Methods and approaches for generating useful knowledge in sustainability science research

In recent decades, the scientific community has increasingly recognized the challenge of utilizing scientific knowledge to address critical sustainability issues, including climate change, biodiversity loss and pollution. To tackle these issues, sustainability science research has focused on understanding complex human-natural systems and has made significant contributions to our understanding of system dynamics. It has also brought much-needed attention to the need for more problem-oriented research and has motivated the exploration of knowledge systems for sustainability. As a result, numerous research and education programs for sustainability science have emerged globally. The success of these programs, however, requires critical reflection from scholars, practitioners, and decision-makers on how to best position sustainability research to enhance decision-making capacity and navigate socio-technical systems towards more sustainable trajectories.

Ultimately, sustainability is about envisioning and pursuing social and natural well-being at various community scales (Miller et al 2014). Through closer collaborations with society, scientists can help develop useful knowledge that informs such visions and pathways to their achievement. For this to happen, however, sustainability scientists must serve as knowledge generators on the one hand, and brokers and change agents on the other.

This three-day course will explore methods and approaches for doing transdisciplinary research, i.e., developing research questions with stakeholders and co-producing knowledge that is relevant and salient for decision-making at multiple scales. The course will cover techniques for navigating the transdisciplinary space, specifically we will explore methods for joint exploration and learning to identify relevant research questions, groupwork facilitation techniques, and issues of leadership in the co-creation processes.

Day 1 (Wed 10th of May): Deciding and preparing for a transdisciplinary approach.

Time	Topic	Methods and Approaches
09:00 – 9:30	Introduction to course & Ice breaker	
09:30 – 10:30	What is TD research and why do it?	Convergence on a shared definition
10:30 – 11:00	The phases of TD research	
11:00 – 11:15	**BREAK**	
11:15 – 11:30	Introduction to Phase 0	
11:30 – 12:30	Phase 0: Developing your own understanding of the research topic or issue	Problem tree analysis & Mind mapping
12:30 – 13:30	**LUNCH**	
13:30 – 14:30	Phase 0: Identifying and understanding who should be involved?	Stakeholder analysis & Social Network Analysis
14:30 – 15:15	Phase 0: Identifying gaps in knowledge and knowledge systems	Knowledge systems gap analysis
15:15 – 15:30	**BREAK**	
15:30 – 16:30	Phase 0: Justifying a TD approach	
16:30 – 17:00	Discussion and reflections about Phase 0	

Day 2 (Thu 11th of May): Joint exploration and learning in TD practice (Phases 1 to 3)

Time	Topic	Methods and Approaches
09:00 – 9:30	Phase 1: Forming the team	
09:30 – 10:30	Phase 1: Building shared understanding of the "issue"	Storytelling, Active listening
10:30 – 11:00	Phase 1: Problem Identification & Prioritization	The ladder of abstraction, 4 I's, Hits & Highlights, Urgency/Impact matrix
11:00 – 11:15	**BREAK**	
11:15 – 12:30	Phase 1: Deciding on the process & outputs	Agile planning, Assisters & Resisters, Venn Diagram
12:30 – 13:30	**LUNCH**	
13:30 – 14:30	Phase 2: Knowledge co-production	Joint fact finding
14:30 – 15:15	Phase 2: Knowledge systems integration	
15:15 – 15:30	**BREAK**	
15:30 – 16:15	Phase 3: Ensuring impact in science and society	
16:15 – 17:00	Discussion and Reflections on Phase 1 to 3	

Day 3 (Fri 12th of May): Facilitation and leadership of TD research

Time	Topic	Methods and Approaches
09:00 – 9:30	Introduction	
09:30 – 11:00	Nurturing a collaborative environment	4 action points, Reflective listening
11:00 – 11:20	**BREAK**	
11:20 -	Leadership in TD research	
12:30 – 13:30	**LUNCH**	
13:30 – 15:15	Conflict management and transformation	
15:15 – 15:30	**BREAK**	
15:30 – 16:30	Plenary: Bringing it all together	
16:30 – 17:00	Course evaluation	