



**INTERNATIONAL
COUNCIL
FOR SCIENCE**



SCWS 2017

Connecting the World
for a Sustainable Future

Co-design for Transformation - Connecting the World for a Sustainable Future

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Co-Chair, Governing Council, Future Earth
Professor Emeritus, Western University, London, Canada**

Presentation to:

**Science Centre World Summit 2017
National Museum of Emerging Science and Innovation
(Miraikan)**

futureearth
research for global sustainability



SUSTAINABLE DEVELOPMENT

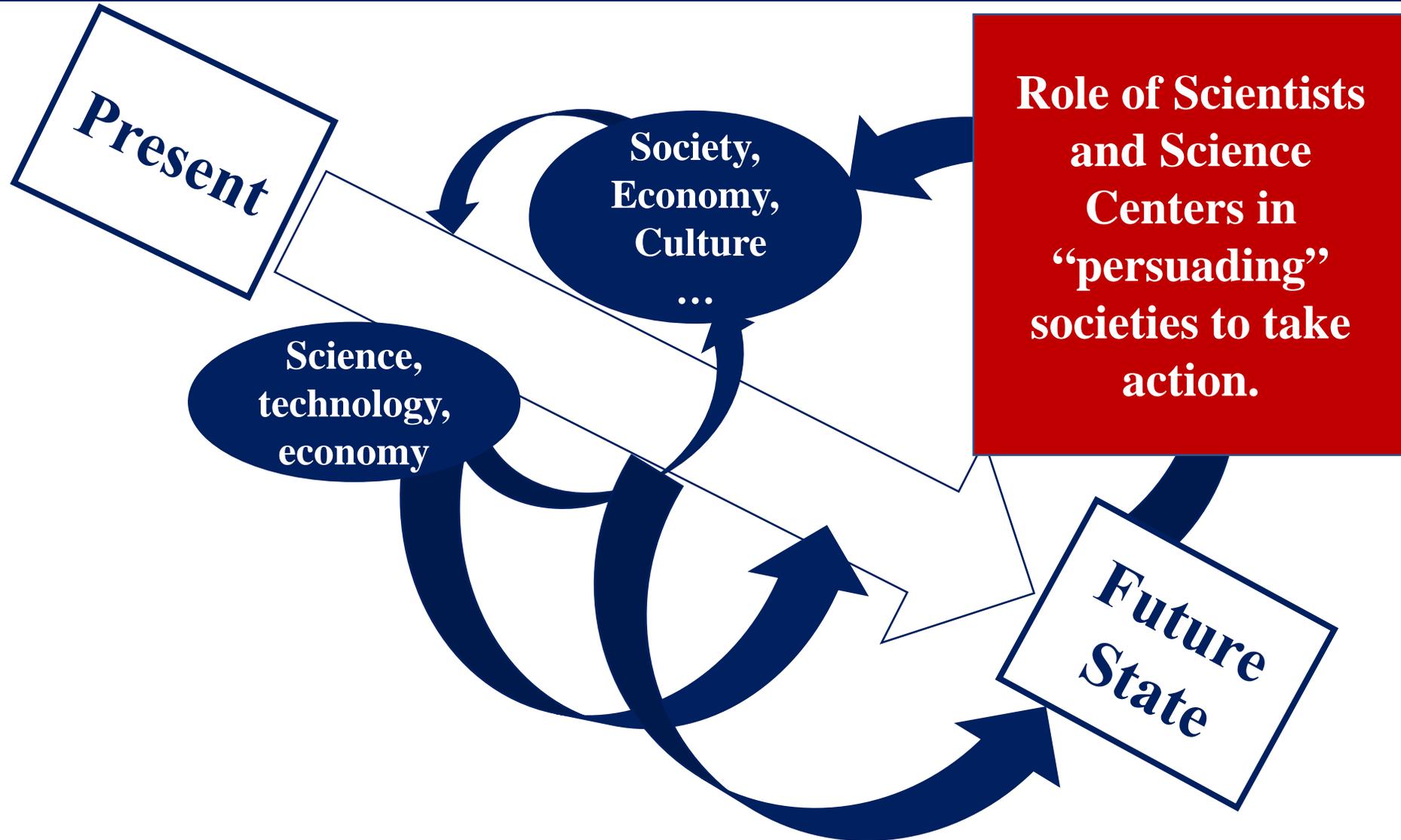
*“Humanity has the ability to make development sustainable - to ensure that it meets the needs of the **present** without compromising the ability of **future generations** to meet their own needs”*

(World Commission on Environment and Development, 1987)

Keys:

- **linking social, economic, technology, science and environmental issues and the future with the present**
- **Evidence-based decision making – including understanding of our societies and how they “respond”.**

SUSTAINABLE DEVELOPMENT



SCIENCE FOR SUSTAINABLE DEVELOPMENT

Keys: Evidence-based decision making:

- **Transdisciplinary science – across natural, social, economic, health, engineering, ...**
- **October 26, 2017 – International Council for Science (ICSU) and International Social Sciences Council voted (over 90%) to MERGE**
- **➡ International Science Council – ISC**
- **40 international scientific unions and associations + > 140 national/regional org.**
- **Vision of advancing all sciences as a global public good**

SDGs – 17 with 169 Targets

Interconnections



SUSTAINABLE DEVELOPMENT GOALS



Important to understand and “deal” with interactions. Role of Scientists and Science Centers.



SDGs – Connecting across the Global Policy Agenda – Global 2030 Agenda



A New Era

Global view from Space ~ 20th Century
Genomic view on the atomic level ~ 21th Century

Earth is a part of the Universe beyond specific design and yet, all life forms are connected

Science and technology has provided a New Perspective "TSUNAGARI"



GJAXA/NH



SCWS 2017

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for a Sustainable Future

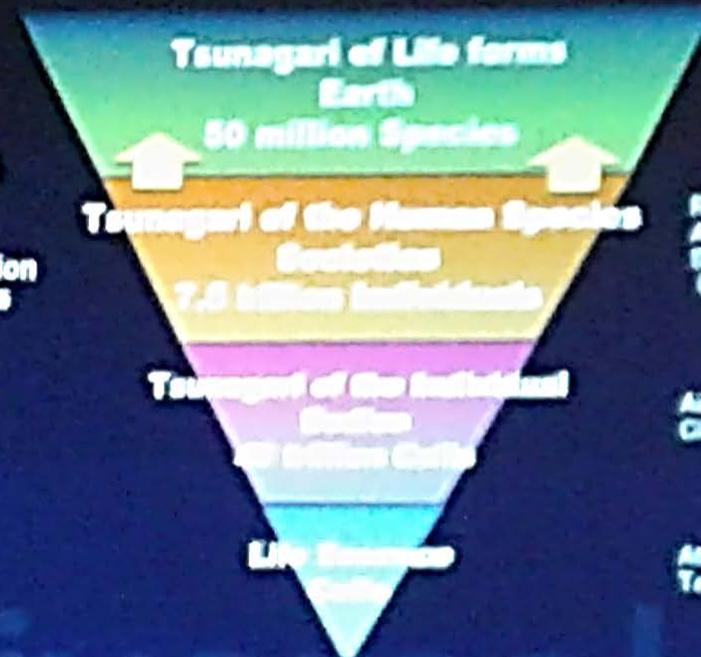


TSUNAGARI

Universally connected network

Transformation

Science Communication
Integrates and Applies
Societies' Culture
(Wisdom)



Global Wisdom

Global Environment
Biodiversity, Sustainability
Symbiosis, Genome

Religion, Military, Nations, Politics,
Arts, Technology, Education, Business,
Science, Sports, Media
(Human Culture)

Air, Water, Food
Clothes, Shelter

Atmosphere, Energy
Temperature, Light, Gravity

VENUE: 31/10/2017-
3/11/2017
L1000 BERSEK
All rights reserved



- Welcoming the adoption of United Nations General Assembly resolution A/RES/70/1, “Transforming our world: the 2030 Agenda for **Sustainable Development**”, in particular its **goal 13**, and the adoption of the Addis Ababa Action Agenda ... and the adoption of the **Sendai Framework for Disaster Risk Reduction**,

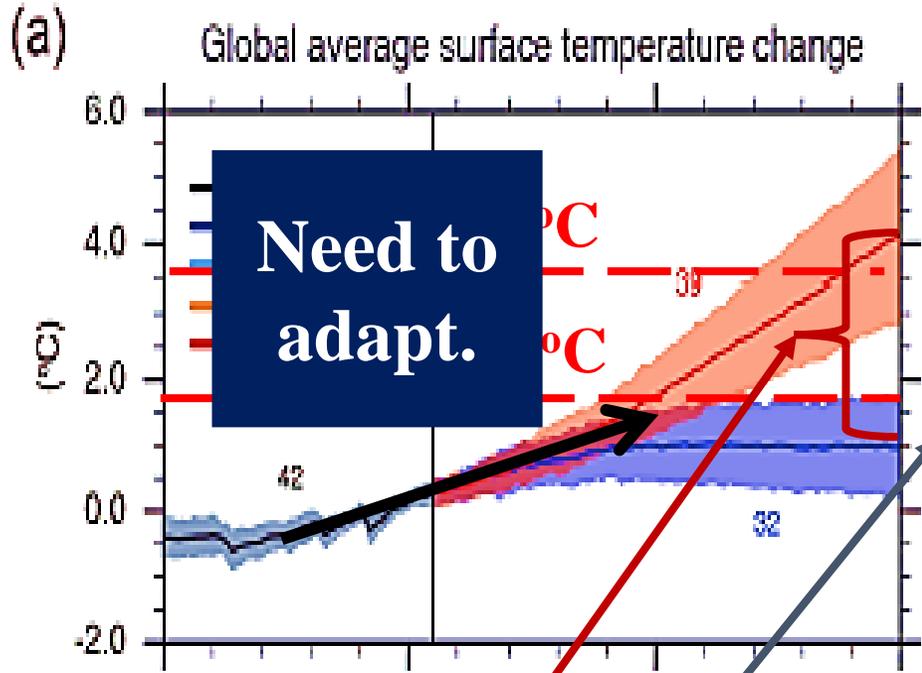
Article 2

1. This Agreement, .. aims to strengthen the global response to .. threat of climate change, .. context of sustainable development and efforts to eradicate poverty:

(a) **Holding the increase .. global average temperature to well below 2 °C above pre-industrial levels and pursuing .. Limit .. to 1.5 °C .., significantly reduce the risks and impacts of climate change; MITIGATION**

(b) **Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production; ADAPTATION**

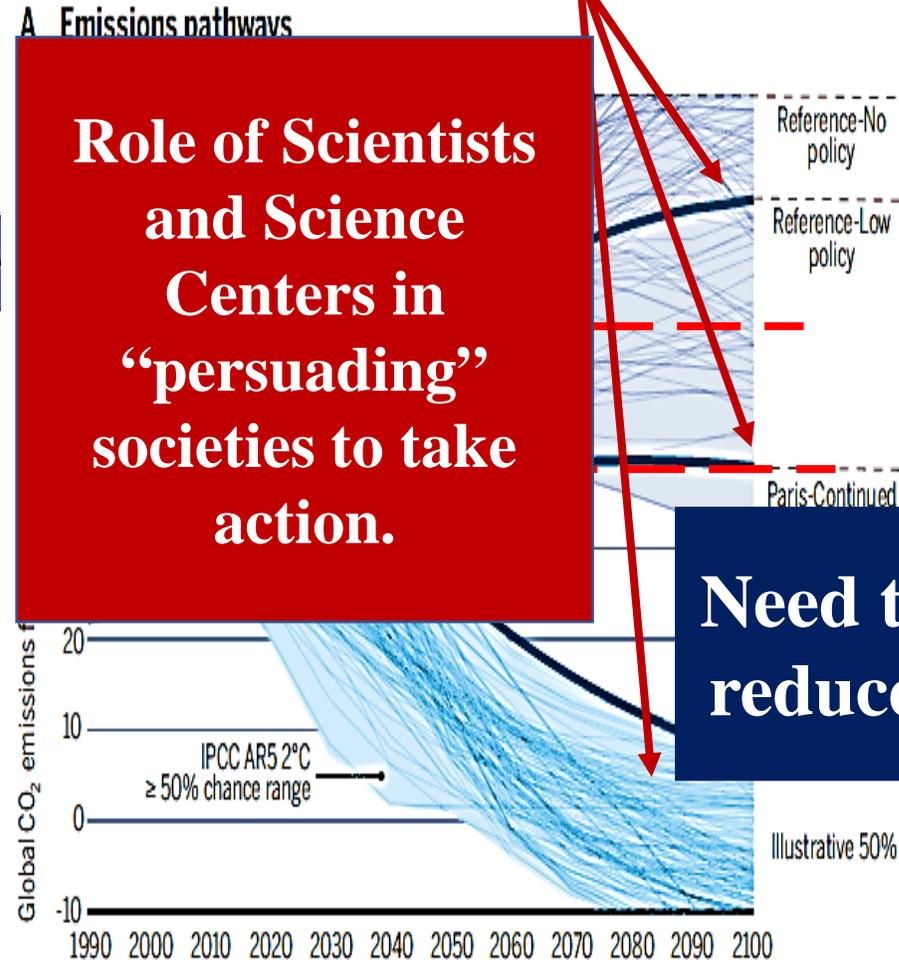
Climate Projections for future



Relative to pre-industrial T 2050

**Climate Projections
Uncertainties:**
**Natural Climate Science
Human "climate" science**

Societal Choices



**Role of Scientists
and Science
Centers in
"persuading"
societies to take
action.**

**Need to
reduce.**

*The post-2015 development agenda,
financing for development, climate change
and disaster risk reduction ...*

Lead - S&T
Major Grp



*Ensuring credible links, ... between these processes will
contribute to building resilience and achieving the global goal
of eradicating poverty.” ...action within and across sectors by*

States at local, national, regional and global levels

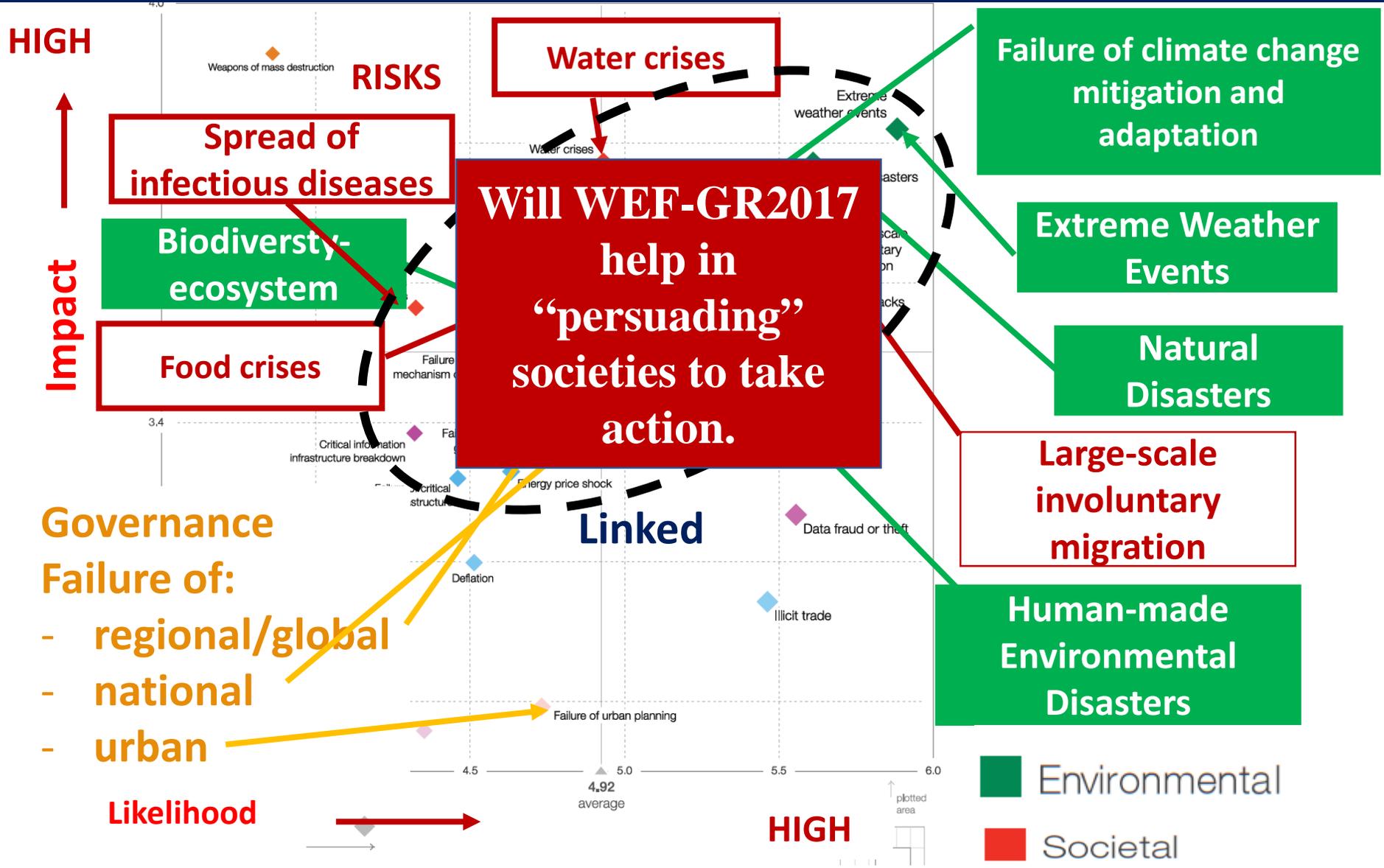
Four priority areas for Disaster Risk Reduction

1. Understanding disaster risk;
2. Strengthening disaster risk governance to manage disaster risk;
3. Investing in disaster risk reduction;
4. Enhancing disaster preparedness and to “Build Back Better” in reconstruction.

Global Forum on S&T
Disaster Resilience 2017-
Tokyo

Major Global Challenges – “Wicked” problems

Global Risks 2017 - World Economic Forum



Governance Failure of:

- regional/global
- national
- urban

Likelihood →

ADDRESSING MAJOR GLOBAL CHALLENGES

**Global Policy
Agenda
2015-2030**



**Global Research
Agenda**

**Paris
Climate
Agreement**



**Sustainable
Development
Goals**



**Disaster
Risk Reduction
Sendai**



**Urban
Agenda
2016**



**Integrated
Science-Policy
Interface**



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ISC- 2018

CO-DESIGN

Science Centers

1. Join in
2. Communications to global community - connect the issues
3. Support – portray – explain the science
4. Motivate the populations – and governance.

Looking back in history

It was
SPUTNIK

Sputnik was the beginning of
space-based observation which
has totally changed our way of
seeing our planet.

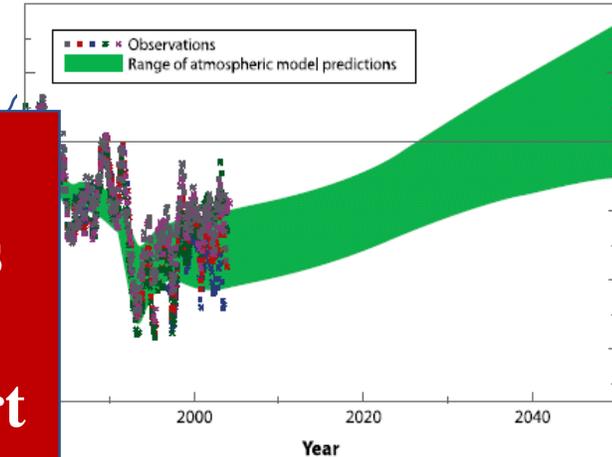
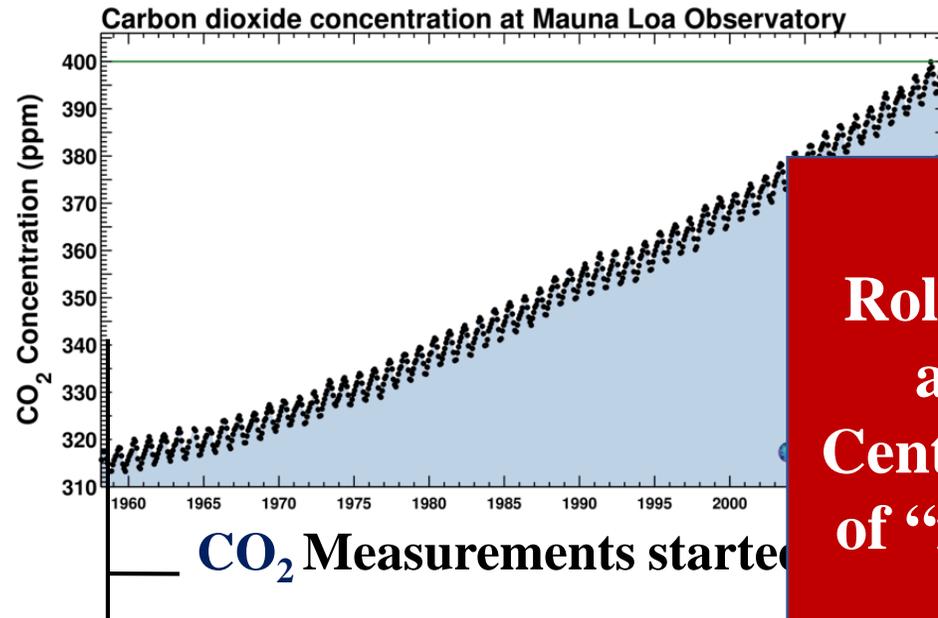


Space Exploration Gifts
to Sustainable Future

Mamoru Mohri



Greenhouse effect - Ozone Depletion



**Role of Scientists
and Science
Centers in support
of “fundamental”
science.**

Measurements started in 1957

1957 –quite a year

- Sputnik
- First systematic global carbon dioxide measurements
- First systematic global stratospheric ozone measurements
- **WHY?**
- **The International Geophysical Year (IGY) of the International Council of Science - ICSU**

International Council for Science



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Key members and associates of ICS



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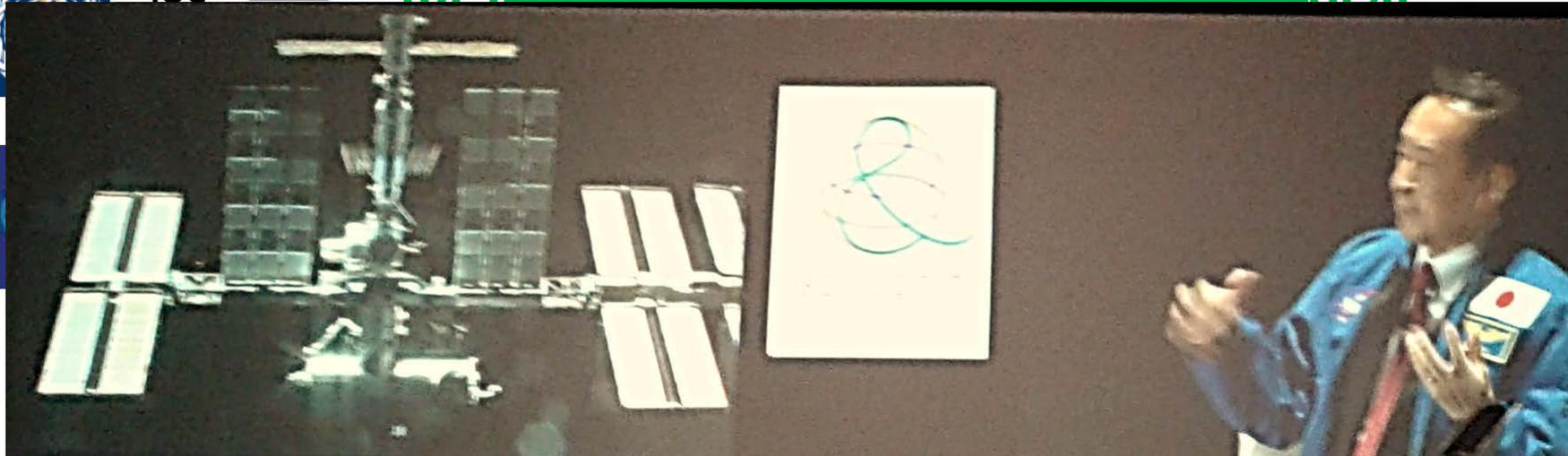
r.

- Now merging with International Social Sciences Council - International Science Council – ISC
- 40 international scientific unions and associations + > 140 national/regional org.
- Vision of advancing all sciences as a global public good



- Mission is to facilitate the analysis and prediction of climate and change for the future

Emissions → temperature + climate?



assessments.



advances society's ability to cope with high impact weather through research focused on improving time and utilization of weather

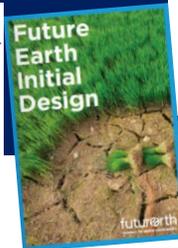
More extreme weather? Which types?
How to get out forecasts?

Planning and Conduct of Science Programs

- Traditional Research programs
- Design – working groups of scientists
- Conduct research and then report on what we found.
- **CO-DESIGN** – also called **participatory design** - is an approach to design attempting to **actively involve all stakeholders** (e.g. employees, partners, customers, citizens, end users) **in the design process to help ensure the result meets their needs and is usable**. Participatory design is an approach which is focused on processes and procedures of design and is not a design style. (Wikipedia)

International Research Collaboration Future Earth

Transition
Team
2011-2012



2007-8



2008-



2012-



2001
Earth System
Science Partnership



WORLD DATA SYSTEM



Established
1980
World Climate Research Programme



2015



futureearth
research for global sustainability



1985

2016



1991
DIVERSITAS



1996
IHDP
International Human Dimensions Programme
on Global Environmental Change



2020+

futureearth

Research. Innovation. Sustainability.



Future Earth:
Accelerating transformations to
global sustainability
through research and innovation

Amy Luers
Executive Director
Future Earth

Image: NASA

Goal:

To 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



Governing Council

Role of Scientists and Science Centers in co-designing science program and maximizing outcomes.

How can we “best” involve society to have approaches for the “right” future?

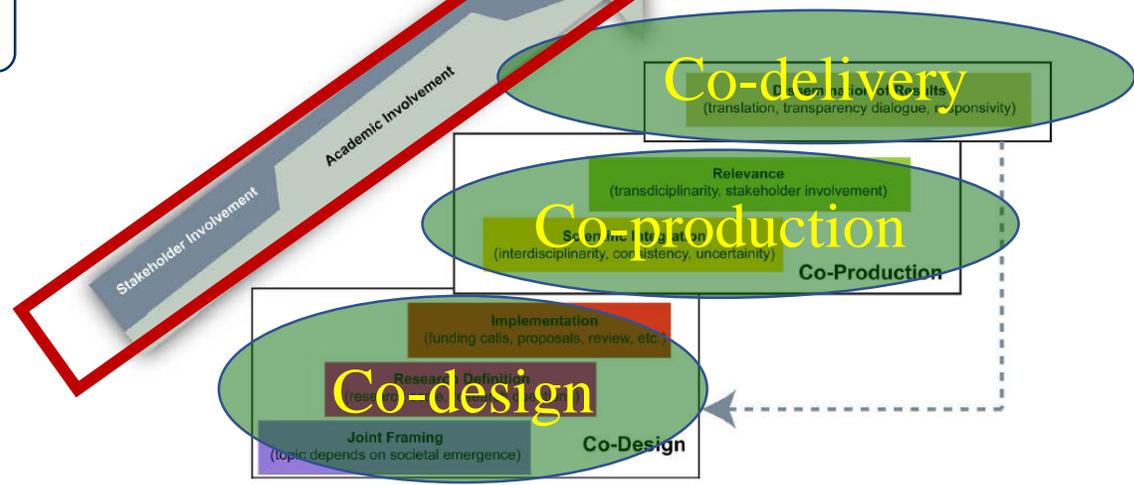


Figure 1: Steps and involvement in co-design and co-production of scientific knowledge⁴

Knowledge-Action Networks are collaborative frameworks that facilitate highly integrative sustainability research.

- **Their aim is to generate the multifaceted knowledge needed to inform solutions for complex societal issues.**
- **They are the essential links to key focal challenges.**

- **Water-Energy-Food Nexus**
- **Oceans**
- **Transformations**
- **Natural Assets**



- **Sustainable Development Goals**
- **Cities**
- **Health**
- **Finance & Economics**
- **Disasters**



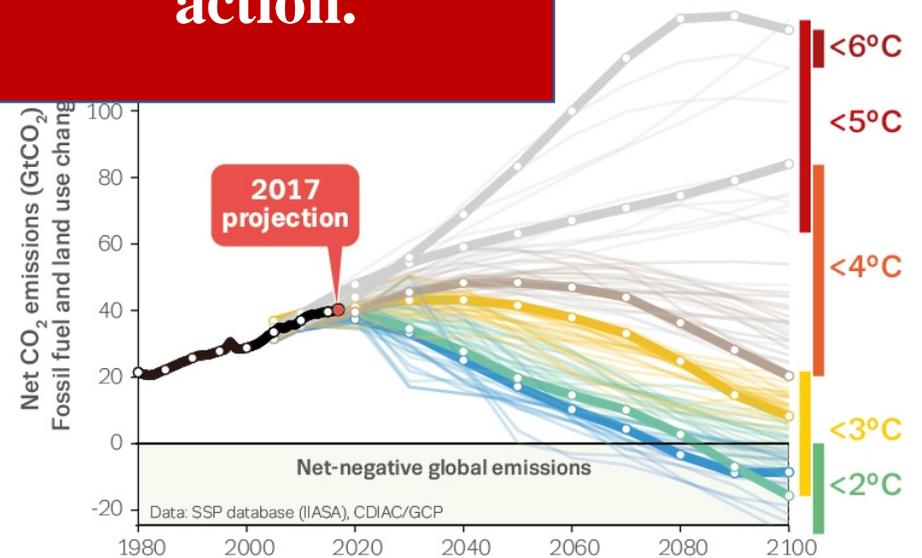
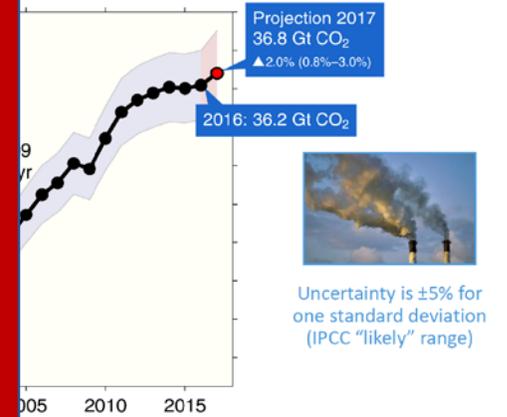
Future Earth and the Earth League called “The 10 Science ‘Must Knows’ on Climate Change” delivered at the Bonn Climate Change Conference on 13 November.

**11 November 2017
Future Earth National Committee for Japan launched in Tokyo**



fossil fuel and industry: 36.2 ± 2 GtCO₂ in 2016, 62% over 1990
Projection for 2017: 36.8 ± 2 GtCO₂, 2.0% higher than 2016

Role of Scientists and Science Centers in “persuading” societies to take action.



Seeding Problem-focused Collaborations

Fourth Industrial Revolution is transforming the way we live.
Need to put **De-carbonization at the center** of this transformation.



Stockholm Resilience Centre
Sustainability Science for Biosphere Stewardship



futurearth
research for global sustainability



An integrated approach to research on disaster risk through: an international, multidisciplinary (natural, health, engineering and social sciences) collaborative research programme.

Objectives:

1. Science for ... hazards, vulnerability and risk
2. Effective decision making risk interpretation to action
3. Reducing risk and curbing losses ...

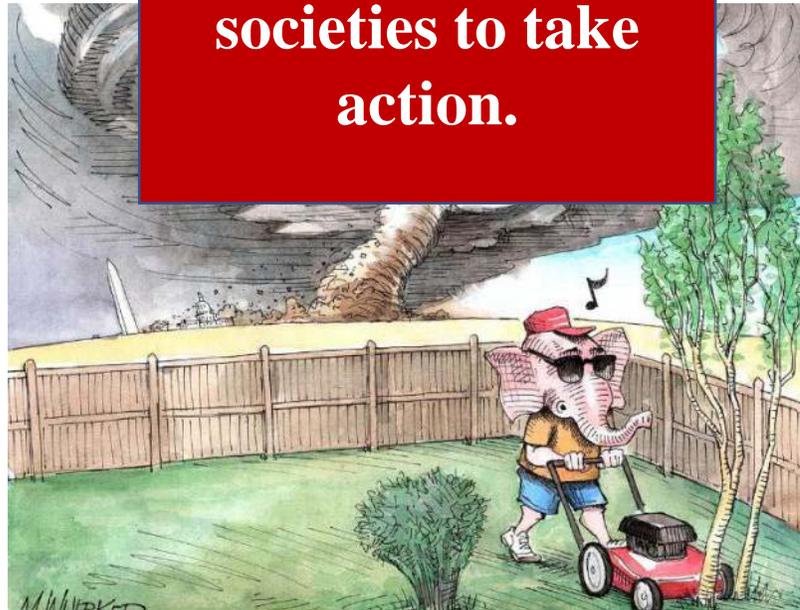
IRDR International Centres of Excellence – ICOE (12)

1. Academy of Sciences located in Taipei, China
3. **Community Resilience** - Joint Centre for Disaster Research, Massey University, Wellington, New Zealand
6. **Risk Interpretation and Action** - Centre for Integrated Research on Risk and Resilience (CIRRR), Department of Geography, King's College London, UK
7. **Disaster Resilient Homes, Buildings and Public Infrastructure** - Institute for Catastrophic Loss Reduction. Western University, London, Canada
10. **Disaster Risk and Climate Extremes** - *Southeast Asia Disaster Prevention Research Initiative, National University of Malaysia*
12. **Spatial Decision Support for Integrated Disaster Risk Reduction**
Faculty of Geo-Information Science and Earth Observation (ITC), The University of Twente

Risk Interpretation to Action



**Role of Scientists
and Science
Centers in
“persuading”
societies to take
action.**



**Science – all sciences – needs to
address the issues of disaster risk
management**

Risk interpretation to action:

**When people and/or governments
receive information on impending
threat:**

- tornado, hurricane, hot-dry summer, etc.,
- What do they do? Actions
 - Nothing, “right” actions – which are “right”?;
- Why do they take these actions?
 - Politics; education; financial; socio-cultural; ...
- **GOVERNMENTS – WHAT ACTIONS DO THEY TAKE???**

Disaster Resilient Homes, Buildings and Public Infrastructure

Institute for Catastrophic Loss Reduction

Building resilient communities



'Research to action'

Co-design

Insurance Bureau,
municipalities, engineers, ...

Role of Scientists
and Science
Centers in
"persuading"
societies to take
action.



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UNITED NATIONS
UNIVERSITY

Inter-Academy Medical Panel

10-year interdisciplinary research effort whose overall aim is to generate policy-relevant knowledge that will improve health status, reduce health inequalities and enhance the well-being of urban dwellers. It will focus on the integration of natural, social, medical and engineering sciences using systems approaches to address the complexity of urban issues and their influence on health.



Science Committee



“Big Data in an Urban Context” - the challenges and opportunities of big data for urban health.

Nov 30-Dec 4, 2015

Policy Issues for Science and Society

Responsibilities of global science

To contribute to post-2015 frameworks, including the Sendai Framework, Agenda 2030, Paris Climate Agreement and the upcoming agenda.

SDG 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development

Develop fully global science capacity

Science for the benefit of all societies and “leaving no scientists behind”

Science and Technology for Sustainable Development

Projecting science, technologies and societal change

Challenging science policy and practice

Time to create the ‘conditions of possibility’, to support science for a sustainable and just world



Develop fully global science capacity

Climate Change & Cities

Rapidly growing urban areas in the developing world provide opportunities for economic growth and yet these cities face significant challenges associated with rapid growth, diminished environmental quality and climate change. START is creating opportunities to facilitate knowledge generation and sharing for cities at risk, particularly coastal cities in Asia. START is also expanding these efforts into Africa.

START Promotes Capacity Building through ...



Supporting Regional Research & Assessments



Promoting Innovation in Education



Enhancing Knowledge Sharing for Action

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GERMANY



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United Nations Foundation
USA



Rémi Quirion
Chief Scientist Officer
Research Funds of Quebec
CANADA



Hassan Virji
(Ex-Officio Member)
Executive Director
International START
Secretariat
USA



Cheikh Mbow



Science Policy - Open Data in a Big Data World



Science International 2015



OPEN DATA IN A BIG DATA WORLD - AN INTERNATIONAL ACCORD

- International science - issues of policy for science

- The Accord

- opportunities and challenges
- predominant issues
- fundamental principles
- distinctive voice of science
- fundamental pre-requisites for maximising public benefit in developing countries.



awarded the Science Forum South Africa Science Diplomacy Award - "an international partnership which has made an outstanding contribution to harnessing scientific advice for multilateral decision-making."

More than one hundred science organisations around the world endorsed the Big Data Accord after its publication.

- ...promote discussion and adoption of these principles and their endorsement by ... bodies of science at national and international levels.

**Role of Scientists
and Science
Centers in
“accelerating”
global
understanding.
Decade of Global
Understanding**

International Year of

GLOBAL 
understanding

2016

IYGU

PRO

International Council for Science (ICSU)

**I. Bokova, Director-General of UNESCO - World Science Day
for Peace and Development - 10 November 2017**

**This year’s theme for the World Science Day for Peace and
Development, Science for global understanding, encompasses
UNESCO’s approach to develop scientific cooperation
between and within societies, combining global sustainability
and local actions and knowledge.**

The International Development Research Centre and The International Council for Science to collaborate on building capacity for science advice in the developing world



The International Council for Science (ICSU) has received a 3 year grant on behalf of INGSA from The International Development Research Centre in Canada to deliver a programme of ... [READ MORE](#)



Science, Technology and Innovation with Society. Role of science advisers in the process.

theoretical and practical and to the use of scientific evidence informing policy at all levels of government.

Connecting INGSA and Science Centers and mutual "benefits"

**policy
mies,
cience,**

**International
Government
Advisers
1st mtg - A**



TOKYO PROTOCOL

On the Role of Science Centres and Science Museums Worldwide In Support of the UN SDGs With Actions Set Forth:

IV. Establish new and strengthen existing partnerships and collaborations

VIII. Accept the responsibility to serve as catalysts for better understanding and coordinated actions within communities



Role of Scientists and Science Centers in “saving” our planet – now and for many future generations.



Co-design for Transformation - Connecting the World for a Sustainable Future for Intergenerational and International Equity and Ethics – need actions now for the future



SCWS 2017

Connecting the World
for a Sustainable Future



INTERNATIONAL
COUNCIL
for SCIENCE

futureearth  IRDR
research for global sustainability Integrated Research on Disaster Risk

International
Science Council

Thank you for your
attention