



TOHOKU  
UNIVERSITY

# GSES Summer School 2022

## Transition to a Sustainable Society: Opportunities and Challenges

International Environmental Leadership Program (IELP)

&

International Joint Graduate Program in Resilience and Safety Studies (GP-RSS)

September 5-9, 2022

Online meeting link <https://bit.ly/GSESSummerSchool2022>



4 days

1-day field trip  
to  
Higashi  
Matsushima

7 invited  
speakers



Contact us

[gses-summerschool@grp.tohoku.ac.jp](mailto:gses-summerschool@grp.tohoku.ac.jp)



Graduate School of Environmental Studies  
Tohoku University

IELP

International Environmental Leadership Program



GP-RSS

International Joint Graduate Program in Resilience and Safety Studies



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International Joint Graduate Program in Resilience and Safety Studies (GP-RSS)  
September 5-9, 2022

## Program at a glance

**Day 1**  
**September 5, 2022**



### Opening remarks



**Tatsuya Kawada**

**Professor, Tohoku University**  
**Dean, Graduate School of Environmental Studies**



### Guest Lectures



**Mark Z. Jacobson**

**Professor, Stanford University**  
**Director of the Atmosphere/Energy Program**  
**Title: «A solution to global warming, air pollution and energy insecurity for 145 countries»**



**Keishiro Hara**

**Professor, Osaka University**  
**Co-director Center of Future Innovation (CFI)**  
**Director of Hara Research Base for Future Design**  
**Graduate School of Engineering, Osaka University**  
**Title: «Future design»**



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Graduate School of Environmental Studies  
Tohoku University

**IELP**

International Environmental Leadership Program



**GP-RSS**

International Joint Graduate Program in Resilience and Safety Studies





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## Program at a glance



### Day 2

### September 6, 2022 Higashi-Matsushima field trip

Time	Activity
8:00	Leave Aobayama at Aobayama Station South 1-Exit
9:00-9:30	Disaster recovery memorial museum (Denshoh-kan), memorial park (Kinen ko-en)
9:45-10:45	Disaster supply warehouse (Bosai bichiku sohko)
11:00-12:00	Smart town
12:00-12:45	Lunch (city hall)
12:45-13:30	On the way to multi-disaster defense facilities, recovered agricultural and fishery buildings by the coast side
13:30-14:30	Beach seine trial (Okumatsushima takein network)
15:00-16:00	Leave Higashi-Matsushima for sendai
16:00	Arrive at Aobayama

### Day 3

### September 8, 2022

### Guest Lectures



#### Makoto Suwa

Senior Disaster Risk Management Specialist at the World Bank

Title: «How to better manage climate risks in developing countries?»



#### Andrew John Chapman

Associate Professor, Energy Analysis Division, I<sup>2</sup>CNER, Kyushu University

Title: «Achieving a just transition: Energy system design and social equity»

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## Program at a glance

Day 4  
September 9, 2022

### Guest Lectures



**Anthony Halog**

**Lecturer in School of Earth and Environmental Science, University of Queensland**  
**Title: «Holonc thinking for transitioning to net zero emission, circular economy in post-COVID era: Its vital role in training the next generation of researchers, policy makers, and business leaders»**



**Katsunori Iha**

**Research Economist, Global Footprint Network, USA**  
**Board of Directors, Ecological Footprint Japan, Japan**  
**Title: «Introduction of Ecological Footprint: It's concept, calculation and application»**



**Xianlai Zeng**

**Associate professor at the School of Environment at Tsinghua University**  
**Title: «Win-win: Anthropogenic circularity for metal criticality and carbon neutrality»**

### Closing remarks



**Masanobu Kamitahara**

**Professor, Tohoku University**  
**IELP-WG Head**



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## Schedule



	September 5	September 6	September 8	September 9
<b>9.00</b>	<b>Opening remarks</b>	<b>Higashi-Matsushima</b>	<b>Makoto Suwa</b>	<b>Anthony Halog</b>
<b>10.00</b>	<b>Mark Z. Jacobson</b>	<b>Field Trip</b>		<b>Katsunori Iha</b>
<b>11.00</b>				
<b>12.00</b>	<b>Break</b>		<b>Break</b>	<b>Break</b>
<b>13.00</b>	<b>Keishiro Hara</b>		<b>Andrew John Chapman</b>	<b>Student activity</b>
<b>14.00</b>			<b>Xianlai Zeng</b>	
<b>15.00</b>				
<b>16.00</b>				<b>Closing remarks</b>
<b>17.00</b>				

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**September 5-9, 2022**

**Day 1, September 5, 2022**  
**9.30-11.40**



**Mark Z. Jacobson**

**Professor of Civil and Environmental Engineering**  
**Director, Atmosphere Energy Program**  
**Stanford University, USA**

**Title: «A solution to global warming, air pollution, and energy insecurity for 145 countries»**



## Bio



Mark Z. Jacobson is Director of the Atmosphere/Energy Program and Professor of Civil and Environmental Engineering at Stanford University. He is also a Senior Fellow of the Woods Institute for the Environment and of the Precourt Institute for Energy. He received a B.S. in Civil Engineering, an A.B. in Economics, and an M.S. in Environmental Engineering from Stanford in 1988. He received an M.S. and PhD in Atmospheric Sciences in 1991 and 1994, respectively, from UCLA and joined the faculty at Stanford in 1994. His career focuses on better understanding air pollution and global warming problems and developing large-scale clean, renewable energy solutions to them. He has published six textbooks and over 175 peer-reviewed journal articles. He received the 2005 American Meteorological Society Henry G. Houghton Award and the 2013 American Geophysical Union Ascent Award for his work on black carbon climate impacts and the 2013 Global Green Policy Design Award for developing state and country energy plans. In 2015, he received a Cozzarelli Prize from the Proceedings of the National Academy of Sciences for his work on the grid integration of 100% wind, water and solar energy systems. In 2018, he received the Judi Friedman Lifetime Achievement Award "For a distinguished career dedicated to finding solutions to large-scale air pollution and climate problems." In 2019, he was selected as "one of the world's 100 most influential people in climate policy" by Apolitical. In 2022, he received the Visionary Clean Tech Influencer of the Year award at the World Clean Tech Awards. He has served on an advisory committee to the U.S. Secretary of Energy, appeared in a TED talk, appeared on the David Letterman Show to discuss converting the world to clean energy, and cofounded The Solutions Project nonprofit. His work is the scientific basis of the energy portion of the U.S. Green New Deal and laws to go to 100% renewable energy in cities, states, and countries worldwide

## Abstract



Global warming, air pollution, and energy insecurity are three of the most significant problems facing the world today. This talk discusses the development of technical and economic roadmaps to convert the energy infrastructures of 145 countries, including Japan, to those powered by 100% wind, water, and sunlight (WWS) for all purposes after energy efficiency measures have been accounted for. All purposes includes electricity, transportation, building heating/cooling, and industry. The talk further discusses the electricity and heat generation technologies and the electricity, heat, cold, and hydrogen storage technologies needed and their current status. It also discusses methods of keeping the electric power grid stable. Results indicate the grid can remain stable at low cost in each of 24 world regions encompassing these 145 countries. Aside from mitigating global warming, these roadmaps have the potential to eliminate seven million air pollution deaths annually, stabilize energy prices, reduce catastrophic risk, and reduce international conflict over energy. The talk also discusses what individuals can do in their own lives and homes to help solve the problems. Please see

<https://web.stanford.edu/group/efmh/jacobson/Articles/I/WWS-145-Countries.html>





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**Keishiro Hara**

**Professor, Osaka University**  
**Co-director Center of Future Innovation (CFI)**  
**Director of Hara Research Base for Future Design**  
**Graduate School of Engineering, Osaka University**  
**Title: «Future design»**



## Bio



Keishiro Hara is a professor and the co-director of Center for Future Innovation (Cfi), Graduate School of Engineering, Osaka University. He is also the director of Hara Research Base for Future Design, at TechnoArena affiliated with the same graduate school. He is consulting fellow at Research Institute for Economy, Trade and Industry (RIETI), Senior Fellow at The Tokyo Foundation for Policy Research, and was the member of Science Council of Japan (-2020). He is elected the Fellow of The Engineering Academy of Japan. As policy position, he was appointed as senior officer for technology policy and strategy at Manufacturing Industries Bureau, Ministry of Economy, Trade and Industry (METI), the government of Japan, between October 2016 and March 2018. His primary research interests include Future Design and Sustainability Science. He holds Ph.D. in Environmental Studies and Bachelor of Engineering, both from the University of Tokyo.

## Abstract



One of the fundamental challenges of sustainability issues lies in intergenerational conflicts. because unborn generations have neither a say nor way to negotiate with the current generation, any decisions made under current social systems are inclined to the interests of the current generation, resulting in various long-term issues, such as climate change and resources depletion. This lecture will introduce the research field "Future Design" that aims to design social systems to incorporate the preferences of future generations into the decision-making of present and to reconcile intergenerational conflicts towards sustainability. In addition to theoretical background and motivation, examples of Future Design practices at public and industrial sectors will be introduced. Along with the lecture, short exercises (group works) will also be planned to provide participating students with an opportunity to experience the perspectives of "Imaginary Future Generations" so that the students can deepen the understanding of Future Design.



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**Day 3, September 8, 2022**  
**9.00-12.00**



**Makoto Suwa**

**Senior Disaster Risk Management Specialist at the World Bank**  
**Title: «How to better manage climate risks in developing countries?»**



## Bio



Makoto Suwa is a Senior Disaster Risk Management Specialist at the World Bank. He leads and supports a wide range of World Bank activities and projects that aim to strengthen weather, climate, and hydrological services in Africa. Prior to joining the World Bank, Makoto worked for the World Meteorological Organization, at both its headquarters in Geneva and its Regional Office for Eastern and Southern Africa in Nairobi. He also taught at Kigali Institute of Science and Technology and Lycée de Kigali in Rwanda, and briefly worked for JICA's Office for Climate Change in Tokyo. Makoto holds a Ph.D. in climate science from Princeton University and a master of environmental management degree from Duke University.

## Abstract



This session will discuss climate and disaster risks developing countries are facing in recent years, how they are tackling the challenges and how international partners like the World Bank are supporting such efforts. The presentation will also discuss potential career paths to work on issues such as climate and disaster risk management with international organizations. The presentation will be followed by a round table discussion among participants to exchange ideas and thoughts on what would be priority climate actions for our generation and how things can be done better and differently. A small group exercise and presentation are planned at the end of the session and active participation of the participants is expected.

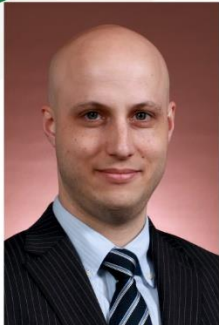




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**13.00-14.30**



**Andrew John Chapman**

**Associate Professor, Energy Analysis  
Division, I<sup>2</sup>CNER, Kyushu University**

**Title: «Achieving a just transition:  
Energy system design and social equity»**



## Bio



Andrew John Chapman is an associate professor at the Energy Analysis Division of the International Institute for Carbon Neutral Energy Research, Kyushu University, Japan. He specializes in several fields, such as energy transitions and energy policy evaluations, sustainability and social equity, and hydrogen society, among others. He published research articles in the reputable journals such as Energy Economics, Environmental Innovation and Societal Transitions, Applied Energy, and many more. Formerly, he was appointed as the Senior Policy Officer for four years (2008 - 2013) in the Department of Clean Energy and Public Works of Queensland State Government. He obtained a PhD in Socio-Environmental Energy Science from Kyoto University, Japan, in 2016. He holds a Master of Governance and Public Policy (Major in Resource Management) from University of Queensland, Australia, in 2012 and a Bachelor of International Studies (Major in International Relations) from Flinders University, Australia, in 2007.

## Abstract



Nations around the world are dealing with the issue of achieving a low-carbon energy transition. This has ramifications for the design of their energy systems, such that energy needs and carbon reductions can be met. In addition to these issues is the issue of a 'just transition', i.e., a transition which not only satisfies energy needs and carbon targets, but also engenders a 'fair' energy system. A just transition requires that issues such as employment, convenience and social equity are also maintained during the energy transition. This lecture deals with this issue from a theoretical viewpoint, and also introduces recent research in Japan and the US toward clarifying how well people understand the concept of a just transition and what stakeholders anticipate from the energy transition. Issues covered include social equity, culture, knowledge, preferences and lived experience relevant to the energy transition





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**Day 4 , September 8, 2022**  
**9.00-10.30**



**Anthony Halog**



**Lecturer in School of Earth and Environmental Science, University of Queensland**

**Title: «Holonc Thinking for Transitioning to Net Zero Emission, Circular Economy in Post-COVID Era: Its Vital Role in Training the Next Generation of Researchers, Policy Makers, and Business Leaders»**



## Bio



Anthony Halog is a polymath and holonic thinker whose knowledge spans a substantial number of subjects, drawing on complex bodies of knowledge to address sustainability challenges. He finished his Ph.D. in Industrial Environmental Economics at the French-German Institute of Environmental Research of Karlsruhe Institute of Technology, Germany, and participated in the United Nations University (Japan) course in Environment and Sustainable Development. He was a recipient of the Japan Society of the Promotion of Science (JSPS) Fellowships and had been a Visiting Professor/Scholar at the University of Tokyo, the National Institute of Advanced Industrial Science and Technology (AIST), and other key leading research institutions in Japan. He had been awarded twice an Organisation for Economic Cooperation Development (OECD) Fellowships to conduct research projects in agri-food systems in Finland and the UK. He was also a recipient of the Natural Science and Engineering Research Council (NSERC) Fellowship at the National Research Council of Canada and the USA's Department of Energy/National Renewable Energy Laboratory (NREL) Faculty Fellowship.

His current research focuses on the sustainability of human-nature complexity through understanding the nexus of material and energy systems. He has authored more than 130 peer-reviewed publications and supervised at least 20 research students to successful completion in Australia and the USA. He has given keynote and plenary talks worldwide to share his expertise in greening supply chains, circular economy, bioeconomy, and life cycle sustainability assessment, within the fields of ecological economics, sustainable engineering, and industrial ecology. He has served on different grant review panels in the USA, Europe, and Asia as well as on technical and scientific committees in conferences over the past years, and member of editorial boards in peer-refereed journals. In the USA, he was one of the chief investigators of US government-funded projects of ~\$7.7 million, out of which \$841,281 was awarded to his specific research on life cycle sustainability assessment.

## Abstract



This lecture discusses how students and participants from different academic backgrounds must alter their mindsets from reductionist/myopic/mechanistic thinking to systems, holonic, cross-disciplinary, and transdisciplinary thinking for strategic sustainability transition and effective implementation of UNSDGs and achieving their targets by 2030. It will explore how we can optimally train the next generation of economists, scientists, engineers, health professionals, policymakers, and business leaders to holistically address the sustainable development challenges and become resilient in our leadership development practices. It is expected that the lecture will be of benefit to faculty and students of Medicine, Engineering, Agriculture, International and Cultural Studies, Disaster Science, and Environmental Studies. The lecture aims to inspire all participants from different disciplines and countries to network and work synergistically to pursue future avenues of collaboration and academic exchanges.







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10.30-12.30



**Katsunori Iha**

**Research Economist, Global Footprint Network, USA  
Board of Directors, Ecological Footprint Japan, Japan**

**Title: «Introduction of Ecological Footprint: It's  
concept, calculation and application»**



## Bio



Katsunori Iha is a research economist in the 'Global Footprint Network', USA, since 2008. He is also a director in the Ecological Footprint Japan, Japan, since 2021. He mainly specializes in creating models for ecological footprints. His research interests include ecological footprint analysis, environmentally extended multi-regional input output (MRIO) analysis, visualization and interactive public engagement processes, behavioral economics for environmental policy, and any relevant studies. Formerly, he was a research associate at the 'Global Footprint Network', California (2007 - 2008), and an instructor at Okinawa International University, Japan (2014 - 2016). He obtained a bachelor of Law in Law and Political Science from University of the Ryukyus, Okinawa, Japan, in 1997. He also achieved a master degree of Arts in Economics from Okinawa International University, Japan, in 2007, and an Associate Art Degree from Santa Monica College, USA, in 2008.

## Abstract



The Ecological Footprint is an accounting tool that makes the reality of ecological limits understandable and useful to governments, businesses, and the general public. Footprint accounting compares a population's demand on ecological resources and services with nature's ability to renew them. In doing so, it helps to measure and communicate a variety of important concepts surrounding sustainability and enables stakeholders to assess the state of ecological assets and measure progress towards sustainable economic performance.

This presentation is for people with a technical/quantitative background, researchers working on projects related to Ecological Footprint, climate change, land use change and human appropriation of natural resources as well as those working on environmental indicators and statistics in general. Those with some background in Ecological Footprint concepts who are primarily interested in the application and communication of the Ecological Footprint method will also benefit from the course.







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Day 4, September 8, 2022  
14.30-16.00



**Xianlai Zeng**



**Associate professor at the School of Environment  
at Tsinghua University**

**Title: «Win-win: Anthropogenic circularity for metal  
criticality and carbon neutrality»**



## Bio

Dr. Xianlai Zeng is currently an associate professor at the School of Environment at Tsinghua University. He obtained the bachelor (2002) and master (2005) degrees in Northwest A&F University, and Ph. D (2014) at Tsinghua University. He worked as a technical advisor for the United Nations Development Programme (2015), visiting staff at Coventry University (2012), visiting professor at Macquarie University (2017), and Fulbright visiting fellow at Yale University (2018–2019). His areas of specialization and interest include anthropogenic circularity, metal sustainability, and circular economy. He has published around 100 articles, patents, and books. Dr. Zeng has chaired or organized a dozen leading international meetings or workshops on resource flow and environmental management.

## Abstract



Resource depletion and environmental degradation have fueled a burgeoning discipline of anthropogenic circularity since the 2010s. It generally consists of waste reuse, remanufacturing, recycling, and recovery. Circular economy and "zero-waste" cities are sweeping the globe in their current practices to address the world's grand concerns linked to resources, the environment, and industry. Meanwhile, metal criticality and carbon neutrality, which have become increasingly popular in recent years, denote the material's feature and state, respectively. The goal of this article is to determine how circularity, criticality, and neutrality are related. Upscale anthropogenic circularity has the potential to expand the metal supply and, as a result, reduce metal criticality. China barely accomplished 15% of its potential emission reduction by recycling iron, copper, and aluminum. Anthropogenic circularity has a lot of room to achieve a win-win objective, which is to reduce metal criticality while also achieving carbon neutrality in a near closed-loop cycle. Major barriers or challenges for conducting anthropogenic circularity are deriving from the inadequacy of life-cycle insight governance and the emergence of anthropogenic circularity discipline. Material flow analysis and life cycle assessment are the central methodologies to identify the hidden problems. Mineral processing and smelting, as well as end-of-life management, are indicated as critical priority areas for enhancing anthropogenic circularity.

