

New Perspectives on Sustainability Science

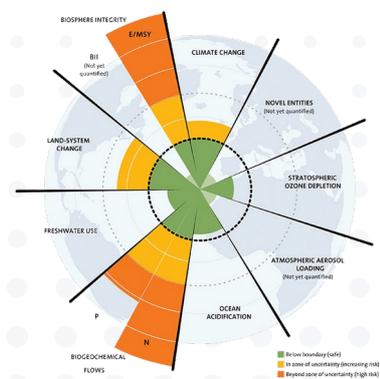
Sustainability Science Forum 2022
Swiss Academy of Sciences (SCNAT)

Dr. Albert van Jaarsveld
IIASA Director General

November 2022



A planet on "red alert"

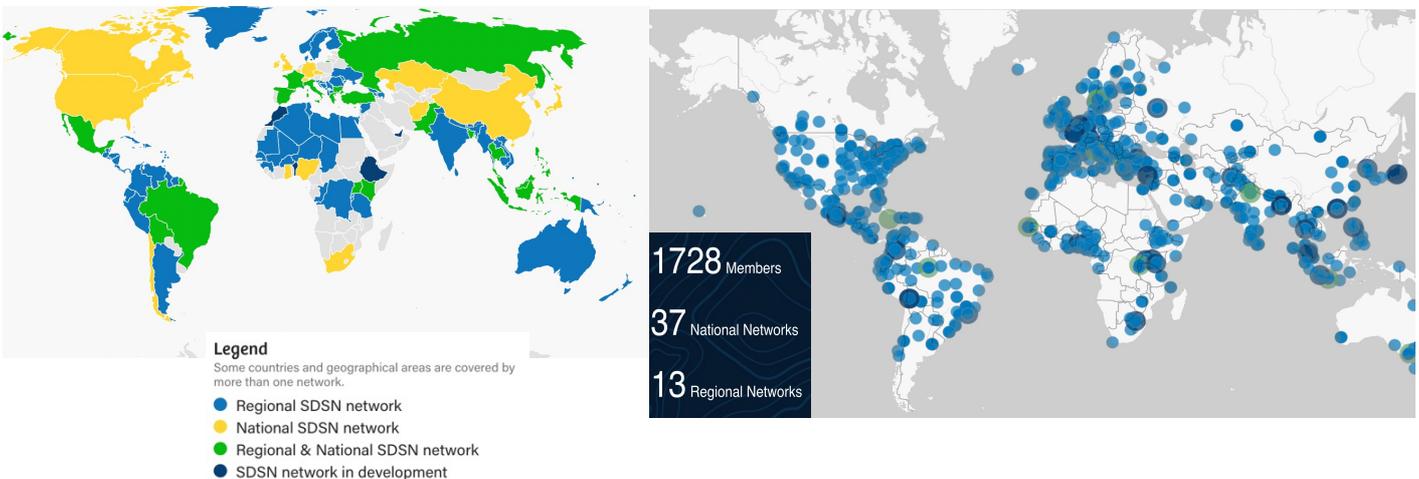


Source: Steffen et al. (2015)

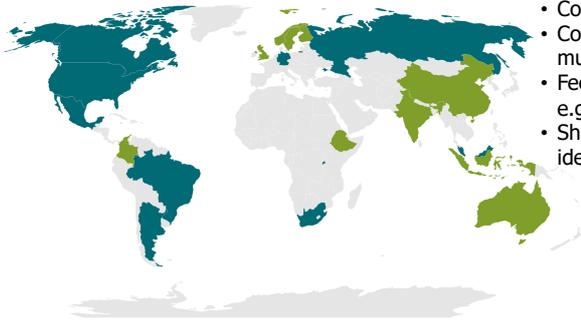
Photos (t/l > b/r): BBC, The Atlantic, CNN, Al Jazeera

... humanity divided

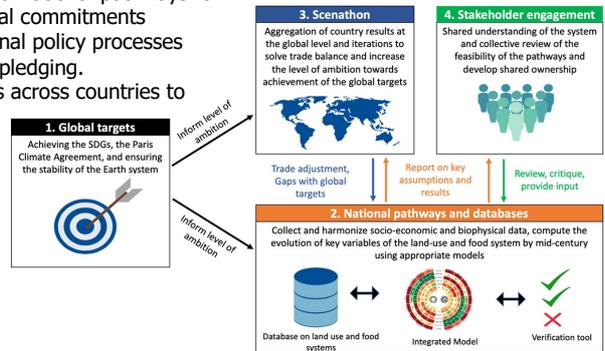
- Wealth
 - 71% of adults own less than \$10,000 in wealth
- Health
 - life expectancy had doubled in a century, for some (12-56 years of good life beyond 20)
 - 100m experience acute hunger - 1 bn are obese
 - ~22% Covid vaccinations coverage in Africa
- Environment
 - 90% of people breathe highly polluted air
 - 1 in 9 people use unsafe water
 - 2.3 bn people have no access to a toilet
- Happiness and resources
 - more die by suicide than war and violence
 - happiness inequality is on the rise
 - 1 bn people have no access to electricity – there are enough cellphones in circulation for all
- 3 bn people exposed to land degradation, desertification and did not benefit from the great acceleration
- Agenda 2030



The FABLE consortium



- Common accounting standards and additionality
- Compliant integrated National pathways for multiple international commitments
- Feed into international policy processes e.g., UNFCCC Paris pledging.
- Sharing experiences across countries to identify solutions.



FABLE and FOLU Country Platforms FABLE Country Teams



Collaborative Research Actions (CRAs) / Opportunities



- > \$ 400 m (since 2012)
- 29 funding agencies on 6 continents
- 99 projects
- 1,000 scientists in 39 countries

Future Earth is a global network of scientists, researchers, and innovators collaborating for a more sustainable planet.

FACILITATE RESEARCH AND INNOVATION

Our 27 Global Research Networks explore interactions among humans and the planet's land, air, water and biodiversity. We develop and partner on initiatives that experiment with technology, data, media, and new ideas.

SHAPE THE NARRATIVE

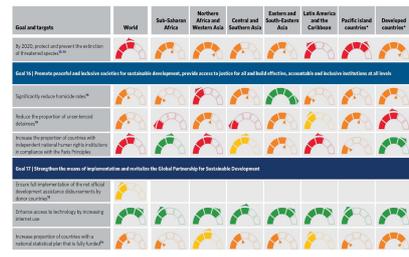
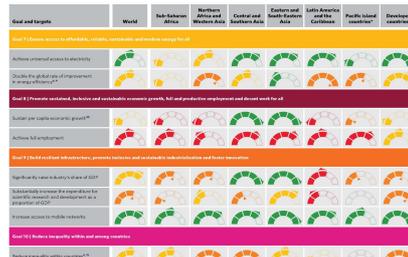
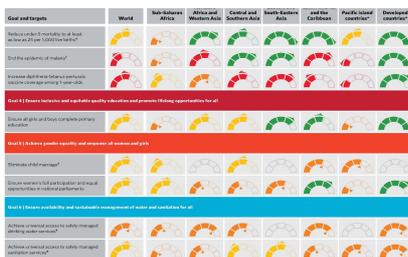
We help incorporate the latest science into global decision-making and engage in conversations on sustainability solutions. See our 10 New Insights in Climate Science and award-winning Anthropocene Magazine for more.

BUILD AND MOBILIZE NETWORKS

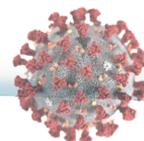
Our networks link policy, business and civil leaders with researchers to address themes like health, urbanization, natural assets and more.



... but society far off-track on the SDGs



Sustainable Development Goals Progress Chart 2022



Progress is slower than needed: We need to urgently redouble efforts to achieve the Sustainable Development Goals

ISC. *Unleashing Science: Delivering Missions for Sustainability* 2021

*"We must rise higher **to rescue** the Sustainable Development Goals – and stay true to our promise of a world of peace, dignity and prosperity on a healthy planet."*

António Guterres, *Secretary-General, United Nations*
The Sustainable Development Goals Report 2022

Why the slow progress?

- Much of **science** is insulated from society and policy, **not anchored in real world issues**.
- Current **modalities, science funding models and mechanisms** - not fit for purpose.
- **Siloed nature of scientific efforts and funding** – diminished relevance and reduced power to remedy key sustainability problems.
- Scientific knowledge of all sorts to achieve the SDGs, **not reaching the hands of decision makers and other stakeholders** to facilitate effective action.
- Urgent need to develop **new ways of undertaking, delivering and translating actionable knowledge**.

Global Commission on Science Missions for Sustainability

Task - to find new ways to support and deliver "missions for science" to assist in meeting the SDGs...and new approaches for aligning funding with the accomplishment of those missions.

Persistent disconnect between knowledge and action in the pursuit of sustainability?

Many scientific efforts to unravel global food, water, energy, health and safety insecurities...

- more focused on understanding the problem than helping to solve it
- top-down scientific community driven, sometimes wrong problems or not aligned with most pressing needs
- produce information that is not trusted (not viewed as legitimate, credible, salient by decision makers, communities and other actors)
- focus on narrow disciplinary questions, no systemic view; critical missing information, decision makers unable to act
- prescriptive and not adaptive; complexity makes failure possible if not likely and experimenting, evaluating, and adapting required at all stages of a project
- siloed - focus on specific sectors or SDGs, while interactions across sectors and the likely feedbacks, trade-offs and synergies that lead to unintended consequences ignored
- not always designed to generate broadly applicable lessons across regions and boundaries

Linking Knowledge and Action: What Works and Why?



The vision

For science to support the urgent societal transformations towards a more sustainable, equitable and resilient future, we need

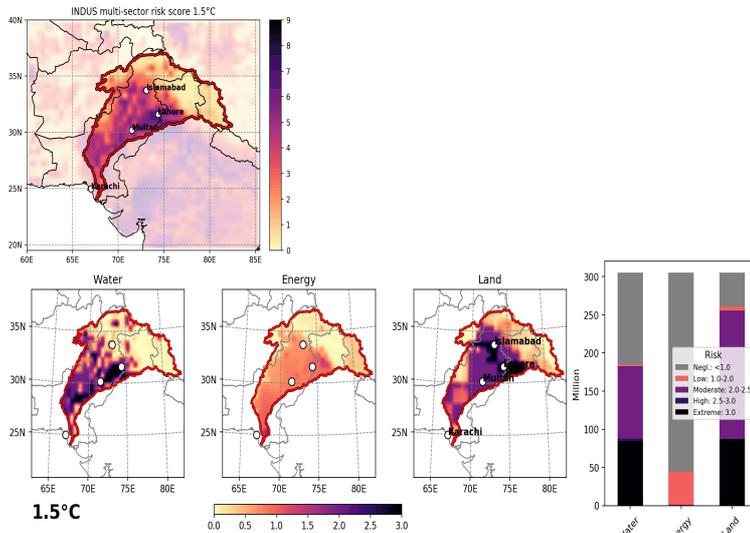
A nimble, targeted, mission-oriented set of socio-political-science initiatives and associated support structures that harness the best of what science offers

- *does so in a completely different (albeit largely proven) way*
- *connected seamlessly with other parts of society to implement necessary policies, practices and behavioral changes*

ISC (2021):
Unleashing science:
delivering missions for sustainability



What is mission science?



- Focused on a clearly defined topic, question or goal (likely to be a nexus issue)
- Singularity goal-oriented and solutions-focused
- Conducted for a limited period of time until a substantial challenge has been successfully addressed
- Significant size, scope and ambition
- Requires co-designed, inter- and transdisciplinary approaches
 - Input from a wide range of knowledge holders and stakeholders
 - Integration across disciplines and knowledge spheres
 - Applied and fundamental knowledge
- Direct engagement - policy-makers and societal actors
- Accessible and used

Transformative

Mission science aims to:

"Achieve the SDGs through provision of actionable knowledge around nexus' issues"

Emerging consensus that:

- **Not about, WHAT is the next big thing to do to achieve the SDGs.** Science frequently knows what is required to achieve sustainability.
What is required is a catalytic intervention to bring scientific understanding to bear and unlock societal implementation.

Thus, the Science Mission is:

- **About HOW we do what we do next.** Requires a new way of engaging science in societal challenges that is truly transdisciplinary (co-design, co-production, co-implementation and co-evaluation), bottom-up and not top-down. **Science in service of society.**

Missions to be developed across these broad basic needs domains...

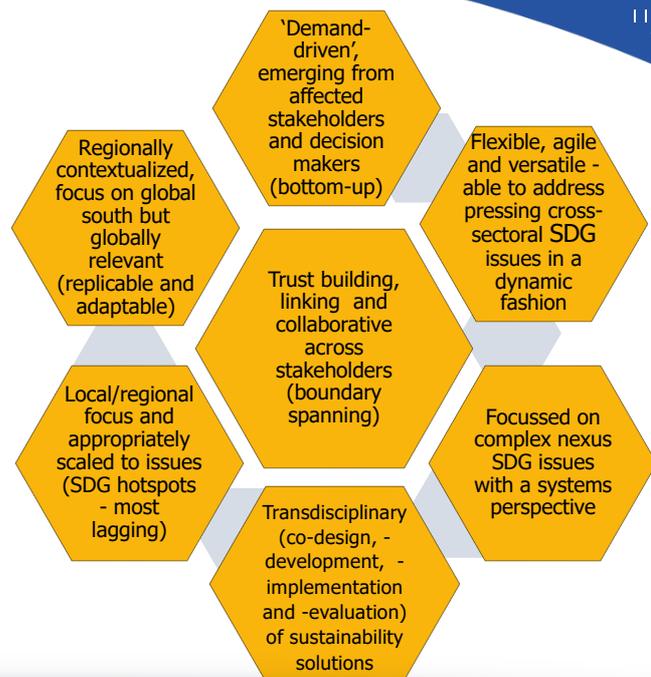


...they embrace most pressing human challenges

Criteria for the Missions

Distributed Sustainability Stations, with in situ teams, that are focused on priorities:

Need **a collaborative process**, carried out by mission teams working together with scientific communities and stakeholders in a complementary fashion with existing efforts.

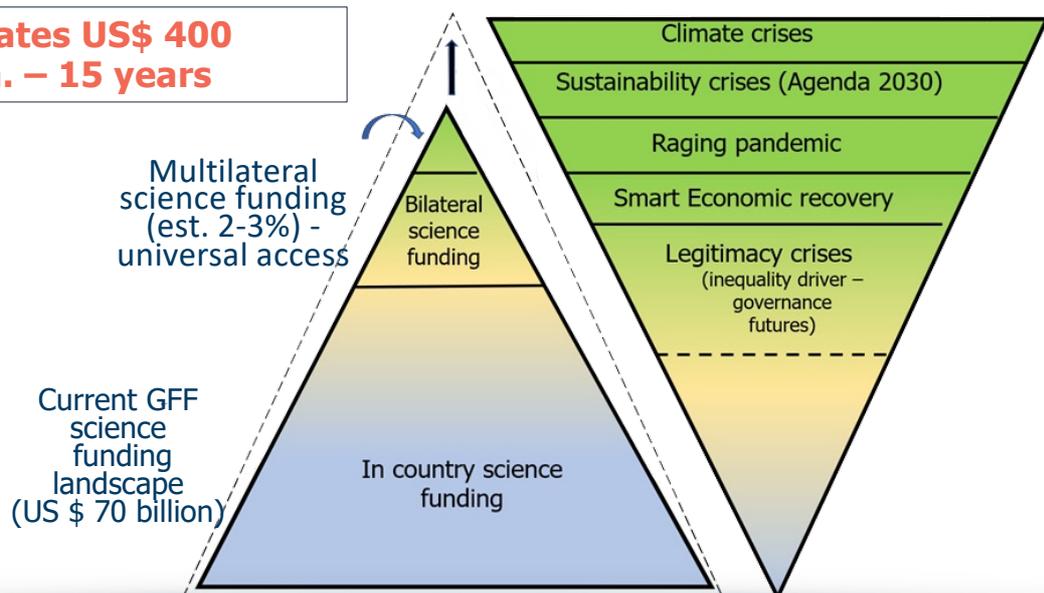


Key considerations

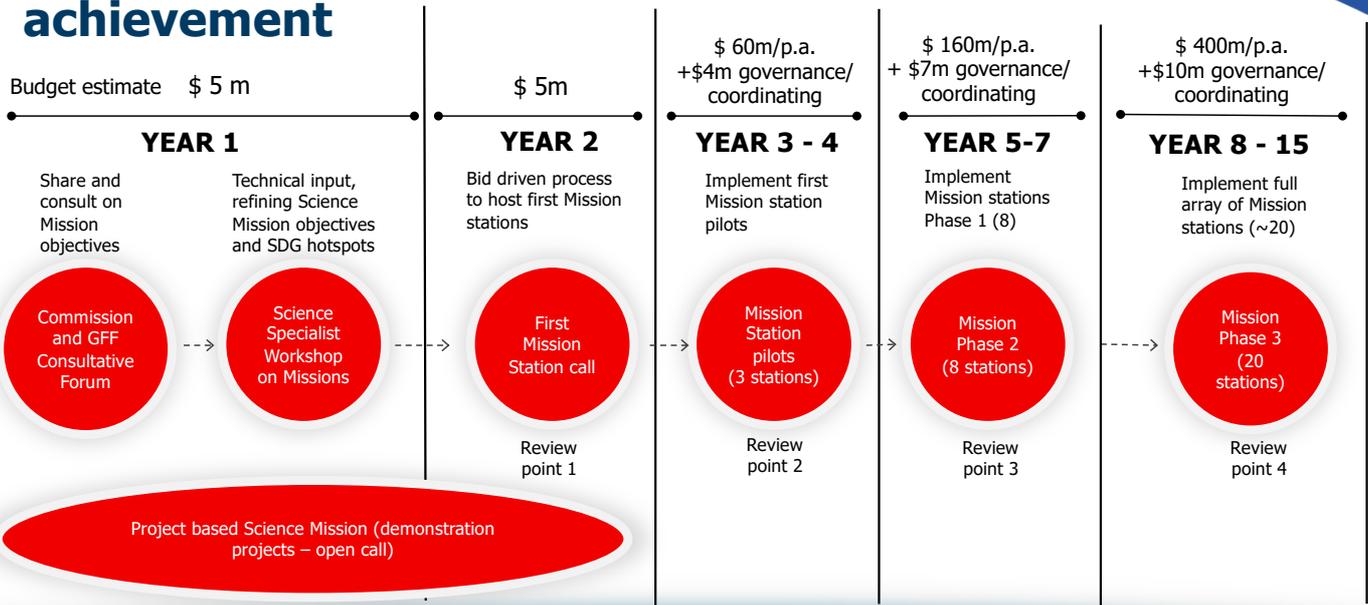
- Sustainable development goals will not be achieved unilaterally – at any scale – common interest
- Urgency – mission-driven global priorities to be tackled at scale, timeously and together
- Business as usual or incremental approach – eventually know exactly what we should have done
- Global societal priorities – determine whether there is a dignified future for humanity or not (funders – pretty basic)
- Large science infrastructures can bring together the science community and funders (CERN \$1.1 bn/annum)
- Shared and universal global societal problems that require our collective effort, not yet

Funding considerations

Early estimates US\$ 400 million/ p.a. – 15 years



Pathway to Science Missions improving SDG achievement



Skills requirements (station core competencies)

- Transdisciplinary expertise (co-design, co-production, and co-implementation)
- Participatory approaches facilitation/negotiation expertise
- Nexus analytical, modelling and pathway exploration capabilities to inform and visualize participatory processes (pathway simulations)
- Data and information stewards to curate and archive regional sustainability information
- Stakeholder engagement expertise (incl. youth engagement)
- Required computational and facilitation infrastructure
- Polling design and execution capabilities
- Inspiring leadership
- A global coordination/ interaction system for sharing emergent best practices and approaches between regional hubs/stations

What kinds of challenges might Mission Stations address? (infrastructure development plan for Nepal)

Example #1: Infrastructure development and the future of Nepal's rivers

As Nepal and its investors consider the future development of the country, the damming of many of its hundreds of rivers that drain from the Himalayas to India is being contemplated.

Where to create this new infrastructure (plus roads and rails that connect China in the north to India in the south), needs careful, multi-disciplinary analysis, examining options and implications for current and future energy production, water use, agriculture, biodiversity protection, ecosystem services, and

economic growth, indigenous cultures and rights, human health, poverty alleviation – across space and time -- for Nepal and its up- and down-stream neighbours.

Before investments are made, government and non-governmental actors in this complex system need to understand the feedbacks, tipping points, scale issues, trade-offs, governance challenges etc. under various options.

Doing so would require contributions from biophysical scientists, social scientists, hydrologists, ecologist, data scientists, engineers and other disciplines in a participatory stakeholder process.



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What kinds of challenges might Mission Stations address? (dual malnutrition action plan for Indonesia)

Example #2: The dual burden of malnutrition

Many marginal communities are facing the dual burden of malnutrition: as traditional sources of food are compromised and due to rural-urban migration, we see on one hand persistent evidence of undernutrition (stunting, impaired brain function, infant co-morbidities (e.g. susceptibility to infections)) and malnutrition (obesity, gestational diabetes, stroke, diabetes, heart disease etc.).

The causes are multiple and related to pricing, food waste, poor use of productive land and environmental degradation, resistance to

technologies, inappropriate marketing, corruption, regulations and lack of nutritional understandings.

While in any one context the balance of factors will differ, understanding how to mobilize communities, farmers/ fishers/ cultivators, small and big business, and governments is a pressing need. This is a nexus matter that could well span countries and regions but Indonesia is considered the most pressing global challenge.

This would require abroad stakeholder participatory engagement.



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What kinds of challenges might Mission Stations address? (Zambezi basin land-use plan)

Example #3: the growing interdependent needs for Food, Energy and Water

Growing needs for secure food, energy and water will amplify existing global challenges over the coming decades, particularly in developing countries. Up to 70 percent more food production will be required globally by 2050, with an even larger demand in developing countries.

Consequently, there is an urgent need to adopt new, more integrated, and more inclusive development

pathways in regions, an approach that captures the synergies and trade-offs among food, energy, water and ecosystems and that identifies cross-sectoral solutions responding to various alternative futures.

The Zambezi basin presents a critical resource central to all these requirements in southern Africa. Its appropriate development to address these multiple potential uses presents a typical nexus dilemma appropriate for Mission Station attention using a stakeholder driven participatory process.



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Outcomes

- A novel mechanism to fast-track the achievement of the SDGs in regions where SDG progress is lagging most (SDG Hotspots)
- A mechanism that builds trust between the scientific community and the societies it serves
- The building of a global community of scientific, policy development and stakeholder expertise capable of resolving complex and nexus SDG matters (science implementers)
- Promoting global cooperation in service of a more sustainable planet and a dignified future for humanity

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ISC: Global Commission on Science Missions for Sustainability – Technical Advisory Group

- **Pamela A. Matson**, member of the Global Commission, Director of Stanford University Change Leadership for Sustainability Program (Co-Chair)
- **Albert van Jaarsveld**, member of the Global Commission, Director-General of the International Institute for Applied Systems Analysis (Co-Chair)
- **Alan Bernstein**, President and CEO of CIFAR, leading scientists of health and cancer, founding president of the Canadian Institutes of Health Research.
- **Barend Mons**, President of CODATA, Scientific director of GO FAIR Foundation, Professor of Human Genetics Department – LUMC
- **Connie Nshemereirwe**, Director of the Africa Science Leadership Programme, former Co-Chair for the Global Young Academy
- **Ian Goldin**, Professor of Globalisation and Development at the University of Oxford
- **Ingrid Petersson**, Director General of Formas – the Swedish Research Council for Sustainable Development
- **Lorae Van Kerkhoff**, Professor and Director of the Institute for Water Futures and Associate Director Staff Development at the Fenner School Of Environment and Society, at the Australian National University
- **Maria Ivanova**, Associate Professor of Global Governance and Director of the Center for Governance and Sustainability, University of Massachusetts Boston
- **William Clark**, Harvey Brooks Research Professor of International Science, Public Policy and Human Development at Harvard University's John F. Kennedy School of Government
- **Zakri Abdul Hamid**, Chairman of Atri Advisory, Ambassador and Science Advisor, Campaign for Nature (CFN), Professor Emeritus
- **ISC support:** Salvatore Arico, Megha Sud, Katsia Paulavets

Thank you

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