Sustainability Science and Sustainable Development:
Questioning Research Approach and Practices in Innovating Solutions for SDGs

Helmi (Andalas University, Indonesia)

A presentation material for the Synthesis Workshop of Projects on “Sustainability Transformation Across the Region (STAR) and Science Harnessed for ASEAN Regional Policy (SHARP)” Langkawi, Malaysia, 3 – 4 November 2016
Outline

• Introduction;
• Sustainability science;
• Obstacle for application and advancement in Sustainability Science;
• A Case: Research on Integrating Livelihood Improvement and Rehabilitation of Degraded Land and Forest in Indonesia;
• Conclusion: Proposed Framework for Research Approach and Practices in Innovating Solutions to support delivery of SDGs
Introduction – 1.

Life systems on earth and domains of sciences

NATURAL SCIENCE  --  Un-connected  --  SOCIAL SCIENCE
Post 2015-Sustainable Development Goals (SDGs)

- Goal 1. End poverty in all its forms everywhere.
- Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture.
- Goal 3. Ensure healthy lives and promote well-being for all at all ages.
- Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
- Goal 5. Achieve gender equality and empower all women and girls.
- Goal 6. Ensure availability and sustainable management of water and sanitation for all.
- Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all.
- Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
- Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.
- Goal 10. Reduce inequality within and among countries.
- Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable.
- Goal 12. Ensure sustainable consumption and production patterns.
- Goal 13. Take urgent action to combat climate change and its impacts.*
- Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development.
- Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.
- Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.
- Goal 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development.
• The question is that can innovative solutions to sustainable development problems be provided independently by natural science or social science alone?

• IF NOT, how both is bridged and what is the framework?
Sustainability Science

• ... is the scientific knowledge generated as the basis to formulate **science-based innovative solutions to the sustainability problems** and delivery of sustainable development goals (SDGs).

• Elements of sustainability science:
  – **interdisciplinary** (trans-disciplinary; cross-disciplinary; or multidisciplinary);
  – **solutions oriented** (of SD problems/issues/challenges);
  – **optimising social and humanity potential** (through learning process approach);
  – **Maintaining continuation of benefits stream** (from ecosystem);
  – **aim at well-being for all**.
Introduction - 4

• This paper intended to contribute to the framing of research approaches and innovation practices to support delivery of SDGs.

• The argument put forward by this paper is that:
  – research approaches and innovation practices to support delivery of SDGs required participation in co-production of scientific knowledge and innovative solutions;
  – delivery of SDGs required networking, synergy and partnership (among community, government, universities/research institutes, and private sector) in implementing the innovative solutions.
• First, un-sustainability partly caused by the divided domain of natural and social sciences and increasingly fragmented disciplines and tended to be un-connected each other and become less relevant to help addressing the complex problems of sustainability (Spangenberg, 2002; Komiyama and Takeuchi, 2006; Benneth, 2013).

• Therefore, there is a need to cross the disciplinary borders and reconnect science to society through renovations of disciplinary approaches (Spangenberg, 2002).
• Second, the aim of sustainability science is to formulate science-based innovatives solutions to the sustainability problems. It is an interdisciplinary arena to satisfy society's need within the limit of nature carrying capacity (Bennet, 2013).

• The objectives of sustainability science are:
  – "(a) understanding the fundamental interaction between nature and society;
  – (b) guiding these interactions along sustainable trajectories; and
  – (c) promoting social learning necessary to navigate the transition to sustainability" (Miller, Wiek, Sarewitz, Robinson, Olsson, Kriebel, and Loorbach, 2014: 239).
About Sustainability Science - 3

• Third, there is a need for participatory approach in dealing with sustainability problems (by all related stakeholders), (Miller, Wiek, Sarewitz, Robinson, Olsson, Kriebel, and Loorbach, 2014).

• Sustainability science required a new approach in setting the boundary of analysis, assessing the impact of the interface between society and nature, formulating innovative solutions and its implementation.
About Sustainability Science - 4

• There is a need to move from narrow analytic focus (which is more experimental in approach) which has limited impact on solving problems (Potschin and Hainess-Young (2006)).

• → toward integrative stream of science where broader and exploratory problem solving can be done based on multiple line of converging evidence and scales.
• It is implies that *combination of critical and problem solving approach is essential in doing research, ... formulation of solutions, and strategies for implementation* (Jerneck, Olsson, Ness, Anderberg, Baier, Clark, Hickler, Hornborg, Kronsell, Lovbrand, and Person, 2011).

• ➔ The co-production of knowledge, reciprocal learning, and the applied aspects of science are very important in this context (Spangenberg, 2002; Benneth, 2013).
Obstacle for application of and advancement in Sustainability Science

• The obstacles to achieve it are (Komiyama and Takeuchi, 2006: 3-4):

  • "(1) **complexity** of the problems and the **specialization of the scholarship** that seek to address them;

  • (2) the **scientific discipline** that examines this complex problems have themselves **grown increasingly fragmented** in recent years, so much research is conducted from a highly restricted perspective with regard to both phenomena identification and problem solving; and

  • (3) **piecemeal approach** which constraining the development and application of comprehensive solutions to these problems".

• ➔ **IN THE PAST efforts NOT SUFFICIENT to connect and integrate** **FRAGMENTED SCIENTIFIC DISCIPLINES AND PIECEMEAL APPROACH.**
Research on Integrating Livelihood Improvement and Rehabilitation of Degraded Land and Forest in Indonesia

• Located in three provinces (West Sumatra, Yogyakarta, and West Nusa Tenggara/NTB).
• The focus is on the INTEGRATING livelihood improvement and rehabilitation of degraded land and forest.
Research framework.

COMMUNITY

Assessment for Sust. Livelihoods & Rehabilitation of DLD

GOVERNMENT

CAREER BUILDING NEEDS ASSESSMENT (INSTITUTIONAL AND INDIVIDUAL)

UNIVERSITY AND RESEARCH AND TECH DEVT INSTITUTES

Policy to support Sust. Livelihoods and Rehabilitation of DLD

Community Capacity Building Needs for Sust. Livelihoods and Rehabilitation of DLD.

Technologies to support Sust. Livelihoods and Rehabilitation of DLD.

COMMUNITY LEARNING and ACTION CENTER/CLAC for Sust. Livelihoods and Rehabilitation of DLD.

PRIVATE SECTOR AND SOCIAL BUSINESS INSTITUTIONS

Program/activities for Sust. Livelihoods and Rehab DLD.
Framework for application of SS to support delivery of SDGs

- **Sustainable Development Goals/Agenda** (at micro, meso, and macro level)
- **Concerted Effort for Innovating Sustainable Solutions at Community Level** (Learning to be effective, and Learning to be efficient)
- **Scaling-up application of sust. devt. solutions** (Learning to expand)
- **Increased the Stock of Sustainability Science**

**ROLES OF CLAC IN PRACTICING SUSTAINABILITY SCIENCE AT COMMUNITY LEVEL AND CONTRIBUTING TO ACHIEVEMENT OF SDGs**

**CLAC** (COMMUNITY LEARNING AND ACTION CENTER) INTEGRATING INTO (LOCAL) GOVT. POLICY

Source: Helmi (2015)
A framework for integrated livelihood improvement and rehabilitation of degraded forest & land.
A framework for strengthening local institution as the driver (engine) for social inclusion.
Conclusion: Proposed Framework for Research Approach and Practices in Innovating Solutions to Support SGGs—2

(PART OF THE) SOCIETY FACING SUST. DEV'T. (SD) PROBLEMS (IN CERTAIN LOCALITY OR REGION)

UNIVERSITIES/HEIs, AND RESEARCH INSTITUTES (WITH RESEARCHERS FROM VARIOUS DISCIPLINES)

PARTICIPATORY SD PROBLEMS DEFINITIONS, IDENTIFICATION OF SUST. SOLUTIONS, AND AGENDA FOR INTER/TRANS-DISCIPLINARY RESEARCH

LOCAL INST'NS, GOVERNMENT, PRIVATE, AND INTERNATIONAL ORGANIZATIONS

INTER/TRANS-DISCIPLINARY KNOWLEDGE GENERATION AND FORMULATION OF INNOVATIVE SOLUTIONS

IMPLEMENTATION OF INNOVATIVE SOLUTIONS IN SYNERGY AND PARTNERSHIP (QUADRUPLE HELIX APPROACH)
THANK YOU