FUTURE EARTH 2013 – MAY 30, 2013
WEBINAR LOGISTICS
WELCOME!

THIS MEETING IS BEING RECORDED

- **Starting Time?** We will begin promptly at the announced starting time (Eastern Time).
- **Webinar Audio?** US/Canada participants dial 1-888 -469-1754 or 1-773-756-4633 and announce passcode: Future Earth to be joined to the audio bridge in listen-only mode. International Participants dial the appropriate free-phone number for your specific country listed on the chart found at URL: http://sites.nationalacademies.org/PGA/biso/futureearth/index.htm.
- **Q&A Session?** Questions will be accepted **via live audio and via email** at future-earth@nsf.gov for reply during the announced Q&A period.
- **Captioning?** Go to: **www.fedrcc.us/** and enter **event confirmation # 2134316** from a separate browser page to view streaming captions**.**
- **Handouts/Slides?** Presentation slides and webinar evaluation form can be found at: http://sites.nationalacademies.org/PGA/biso/futureearth/index.htm.
- **To Get Help?** Send private WebEx chat to meeting host**,** call WebEx at 1-800-857-8777 and press 0 for technical support, or Email: kotts@nsf.gov.
- **Feedback?** Give us your feedback at: https://www.surveymonkey.com/s/9SJKX9G

futurearth
research for global sustainability

Recap of Webinar I
New approach to global environmental change research

Enhancing the foundation: the role of disciplinary research

Fostering greater inter- and trans-disciplinary research

Fostering co-design and co-production of knowledge

futureearth
research for global sustainability

Recap of Webinar I

New approach to global environmental change research

Enhancing the foundation: the role of disciplinary research

Fostering greater inter- and trans-disciplinary research

Fostering co-design and co-production of knowledge

photos: www.dawide.com

futureearth
research for global sustainability

Recap of Webinar I

Jack Kaye

UNEP

IGFA
International Group of Funding Agencies for Global Change Research

UNESCO
United Nations Educational, Scientific and Cultural Organization

BELMONT FORUM

ICSU
International Council for Science

ISSC
international social science council

UNITED NATIONS UNIVERSITY

WMO

futurearth
research for global sustainability

Recap of Webinar I

New approach to global environmental change research

Enhancing the foundation: the role of disciplinary research

Fostering greater inter- and trans-disciplinary research

Fostering co-design and co-production of knowledge

photos: www.dawide.com

Future Earth

North American Consultation

Webinar II

photos: www.dawide.com

Overview - Diana Liverman

Origins in five major international global change programs

WMO
IOC
ICSU

ICSU
IUBS
SCOPE
UNESCO

IGBP
IHDP
DIVERSITAS
WCRP

1980

1986

1991

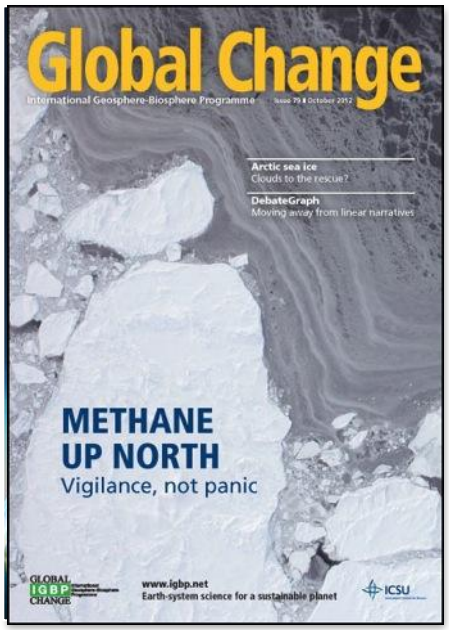
1996

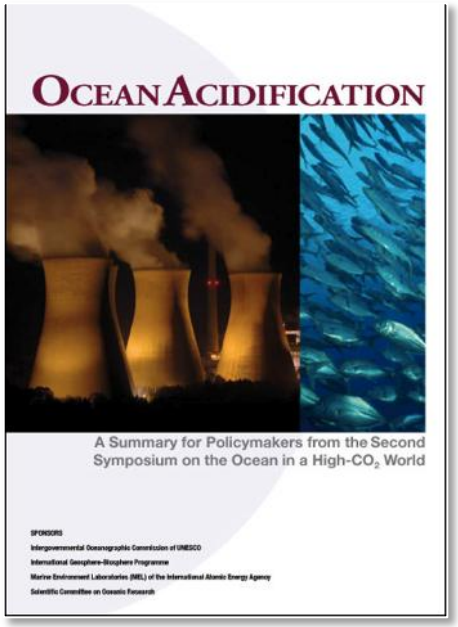
2001

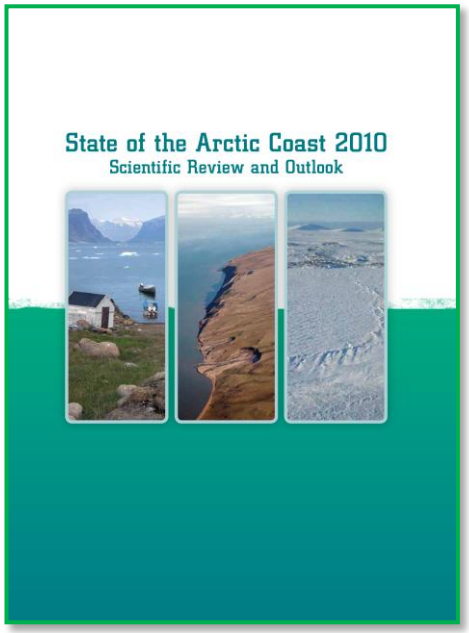
ICSU

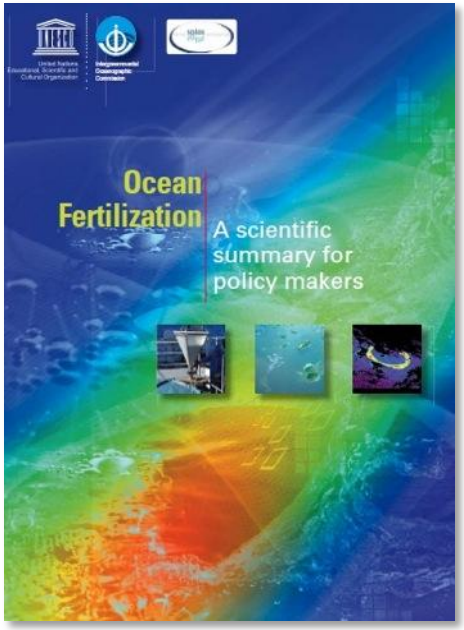
ICSU
ISSC
UNU

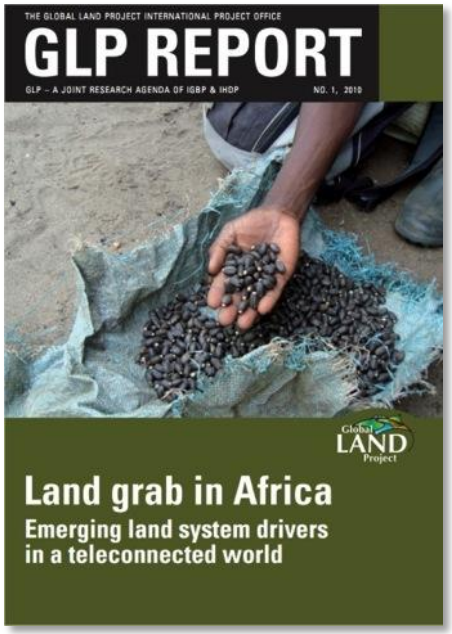
Future Earth to continue the strong leadership of past Programmes

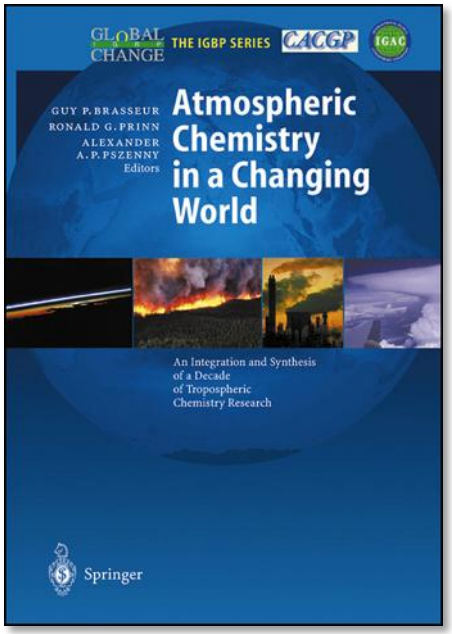


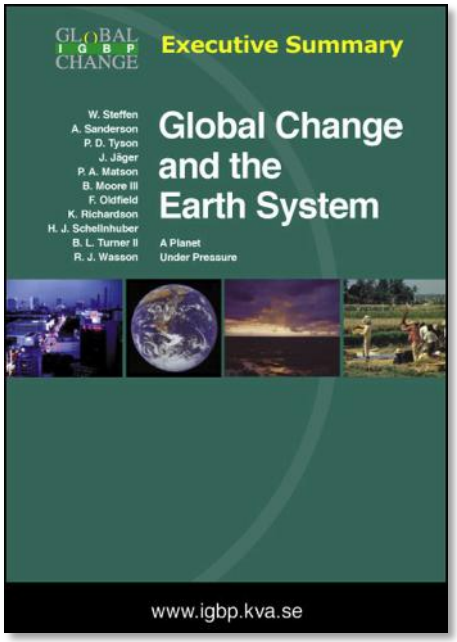












PLANET UNDER PRESSURE

RIO+20 POLICY BRIEF #1

Water security for a planet under pressure

Transition to sustainability: interconnected challenges and solutions

RIO+20 POLICY BRIEF #4

Biodiversity and ecosystems for a planet under pressure

Transition to sustainability: interconnected challenges and solutions

RIO+20 POLICY BRIEF #7

A green economy for a planet under pressure

PLANET UNDER PRESSURE

2012 MARCH 26-29 LONDON

POLICY BRIEF #8

...y vision for a ...nder pressure

...to sustainability: interconnected ...solutions

RIO+20 POLICY BRIEF #2

Food security for a planet under pressure

Transition to sustainability: interconnected challenges and solutions

RIO+20 POLICY BRIEF #3

Transforming governance and institutions for a planet under pressure

Revitalizing the institutional framework for global sustainability: Key Insights from social science research

RIO+20 POLICY BRIEF #6

Human well-being for a planet under pressure

Transition to social sustainability

RIO+20 POLICY BRIEF #9

Global health for a planet under pressure

Transition to sustainability: interconnected challenges and solutions

FORUM ON SCIENCE, TECHNOLOGY & INNOVATION FOR SUSTAINABLE DEVELOPMENT

11 to 15 JUNE 2012
RIO DE JANEIRO, BRAZIL

RIO+20 United Nations Conference on Sustainable Development

International Geosphere-Biosphere Programme Current Projects

- ✧ **Analysis, Integration & Modeling of the Earth System**
- ✧ **Global Land Project**
- ✧ **International Global Atmospheric Chemistry**
- ✧ **Integrated Land Ecosystem-Atmosphere Processes Study**
- ✧ **Integrated Marine Biogeochemistry & Ecosystem Res**
- ✧ **Land-Ocean Interaction in the Coastal Zone**
- ✧ **Past Global Changes**
- ✧ **Surface Ocean—Lower Atmosphere Study**

World Climate Research Programme (WCRP)

- ✧ **Climate and Cryosphere**
- ✧ **Climate Variability and Predictability**
- ✧ **Global Energy and Water Exchanges**
- ✧ **Stratospheric Processes and their Role in Climate**

International Human Dimensions Programme (IHDP)

- ✧ **Earth System Governance Project**
- ✧ **Global Land Project**
- ✧ **Land-Ocean Interactions in the Coastal Zone**
- ✧ **Integrated History of People on Earth**
- ✧ **Integrated Risk Governance**
- ✧ **Urbanization and Global Environmental Change**

DIVERSITAS

- ✧ bioGENESIS
- ✧ bioDISCOVERY
- ✧ ecoSERVICES
- ✧ bioSUSTAINABILITY
- ✧ agroDIVERSITY
- ✧ ecoHEALTH
- ✧ freshwaterBIODIVERSITY
- ✧ Global Mountain Biodiversity Assessment

Earth System Science Partnership

- ✧ Global Carbon Project
- ✧ Global Environmental Change and Food Systems
- ✧ Global Environmental Change and Human Health
- ✧ Global Water System Project

Future Earth is a new initiative arising from converging reviews and efforts suggesting an overarching initiative to engage new researchers, funders and stakeholders (and reenergize existing participants)

ICSU – ISSC Visioning Report

Seeking stronger partnership

Belmont Forum (funders)

Future Earth has been co-designed by a new global Alliance of partners

WMO is an observer

Future Earth needs to address urgent challenges

- Feeding 9 billion people within sustainable planetary boundaries
- Valuing and protecting nature's services and biodiversity
- Adapting to a warmer and more urban world
- Transitioning to low carbon societies
- Providing income and innovation opportunities through transformations to global sustainability
- Reducing disaster risks
- Aligning governance with stewardship

Future Earth research will focus on

- Linking fundamental to actionable Earth system research for global sustainability
- Supporting existing GEC projects and stimulating new activities
- Answers to complex questions that require international collaboration
- Co-design and co-production of knowledge
- Integration of natural, economic, engineering, arts, humanities and social sciences
- Regional to global scale

photos: www.dawide.com

futureearth

research for global sustainability

Will provide the knowledge required for societies in the world to face risks posed by global environmental change and to seize opportunities in a transition to global sustainability

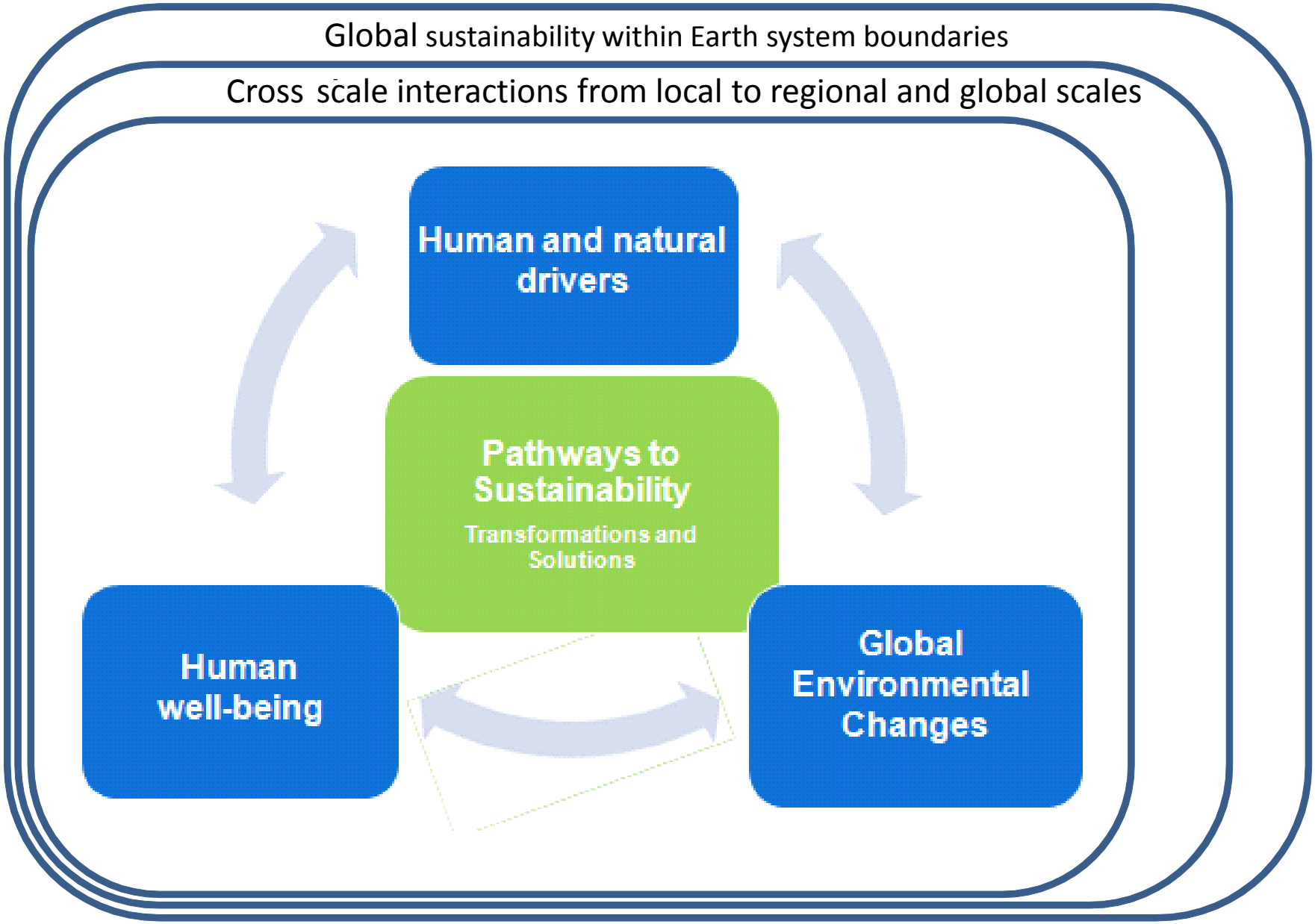
futurearth
research for global sustainability

- how and why the global environment is changing
- what are likely future changes
- what the implications are for human wellbeing and other species
- what choices can be made to reduce harmful risks and vulnerabilities and enhance resilience, and
- how this knowledge can support decisions and sustainable development

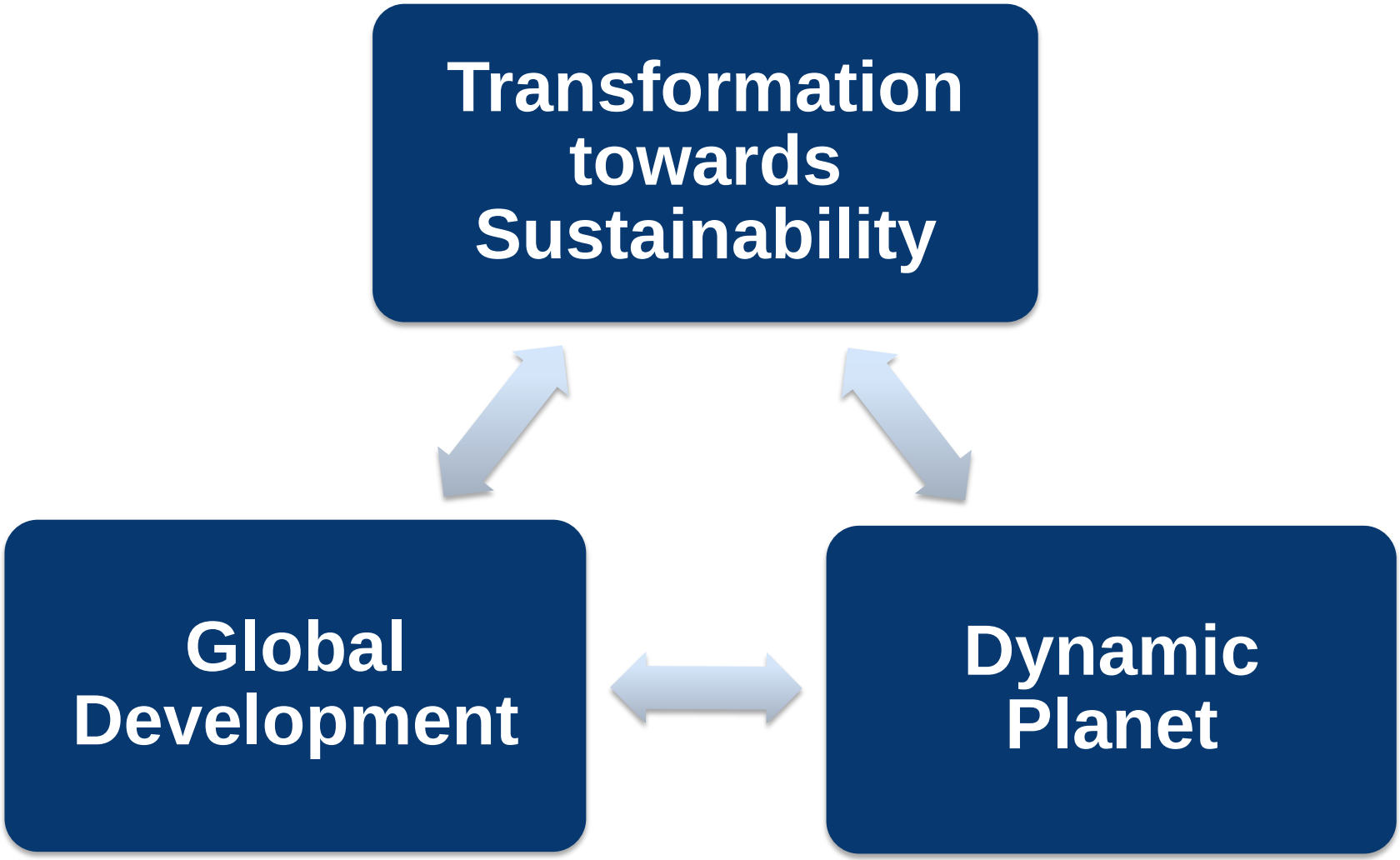
Organizing Future Earth research

1) A conceptual framework
   - overall concept
2) A set of research themes
   - broad areas in which research will be carried out
   - example research questions
3) Populate with existing and new projects
4) Propose a governance framework for the initiative

Conceptual framework for Future Earth

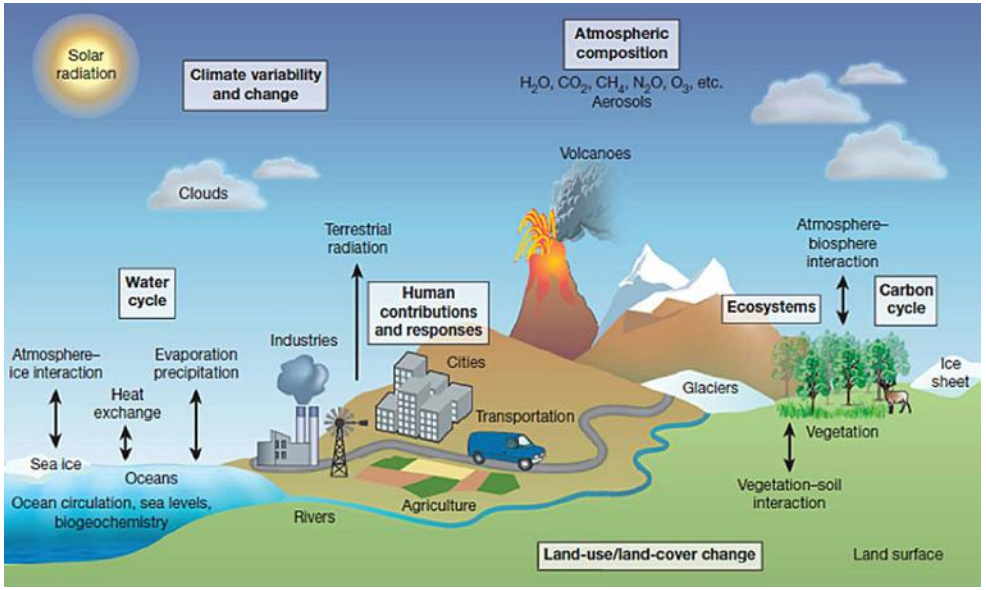


Future Earth Research Themes



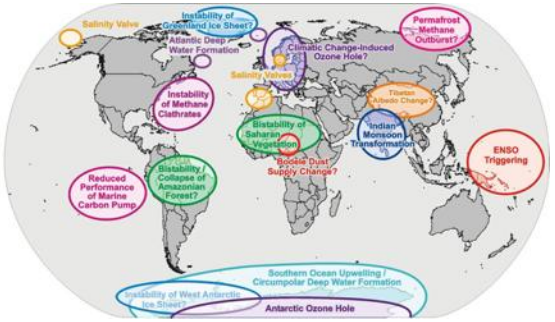
Dynamic Planet:

Observing, explaining, understanding, projecting earth, environmental and societal system trends, drivers and processes and their interactions; anticipating global thresholds and risks.



Dynamic Planet: Possible questions

- What are the states and trends of global change?
- What are the risks and effects of crossing regional to global thresholds/ planetary boundaries/tipping points?
- What kind of integrated global and regional observing systems and data infrastructures are needed?
- What can be understood and anticipated about critical zones and biomes such as coasts, tropical forests, or polar regions?



Global development:

Providing the knowledge for sustainable, secure and fair stewardship of food, water, biodiversity, health, energy, materials and other ecosystem functions and services.

Global development: possible questions

- How can we ensure sustainable access to food, water, clean air, energy and materials for current and future populations?
- What are the implications of climate change for food, water, health, human settlements, and ecosystems?
- What are the links between biodiversity, ecosystems, human wellbeing and sustainable development?
- What options are available to provide energy for all with reduced environmental impacts?
- How does global environmental change affect distinct groups in society?

Transformation towards Sustainability:

Understanding transformation processes and options, assessing how these relate to human values, emerging technologies and economic development pathways, and evaluating strategies for governing and managing the global environment across sectors and scales.

Transformation towards sustainability

What are approaches to governance for human prosperity and global sustainability?

Can emerging technologies provide viable solutions to global environmental change and promote sustainable development?

How do values, beliefs and worldviews influence individual and collective behavior towards more sustainable lifestyles, patterns of trade, production and consumption?

What do we know about past transformations of the Earth system, ideas, technology and economy and how can this knowledge and lessons learned guide future choices?

Transformation towards sustainability

- What are the longer-term pathways towards sustainable urban futures and landscapes, successful and sustainable ‘blue societies, and a green economy?
- How can the earth and social system adapt to environmental changes that could include warming of more than 4C over the next century?
- What are the implication of global changes for economic frameworks?
- What are the implications of efforts to govern and manage the earth system for sustainability for scientific observations, monitoring, indicators and analysis?

Future Earth Cross Cutting Capabilities

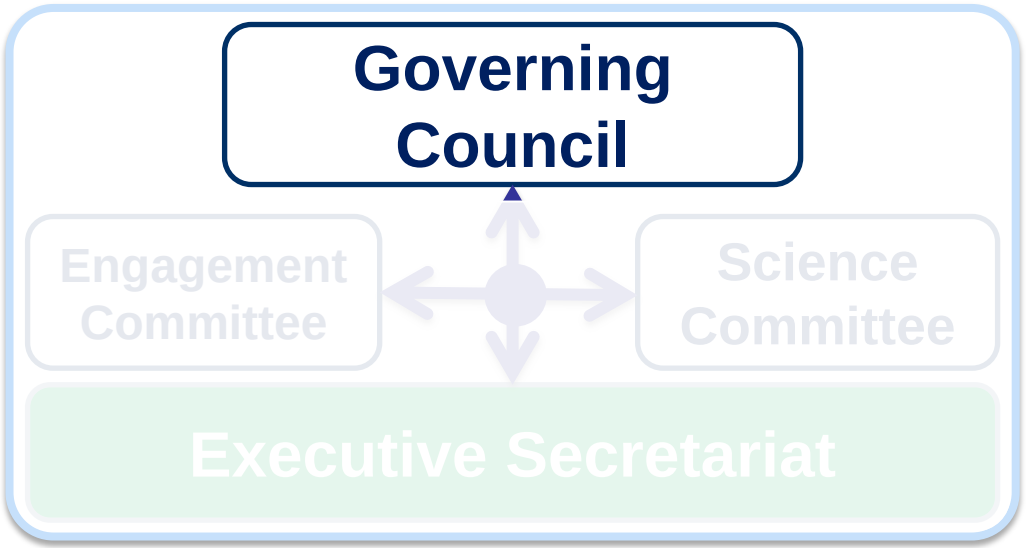
To facilitate integration across research themes, science will be supported by a set of cross-cutting capabilities in science and outreach (many delivered through partnerships).

	Activity
S1	Observing Systems
S2	Data Systems
S3	Earth System Modeling
S4	Theory Development
O1	Synthesis and Assessments
O2	Capacity Development and Education
O3	Communication
O4	Science-Policy Interface and interactions

Governance: The Alliance

- A growing, multi-stakeholder partnership
- Established Future Earth
- Will promote and support the further development of Future Earth
- By building and maintaining the enabling conditions for Future Earth to operate successfully

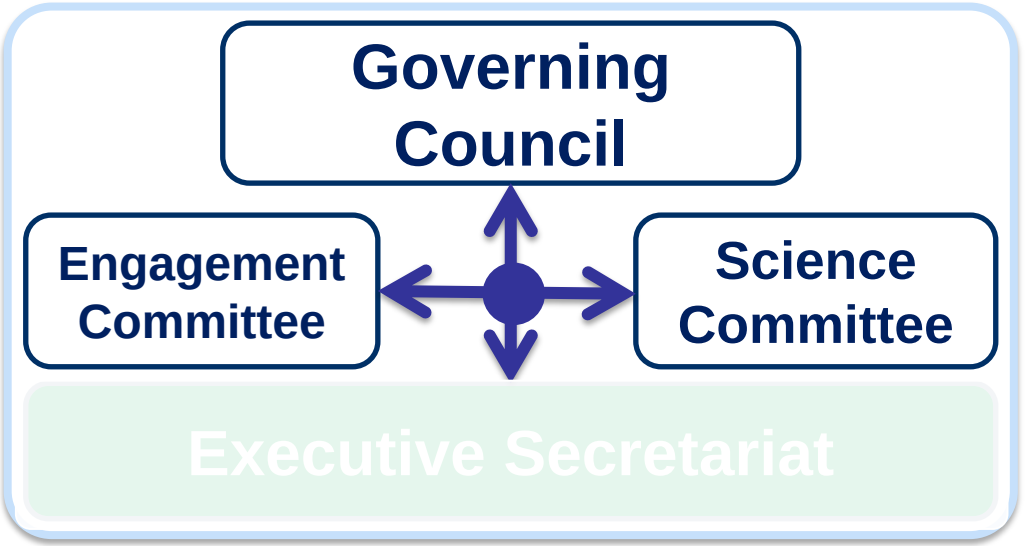
Consultations timeline



- The overarching decision-making body, providing strategic guidance on and oversight of Future Earth's operations and resource mobilisation
- To comprise scientists from different fields, policymakers, business, industry and other stakeholders from different parts of the world
- Will be appointed by the Alliance
- Between now and May 2014 the Alliance will function as an interim Governing Council

The Engagement Committee:

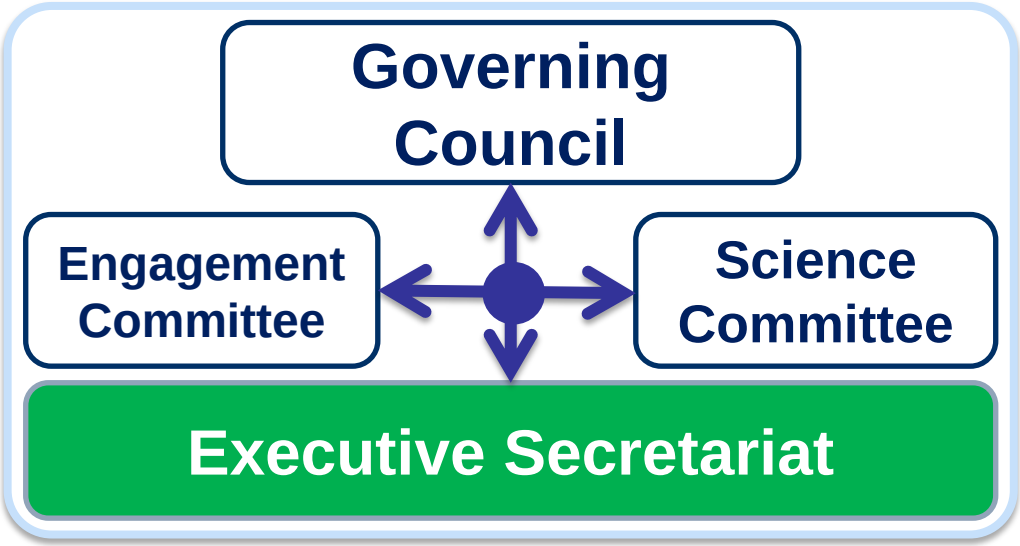
- To guide/oversee implementation of co-design/production/
- dissemination of research
- To include voices from e.g. business, civil society and government
- Will be established by late 2013 and appointed by the Alliance
- Role in outreach, communication, regional activities



The Science Committee:

- Provide scientific guidance, propose new projects and priority issues, and secure the highest quality research
- Represent the full spectrum of scientific fields, as well as scientists from other sectors
- Will be established early 2013; appointed by ICSU/ISSC on behalf of the Alliance

They must work closely together



- To implement the strategies and activities approved by the Governing Council, carrying out the day-to-day functions of Future Earth
- To act as an integrator and facilitator, also coordinating access to cross-cutting capabilities
- To be established via an open, competitive call that will be issued by the Alliance
- An interim Secretariat, bringing together capacities of existing GEC Programme Secretariats will be operational as from early 2013

Future Earth as a globally representative platform

But also a globally distributed platform to ensure that research, capabilities and partnerships are developed at the most relevant level(s)

Role of regions in linking across scales, integrating knowledge, catalysing transformative initiatives

Timeline towards implementation

GECs

Important Dates

futureearth
research for global sustainability

ESSP — Ended Dec 2012 — **FE Transition Team**

Spring 2013 — **Interim Secretariat**

Fall 2013 — **Project transition begins**

IHDP International Human D on Global Environment — Ends Jun 2014

Spring 2014 — **Permanent Secretariat**

DIVERSITAS an international programme of biodiversity science — Ends Dec 2014

GLOBAL IGBP CHANGE International Geosphere-Biosphere Programme — Ends Dec 2015

Dec 2015 — **Projects transition is complete**

WCRP World Climate Research Programme — **Continues as key partner**

futurearth
research for global sustainability

Recap of Webinar I

New approach to global environmental change research

Enhancing the foundation: the role of disciplinary research

Fostering greater inter- and trans-disciplinary research

Fostering co-design and co-production of knowledge

photos: www.dawide.com

futureearth
research for global sustainability

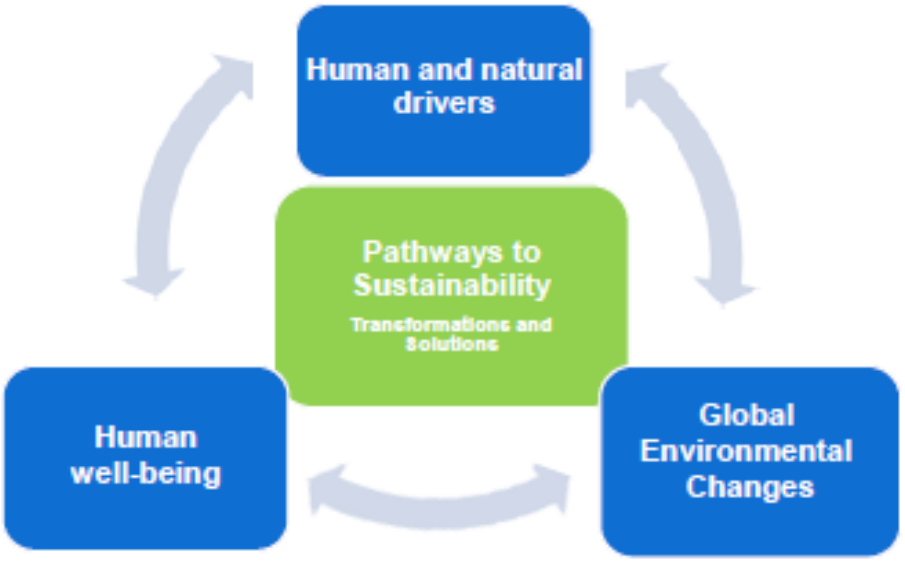
Enhancing the foundation: the role of disciplinary research in Future Earth

Bradley Cardinale

UNEP IGFA UNESCO BELMONT FORUM ICSU ISSC UNITED NATIONS UNIVERSITY WMO

Research framework …

CONCEPTUAL FRAMEWORK



RESEARCH THEMES

Dynamic planet—understand and predict change

Global development—deal with most pressing needs

Sustainable future—develop strategies for transition

CROSS-CUTTING CAPABILITIES

Observing systems, data systems, earth system modeling, theory development

Key principle of Future Earth

disciplinary research is the bread-and-butter

Figure 5: Schematic of various levels of public funding associated with GEC research

WCRP
World Climate Research Programme

DIVERSITAS
an international programme of biodiversity science

GLOBAL CHANGE
IGBP
International Geosphere-Biosphere Programme

IHDP
International Human Dimensions Programme on Global Environmental Change

Key principle of Future Earth

build around the core disciplinary projects

… 8 core projects

ex. bioGENESIS

ex. ecoSERVICES

… 8 core projects

ex. GLP

ex. AIMES

… 4 core projects

ex. CliC

ex. CLIVAR

… 6 core projects

ex. Global Land project

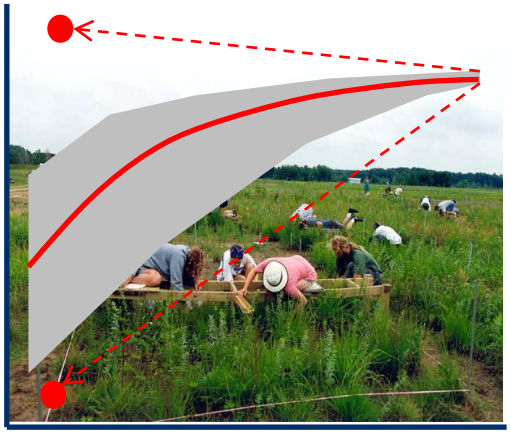
ex. Earth System Gov project

Example from DIVERSITAS …

ecoSERVICES

How does biodiversity affect ecosystem functioning?
How do functions translate to ecosystem services?
How will change in services impact human well-being?

Ecosystem function
(ex. biomass production, decomposition, nutrient recycling)



Biological diversity
(genes, species, and functional traits)

Syntheses of …

574	experiments
541	types of organisms
30/5	biomes/continents
1,417	estimates of diversity effects

Balvanera et al. *Ecol Lett* 2006, Cardinale et al. *Nature* 2006, Stachowicz et al. *Ann Rev Ecol Syst* 2007, Cardinale et al. *Proc Nat Acad Sci* 2007, Cadotte et al. *Proc Nat Acad Sci* 2008, Srivastava et al *Ecology* 2009, Cardinale et al. *Am J Bot* 2011, Griffin et al. *Ecology* 2013

>1,700 papers, 36 diversity-service relationships

Category		Ecosystem service	S.P.U.	D.L.	Source	Study type	N	Relationship	
								Pred	Act
Provisioning	Crops	Crop yield	PI	G	DS	Exp	575	↑	↑
				S	DS	Exp	100	↑	↕
	Fisheries	Stability of fishery yield	Fi	S	PS	Obs	8	↑	↑
	Wood	Wood production	PI	S	DS	Exp	53	↑	↑
	Fodder	Fodder yield	PI	S	DS	Exp	271	↑	↑
Regulating	Biocontrol	Control of herbivorous pests *(bottom-up effect of plant diversity)*	PI	S	DS[a]	Obs	40	↑	↑
					DS[b]	Exp	100	↑	↑
					DS[c]	Exp	287	↑	↕
					DS[d]	Exp	100	↑	0
		Control of herbivorous pests *(top-down effect of natural enemy diversity)*	NE	S/T	DS[a]	Obs	18	↑	↑
				S	DS[b]	Exp/Obs	266	↑	↑
					DS[c]	Exp	38	↑	↕
		Resistance to plant invasion	PI	S	DS	Exp	120	↑	↑
		Disease prevalence *(on plants)*	PI	S	DS	Exp	107	↑	↑
	Climate	Primary production	PI	S	DS	Exp	7	↑	0
		Carbon sequestration	PI	S	DS	Exp	479	↑	↑
		Carbon storage	PI	S/T	PS	Obs	33	↑	↕
	Soil	Soil nutrient remineralization	PI	S	DS	Exp	103	↑	↑
		Soil organic matter			DS	Exp	85	↑	↑
	Water	Freshwater purification	M	G/S	PS	Exp	8	↑	0
	Pollination	Pollination	In	S	PS	Obs	7	↑	↕

39%	supported
17%	mixed data
8%	incorrect
36%	insuff. data

Cardinale et al. Biodiversity loss and its impact on humanity. *Nature* 2012.

Biodiversity & Ecosystem Services | ecoSERVICES | Global C project

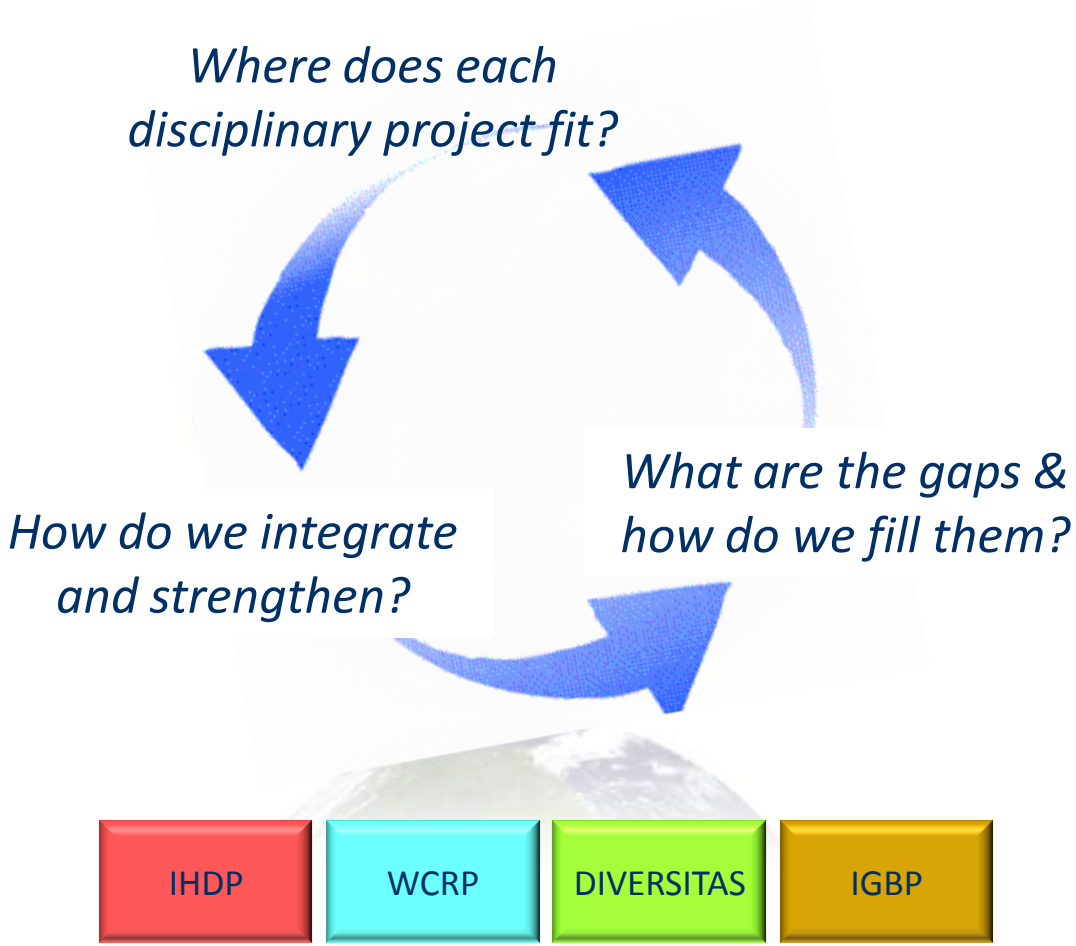
disciplinary research is the bread-and-butter
bridging disciplinary work → stronger foundation

RESEARCH THEMES

Dynamic planet—What is the risk of crossing planetary boundaries or tipping points for biodiversity & ecosystem services?

Global development—How does biodiversity influence human well-being and sustainable development?

Sustainable future—Can we identify 'win-win' scenarios for conservation and sustainable use of natural resources?



disciplinary research is the bread-and-butter
bridging disciplinary work → stronger foundation

RESEARCH THEMES

Dynamic planet—understand and predict change

Global development—deal with most pressing needs

Sustainable future—develop strategies for transition

Other examples

Climate change, water security, geoengineering, collective behavior, human health, urbanization, equitable access, coastal zones, etc.

futurearth
research for global sustainability

Recap of Webinar I

New approach to global environmental change research

Enhancing the foundation: the role of disciplinary research

Fostering greater inter- and trans-disciplinary research

Fostering co-design and co-production of knowledge

photos: www.dawide.com

futureearth
research for global sustainability

Fostering greater inter- and trans-disciplinary research under Future Earth

Tom Pedersen

Interdisciplinary and Engagement Challenges for Future Earth: What Works?

Tom Pedersen,
Pacific Institute for Climate Solutions (PICS)
University of Victoria, Canada

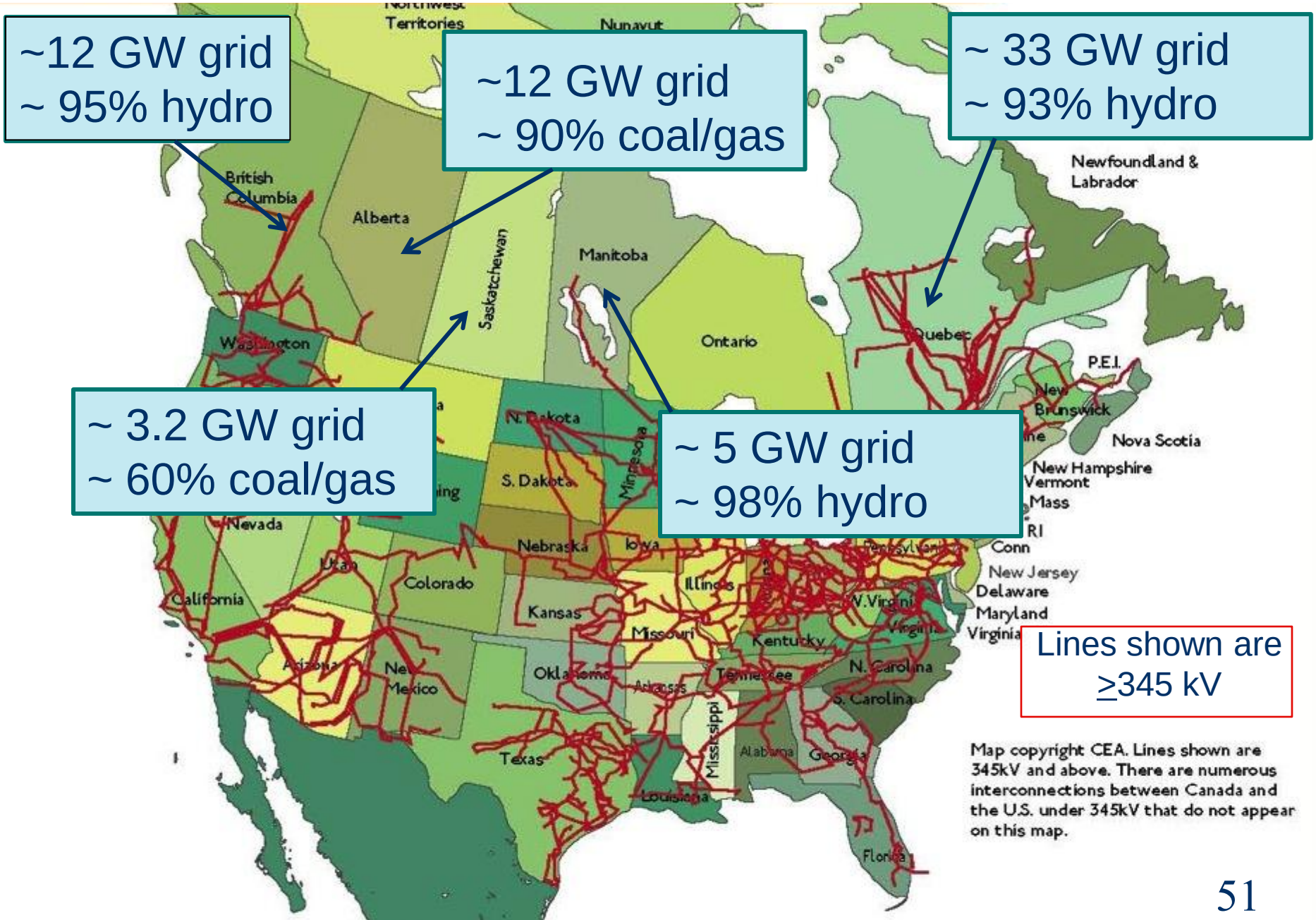
Three challenges:

- Developing robust climate-action strategies based on framing key questions that are tackled by interdisciplinary teams.

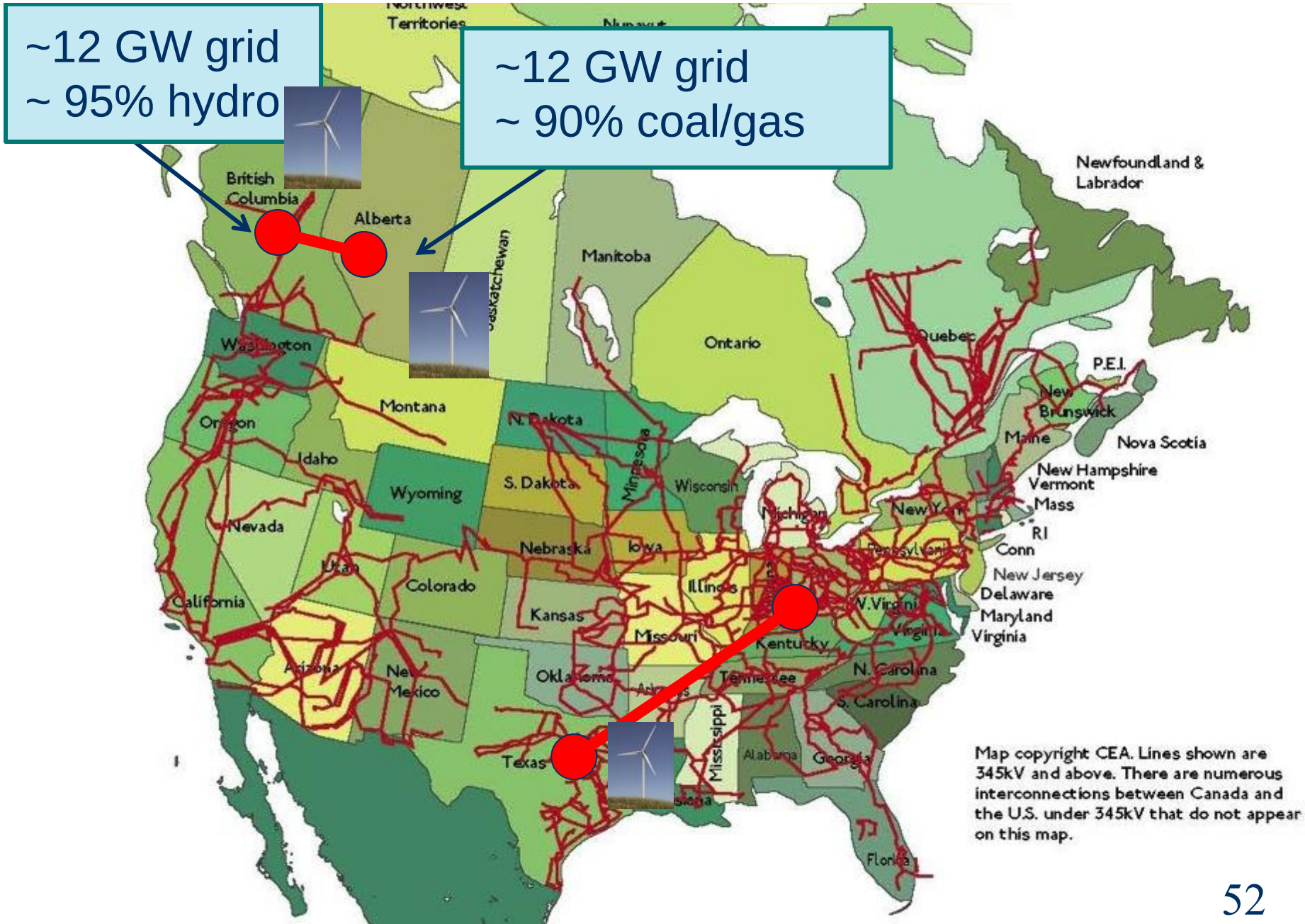
- Engaging with and communicating to national governments, international institutions, industry and the international public.

- Move away from speaking to the choir.

A North American example: Integrating the electrical grid



A North American example: Integrating the electrical grid



A North American example: Integrating the electrical grid

ICSU
International Council for Science

The question:

- How much coal (and/or natural gas) can we remove from our electricity-generation system by integrating the grid so as to accommodate more renewables?

The approach – first, make the case:

- Build an interdisciplinary team—in this case, economists and marketing experts, engineers, systems modelers, hydrologists, wind and solar resource experts, among others—to produce a thorough ***quantitative*** analysis of costs, benefits, and impacts.

- Engage from the beginning with utilities authorities, regional government ministries (Energy, Environment, Resources…), the business sector – bring them directly into the mix.

Advantages of the approach:

- Choosing a question that is timely, compelling, and promises to yield emissions reductions (or an adaptation scheme) is key. ***It opens doors directly into the policy realm.***

- Interdisciplinarity demands consideration of ***all*** aspects: political, physical, economic, social.

- Approach could be/would be transferable to other jurisdictions, with appropriate engagement.

futurearth
research for global sustainability

Recap of Webinar I

New approach to global environmental change research

Enhancing the foundation: the role of disciplinary research

Fostering greater inter- and trans-disciplinary research

Fostering co-design and co-production of knowledge

photos: www.dawide.com

futureearth
research for global sustainability

Fostering greater inter- and trans-disciplinary research under Future Earth

Roberto Sanchez

UNEP
IGFA International Group of Funding Agencies for Global Change Research
UNESCO United Nations Educational, Scientific and Cultural Organization
BELMONT FORUM
ICSU International Council for Science
ISSC international social science council
UNITED NATIONS UNIVERSITY
WMO

futurearth
research for global sustainability

Recap of Webinar I

New approach to global environmental change research

Enhancing the foundation: the role of disciplinary research

Fostering greater inter- and trans-disciplinary research

Fostering co-design and co-production of knowledge

photos: www.dawide.com

futureearth
research for global sustainability

Fostering co-design and co-production of knowledge under Future Earth

Karen O'Brien

FOSTERING CO-DESIGN AND CO-PRODUCTION OF KNOWLEDGE UNDER FUTURE EARTH

futureearth
research for global sustainability

”Co-design and co-production”

What do we mean?

How do we do it?

What are the challenges?

Example: Transforming food cultures

What do we mean?

“Co-design and co-production of knowledge include various steps where both researchers and other stakeholders are involved but to different extents and with different responsibilities.

Whilst researchers are responsible for the scientific methodologies, the definition of the research questions and the dissemination of results are done jointly.

Co-design and co-production also recognizes that researchers, information and models are now based in many different types of organizations and the great benefits from research collaborations between, for example, universities, NGOs, and the private sector. “

How do we do it?

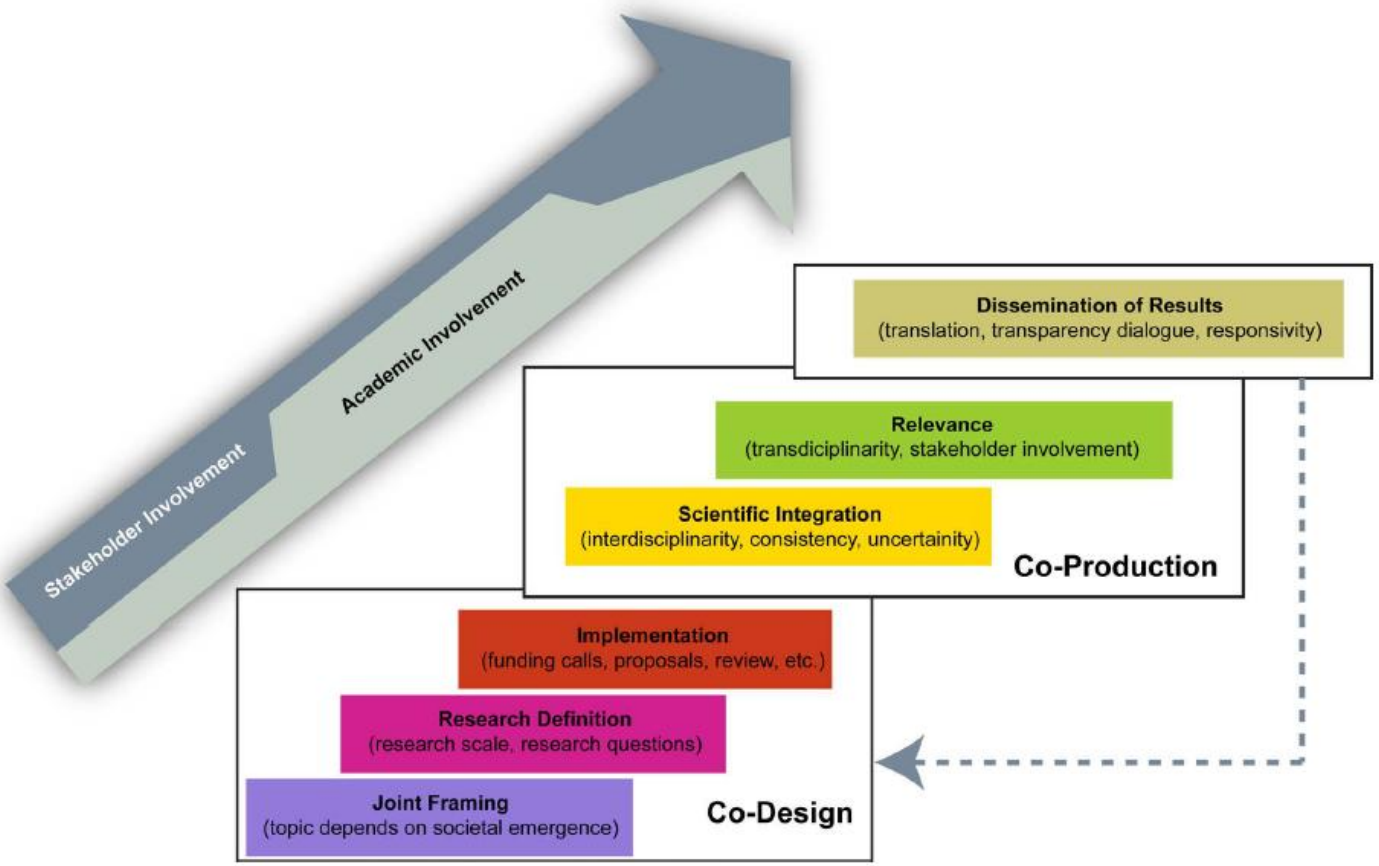


Figure 1: Steps and involvement in co-design and co-production of scientific knowledge[4]

What are the challenges?

Direct challenges : Engaging stakeholders, building trust, maintaining scientific integrity, *and* being relevant.

Deeper challenges: Recognizing different types of knowledge, different values, interests and motivations, and different ways of looking at both problems and solutions.

Transforming Food Cultures

Climate change, biodiversity loss, ocean acidification, N & P cycles, etc.

Stakeholders: farmers, consumers, researchers, retailers, chefs

Products vs. Ingredients
Cost vs. Taste

Macro trends: meat consumption; vegetable protein; seafood availability; artisanal foods, etc.

Co-design and co-production issues

Joint framing: What are the questions? (food availability, changing tastes, decreasing nutrient content, increasing costs, etc.)

Research definition: What do we need to know? What methods will be used?

Implementation: Where is the research carried out and by whom? Regional contexts?

Scientific integration: Seeing it from a systems perspective

Relevance: Who is most interested in the results? Chefs? Consumers? Farmers?

Dissemination: Transformative cook books? Information markets?

FUTURE EARTH 2013 – MAY 30, 2013

THIS MEETING IS BEING RECORDED

- **Starting Time?** We will begin promptly at the announced starting time (Eastern Time).
- **Webinar Audio?** US/Canada participants dial 1-888 -469-1754 or 1-773-756-4633 and announce passcode: Future Earth to be joined to the audio bridge in listen-only mode. International Participants dial the appropriate free-phone number for your specific country listed on the chart found at URL: http://sites.nationalacademies.org/PGA/biso/futureearth/index.htm.
- **Q&A Session?** Questions will be accepted **via live audio and via email** at future-earth@nsf.gov for reply during the announced Q&A period.
- **Captioning?** Go to: **www.fedrcc.us/** and enter **event confirmation # 2134316** from a separate browser page to view streaming captions**.**
- **Handouts/Slides?** Presentation slides and webinar evaluation form can be found at: http://sites.nationalacademies.org/PGA/biso/futureearth/index.htm.
- **To Get Help?** Send private WebEx chat to meeting host**,** call WebEx at 1-800-857-8777 and press 0 for technical support, or Email: kotts@nsf.gov.
- **Feedback?** Give us your feedback at: https://www.surveymonkey.com/s/9SJKX9G