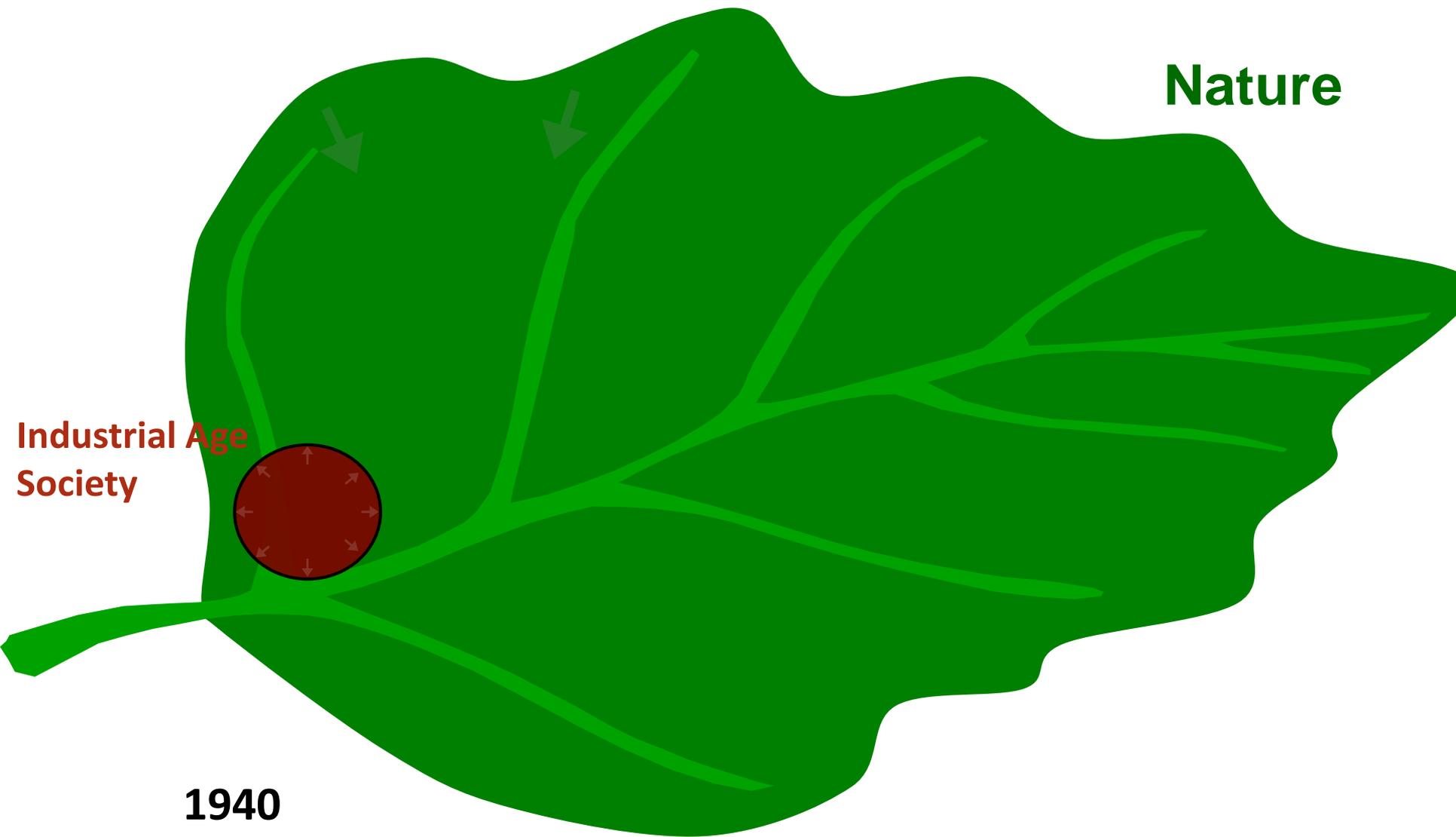
- Food & water
- Energy & transport
- Materials (products and services)



Nature

**Industrial Age
Society**

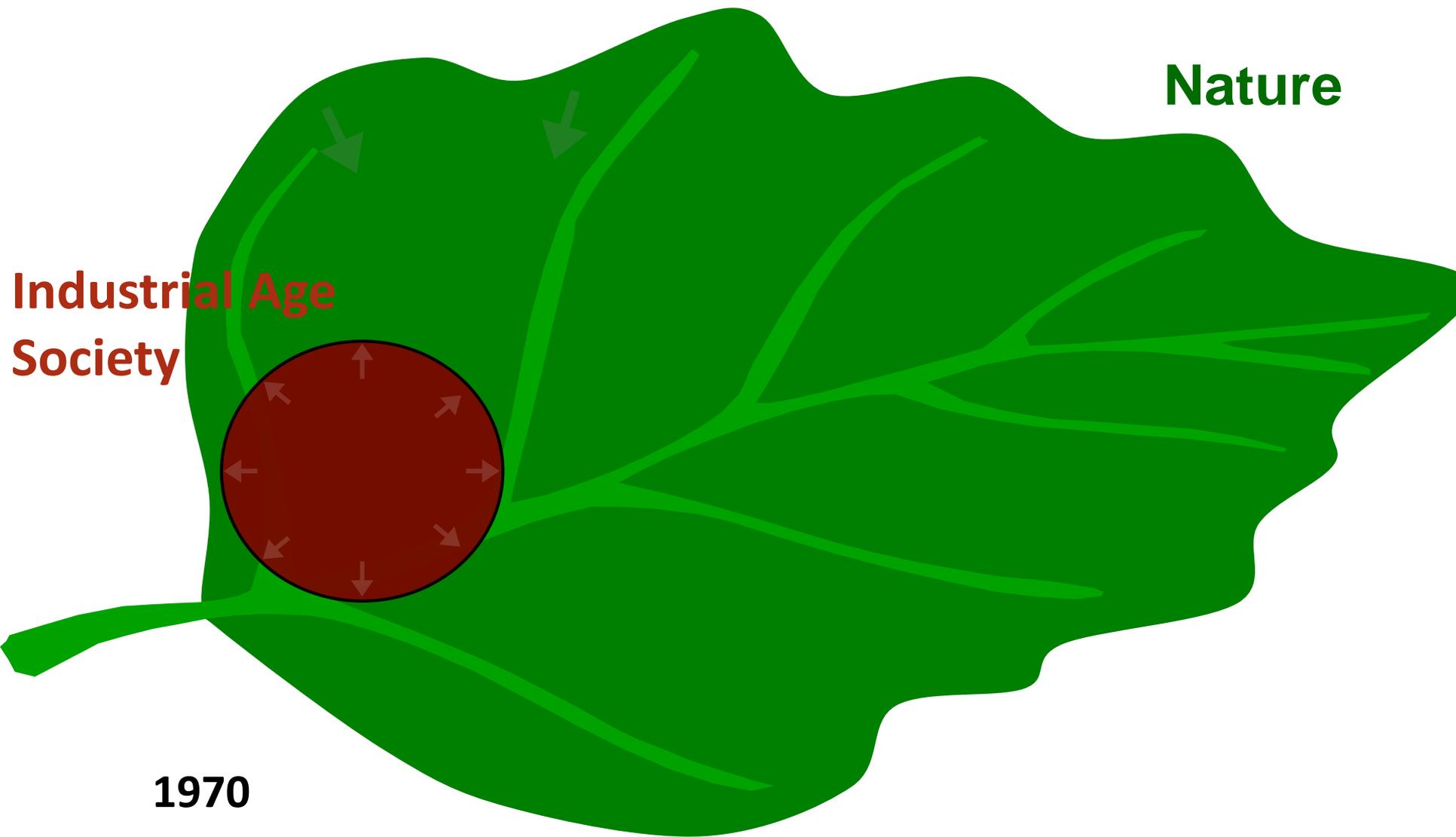
1910



Nature

Industrial Age
Society

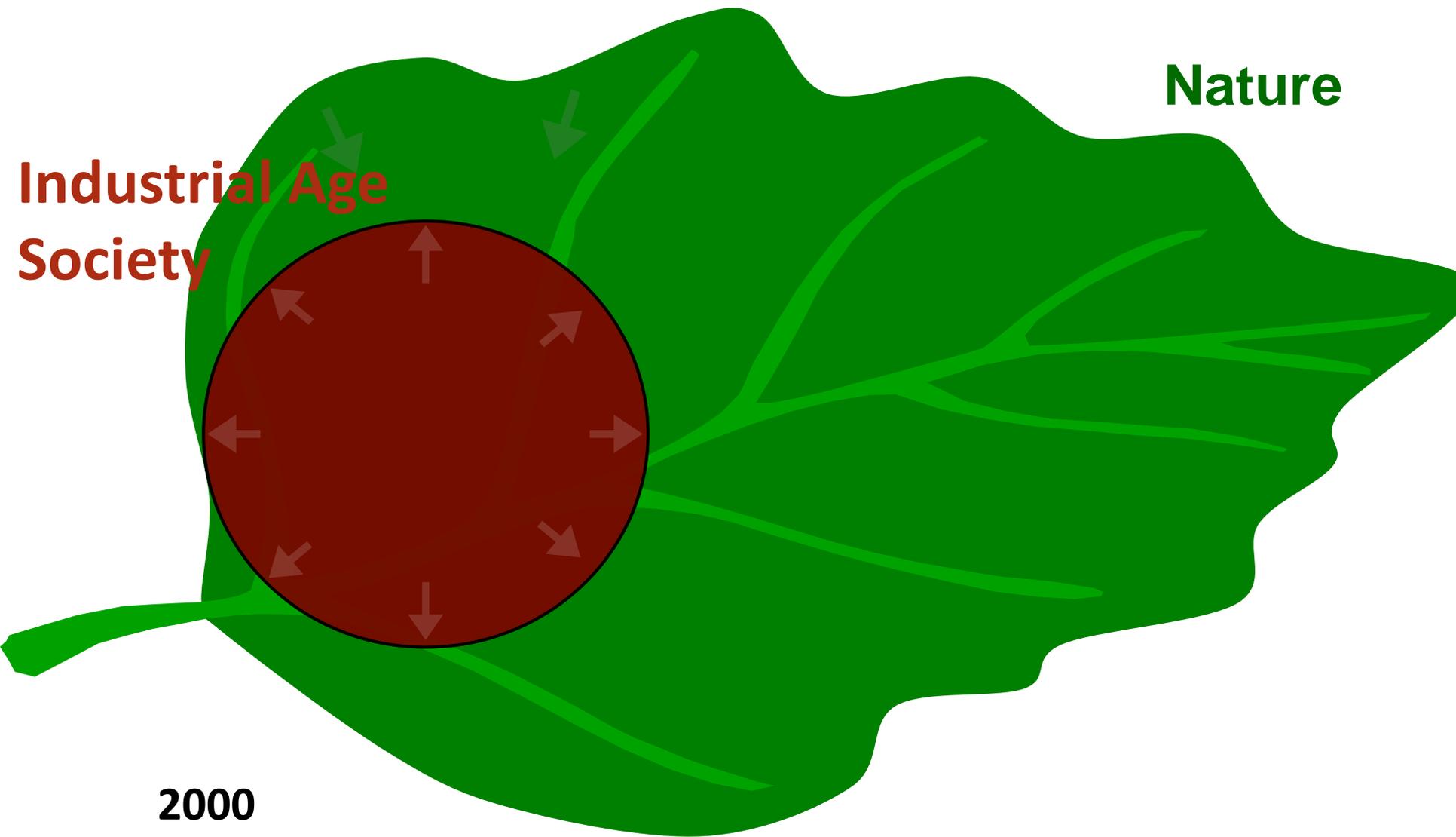
1940



**Industrial Age
Society**

Nature

1970



Nature

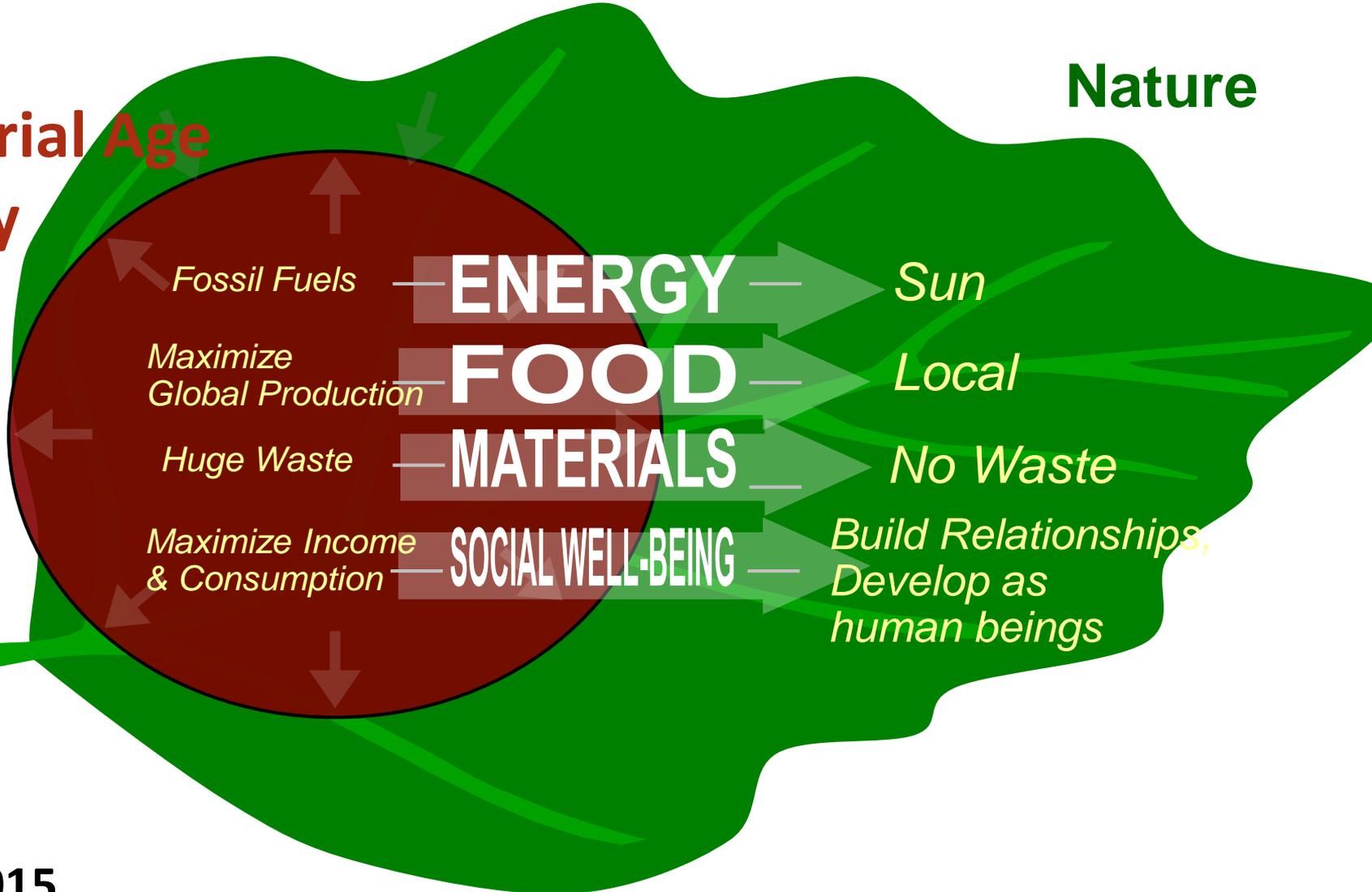
**Industrial Age
Society**

2000

Life Beyond the Bubble
HOW NEEDS ARE MET

Industrial Age
Society

Nature



2015

The Awakening

Our pursuit of (material) well-being today may have its roots in a confusion. The ultimate meaning of living is the harmony between human being and the nature.

To me, there is but one destiny for human being, either to be in harmony with the nature or to be destroyed with the earth.

Member, CCCC
Central Committee
Chinese Communist Party

A Global Renaissance in Education

Around the world, new models for education are emerging. They have guiding ideas like:

- Ethics & moral development
- Grit
- Social and emotional learning
- Social competencies
- Compassion & empathy education
- Educating the heart
- Mindfulness
- Emotional intelligence
- Education for sustainability
- Eco-literacy
- Project-based learning
- Design thinking
- Systems thinking
- Innovation academies
- Science as discovery
- Teaming and cooperative learning

A Global Renaissance in Education

The Core Idea **Profound interconnectedness**

Students and adults engaged in understanding and caring for the three fundamental levels of systemic awareness

- Self (mind-body system) – the inner landscape
- Other (relationships, teams, groups, larger organizations) – the social landscape
- Larger systems (ecology, economy, society) – the collective landscape

An integrating pedagogy: The Habits of Systems Thinker



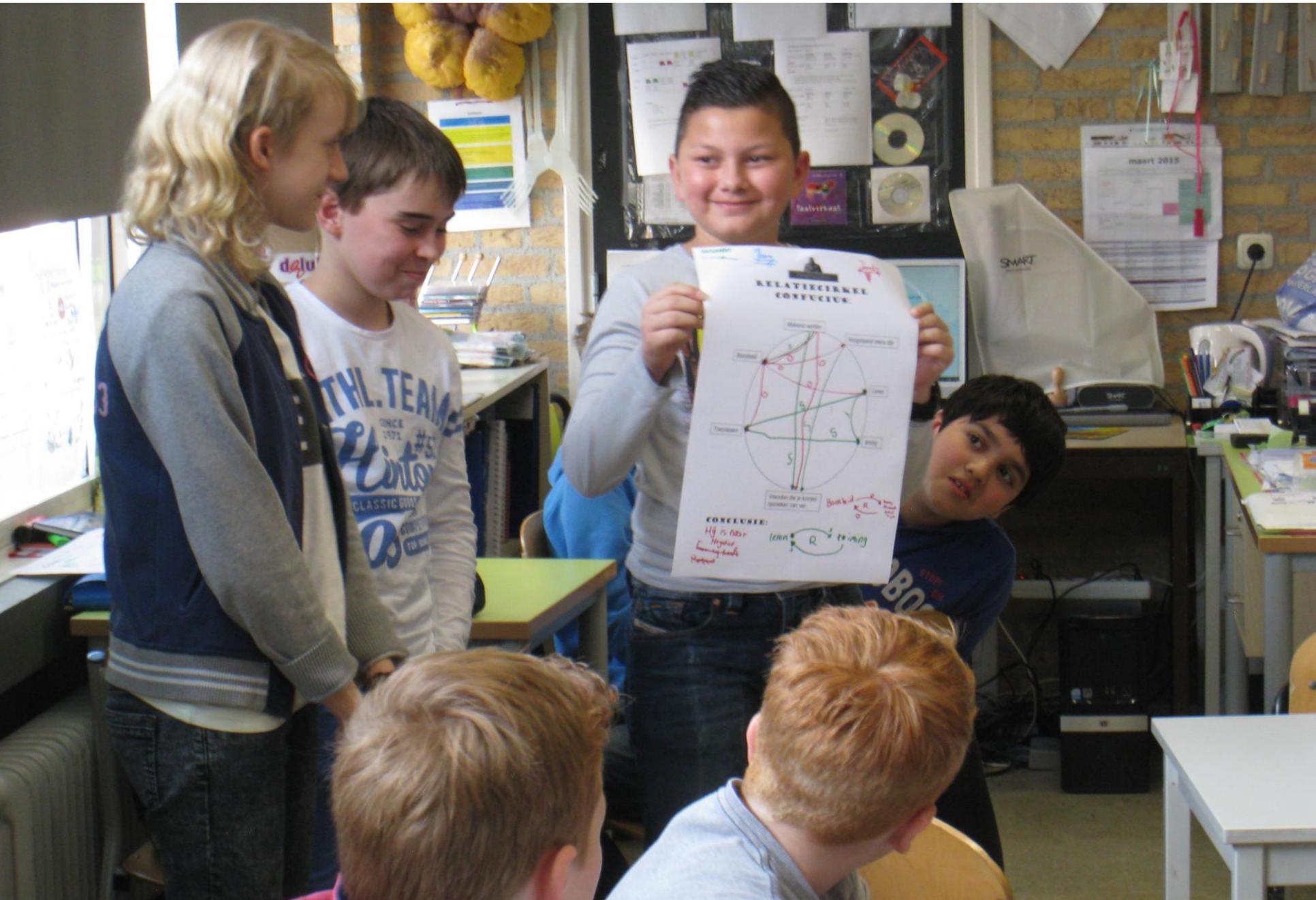
An integrating pedagogy: The Habits of Systems Thinker



Each Habit has associated tools, like:

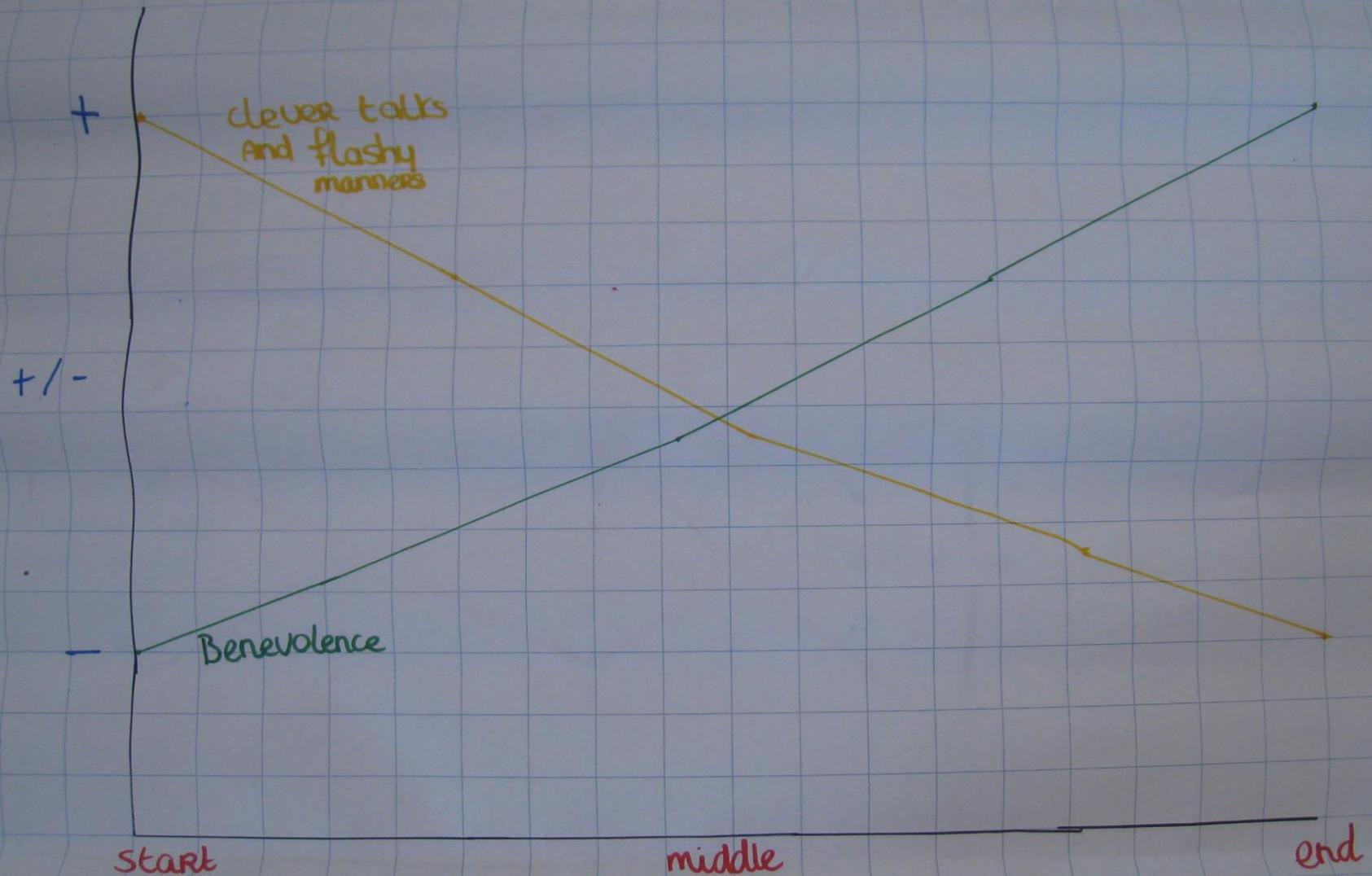
- Behavior over time graphs
- Connection circles
- Reinforcing and balancing feedback loops
- The systems thinking iceberg
- The ladder of inference
- Stock & flow diagrams
- Dynamic simulation models
- ...

Studying Confucian Analects to create interconnection with China

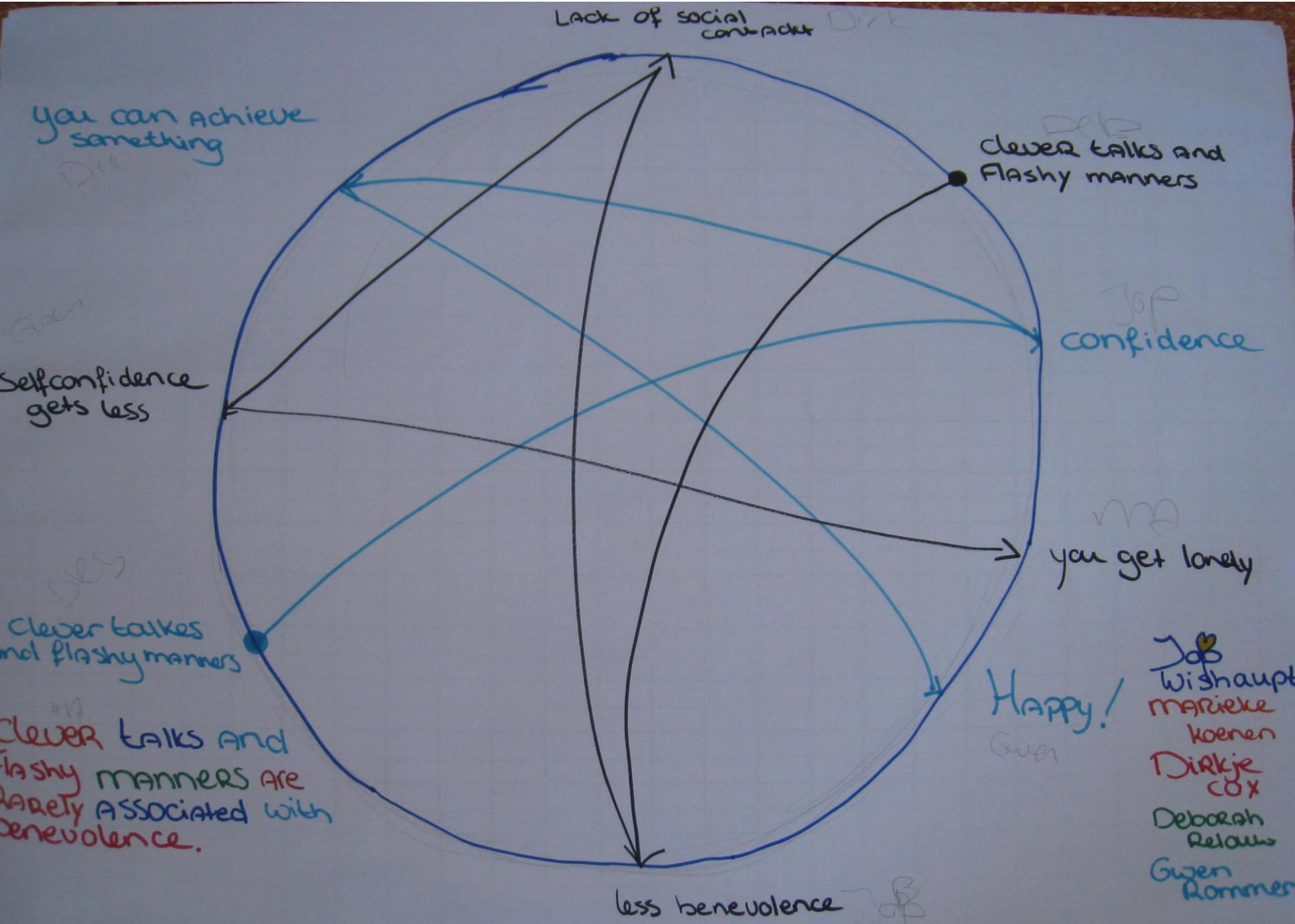


Students' "Behavior over Time" graphs from Confucian Analects

Zi said: 'clever talks and flashy manners are rarely associated with Benevolence'



Students' "Connection Circle" from Confucian Analects



Video of young man talking about trade negotiations with the Chinese,
along with older video of him as a middle school student

(illustrates Systems Thinking Habit: “Changes Perspective to Increase Understanding”)

<https://www.youtube.com/user/CLExchange?feature=mhum>

The specific video is

CLE DVD Example 2...That School in Tucson.

This video excerpt comes from the “That School in Tucson”
– the full video available from Creative Learning Exchange
www.clexchange.org

Video of three young boys and their “mean words-hurt feelings” reinforcing feedback loop to better understand why they are having fights on the playground

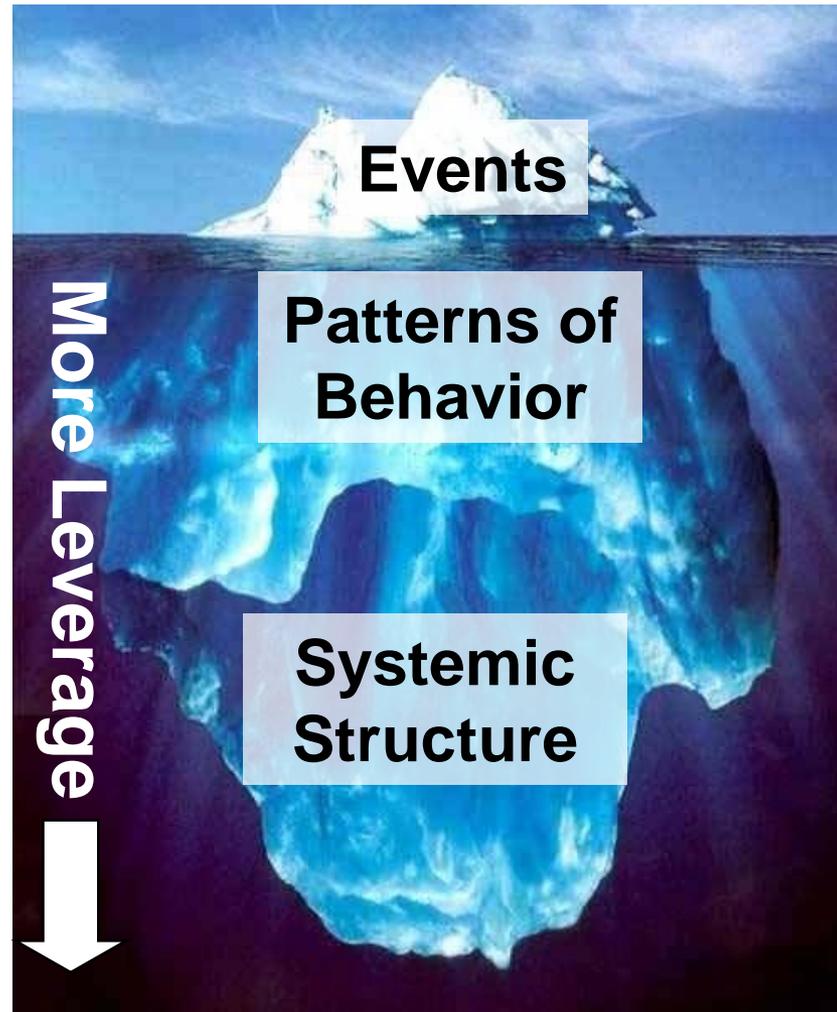
<https://www.watersfoundation.org>

(several videos on Waters Foundation home page

– this is the one on “first graders using systems thinking tools to solve an issue relating to ongoing playground conflicts”)

The Iceberg

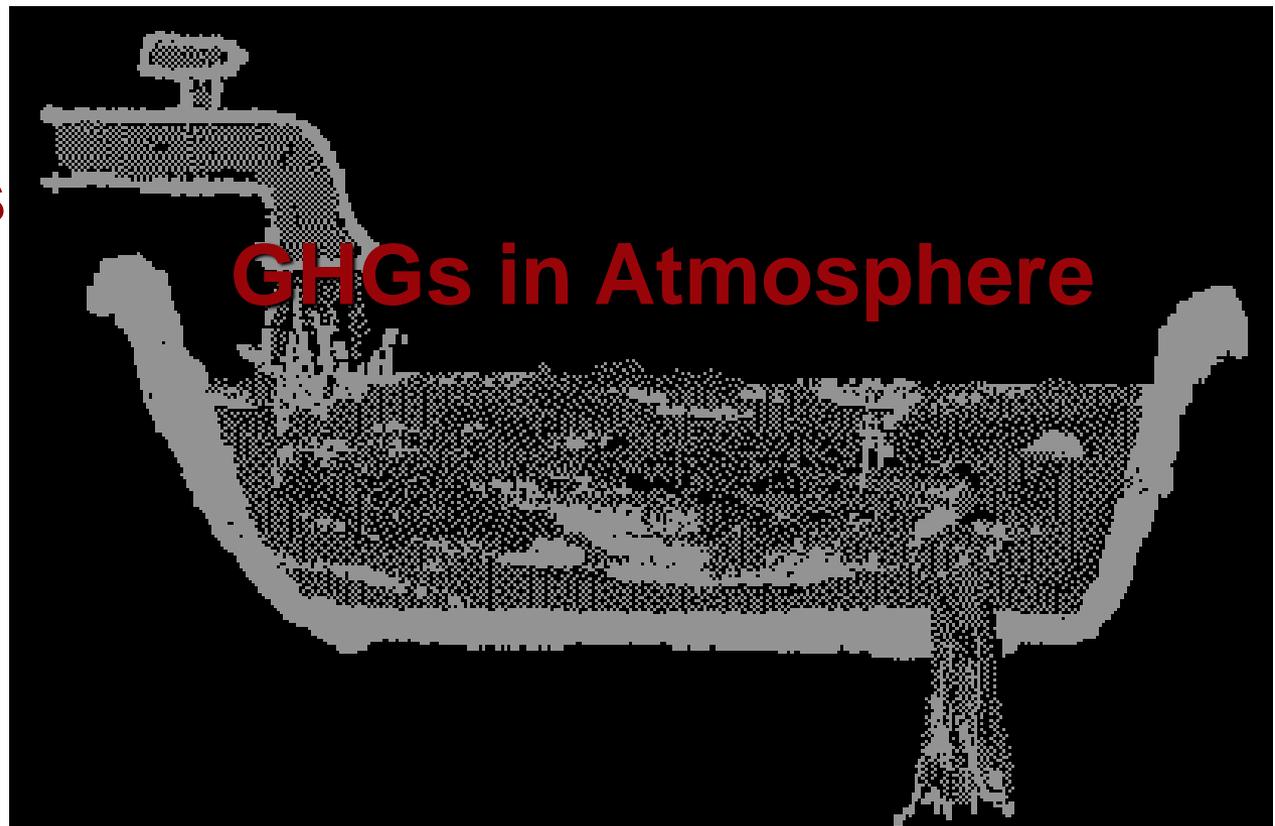
A Metaphor for Systems Thinking



“Climate Change Bathtub”

Applying Systems Thinking Iceberg to climate change helps students see a key underlying structure: how Emissions of Atmospheric Greenhouse Gases (GHGs) differ from concentration and removal of GHGs. GHG concentration only stops rising when emissions falls to equal removals

**GHG
Emissions**

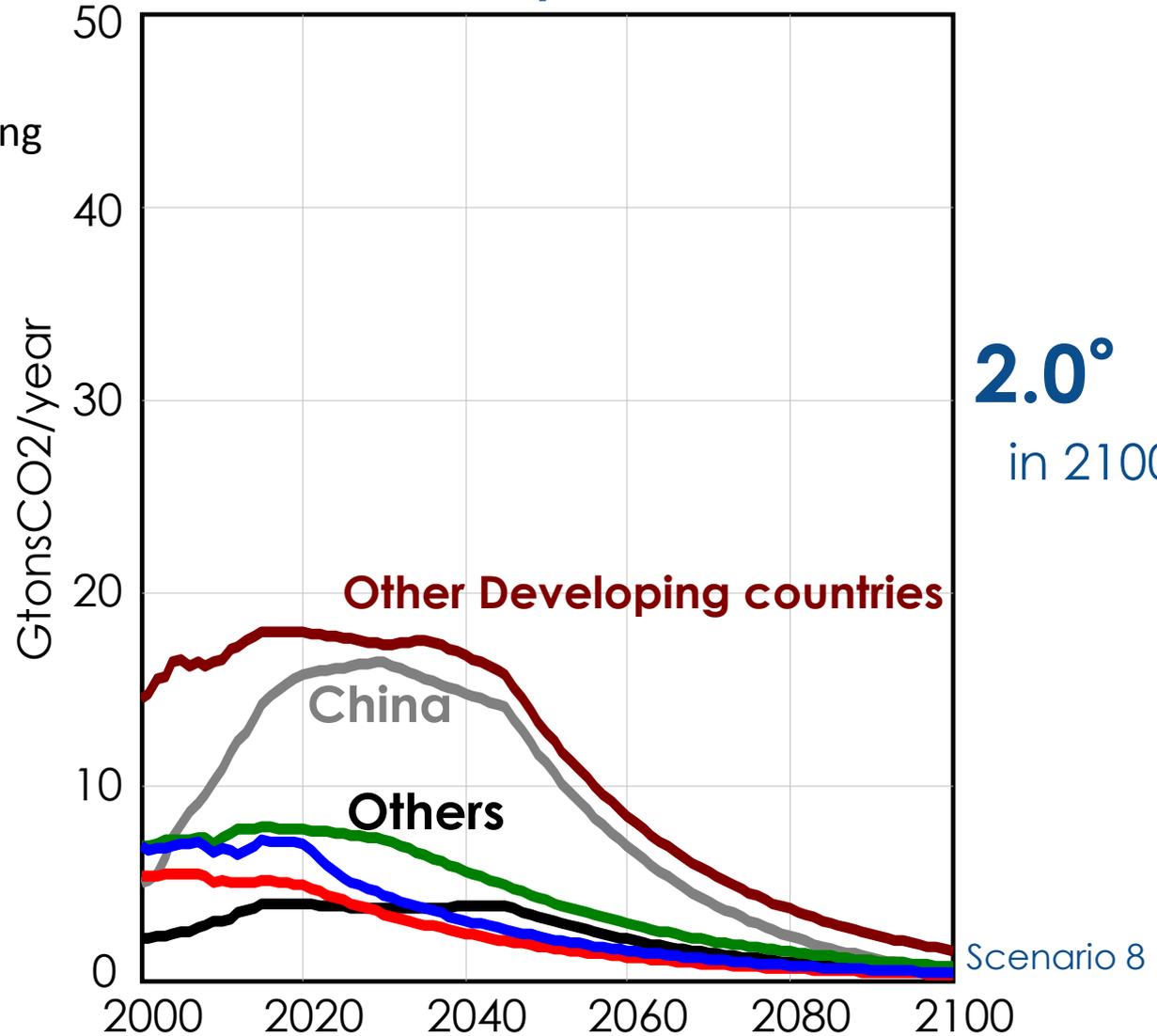


**GHG Removal from atmos
("carbon sequestration")**

The Climate Change Bathtub shows that stopping rising GHG levels and stabilizing temperature at 2C requires major reductions in emissions from all countries, something just now being recognized in Climate negotiations, a poignant illustration of the absence of systems thinking

Two Degrees Path

CO2 Equivalent Emissions



2.0° C
in 2100

Scenario 8

Guiding Ideas for deep change in education

All systems of education mirror their larger society.

They embody core assumptions that reflect their societies' priorities and that need to be pondered as part of any deep change process.

We believe that the Industrial Age System of Education that has spread around the world is increasingly at odds with the needs to conserve ecological and social well being, locally and globally, in an increasingly interconnected technological world.

It is naïve to think that the sorts of societal changes needed in the future will arise without change in the education systems that shape those societies. We believe this understanding is driving education innovators in diverse settings around the world.

1. One Idea: profound inter-connectedness

2. Two levels of work

1) An overarching intent to sustain an expansive investigation of education as a means of human evolution

2) A network of collaboration among different system change sites in different cultural settings

- Mexico
- USA
- Denmark
- China (prospective)
- Canada

Coordinated by a

- Systems board to help each site see itself as a living system interacting with other living systems
- Research Board: what are we learning, how do we assess it and how do we share this with others
- Secretariat: administration, funding, coordination of capacity building & research plans and resources, integration and communication

- In all settings, there are significant gaps between the aspirations for deep change and the realities of the many forces that preserve the status quo. This creative tension of

- embracing concrete real challenges and
- sustaining a deep inquiry into the education system of the future

energizes our undertaking.

Guiding Ideas (cont'd)

3. Three levels of inter-connectedness

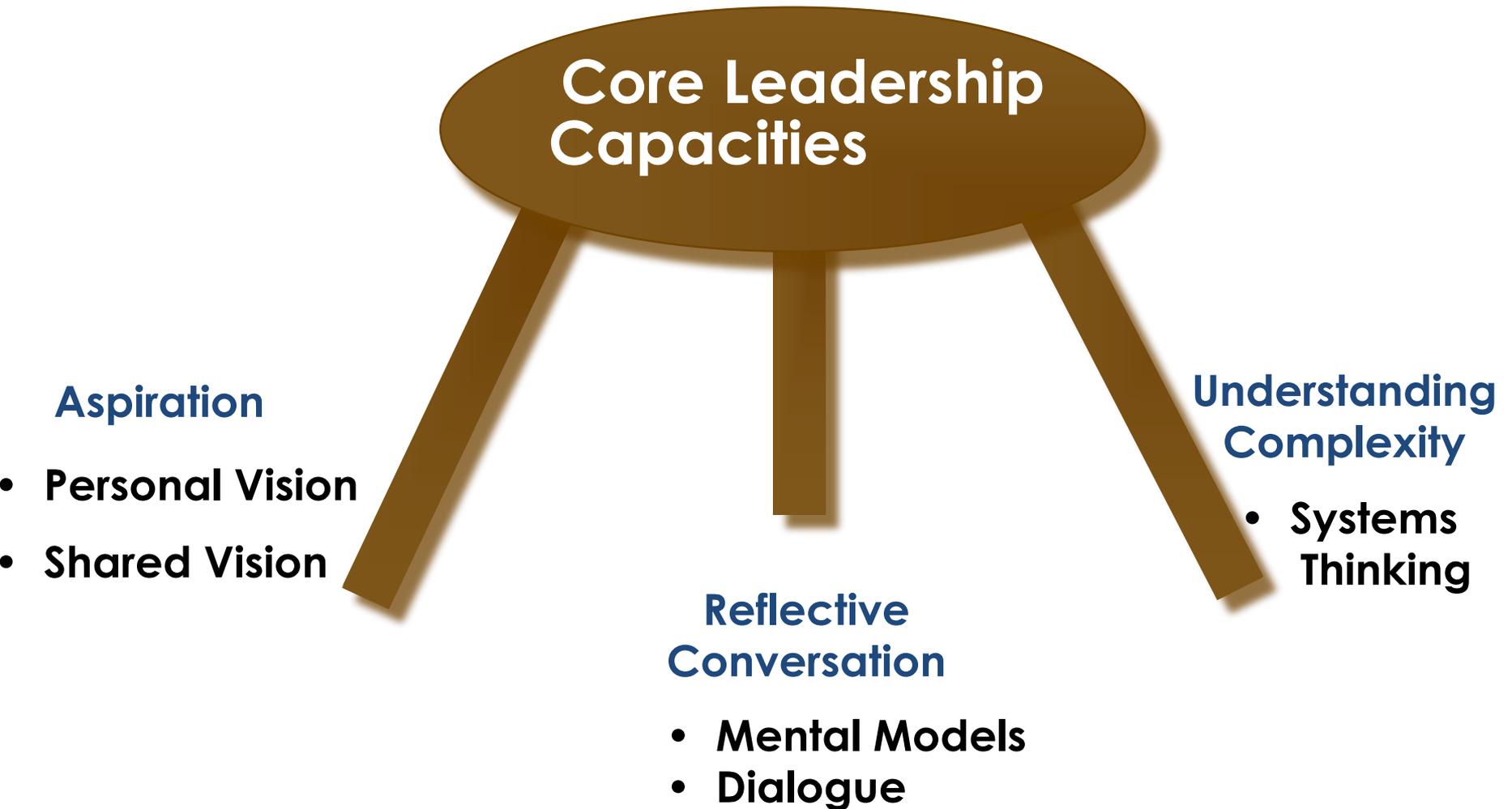
Making education relevant for today's world: students and adults engaged in understanding and caring for

- Self (mind-body system) – [the inner landscape](#)
- Other (relationships, groups, teams, larger organizations) – [the immediate social landscape](#)
- Larger systems (ecology, economy, society) – [the collective landscape](#)

4. An “ecological” perspective on change.

- Seeing the larger river: work with the many currents of deep change unfolding in education around the world
- Honoring autonomy: encourage local leadership and strategies based on the unique cultural, political and institutional realities in each setting
- Appreciating the basic ‘ecotope’ (smallest distinct unit of whole system):
e.g., the basic system of student-teacher-family.
- Harmonizing multiple levels of change:
 - Classroom: innovation in pedagogy, instructional design, ...
 - School: building cultures of collaboration and risk taking
 - School system and community: system leaders and community stakeholders focused on well being of children and the community as a whole, rather than seeing school as an isolated institution
- Encouraging diverse type of leaders and seeing interdependencies among them:
 - Executive leaders (superintendents, school boards, ministries) - [shape conditions, policies and context](#)
 - Front line leaders (teachers and principals) – [put new ideas and tools into practice](#)
 - Internal network leaders (parents, community leaders, students) – [collaboration across boundaries](#)
- Building a portfolio of practical tools for seeing the school-community system, such as
 - System maps
 - Tools of individual and collective reflection and personal development and sustaining energy
 - Methods for stakeholder engagement and building shared visions
 - Tools for collective sense-making to foster shared understanding of current reality
 - ...
- Following the flows of energy
 - Self-reinforcing sources of growth and creativity vs. balancing processes
 - Energy for growth comes from many sources: ‘bottom up,’ ‘top down,’ ‘outside-in,’ ‘inside-out’
 - Energy blockages often occur at interfaces: e.g., innovative teachers vs. concerns of superintendents & boards, aspirations of parents and community members vs. rigidities of formal bureaucratic systems

Systemic change in education requires shaping school cultures around building core leadership capacities at all levels (classroom, school, larger community)



(The Fifth Discipline, 2006)

Thinking Strategically about Systemic change starts with distinguishing what leaders can focus on (the strategic architecture that shapes the environment for change) from the deeper learning cycle that actually embodies that change

