Unit 3.6 Capacity to Link Knowledge with Action: How can we ensure knowledge to support informed agitation for sustainability is utilized in practice?

Knowledge, we argued in Unit 1.3, is one of the key resources on which society draws to produce well-being. The stock of knowledge capital, like all resources, can be both depleted and augmented through human activities. Scholars and practitioners have built a growing stock of knowledge with the potential to inform action for sustainable development. Yet agitators working on the front lines of sustainability continue to lament the lack of action-oriented knowledge they most need. This gap between what is known about sustainable development and what is actually applied has long been recognized but remains stubbornly persistent.

The traditional model of science communication — where researchers produce knowledge and deliver it to users who are expected to act on it — has proven largely ineffective for sustainability challenges. This "loading dock" model fails because it ignores fundamental realities: knowledge and society continually shape each other in what scholars call co-production; actors will only use knowledge they trust; and trust emerges from collaborative processes that ensure knowledge is credible to users, salient to their needs and legitimate in their eyes.

Creating usable knowledge for sustainability requires recognizing it as simultaneously a collaborative enterprise (bringing together diverse expertise and perspectives), a systems enterprise (addressing interconnected problems across scales), an adaptive enterprise (learning and adjusting as conditions change), and a political enterprise (navigating power dynamics and incumbent interests). Boundary work—the processes through which research communities organize their relations with decision-makers and other knowledge holders—becomes essential for creating knowledge that can influence action.

In this unit, we explore how knowledge can be better linked with action to promote sustainable development. We examine why actors should let their actions be changed by the incomplete, contested knowledge that characterizes sustainability issues. We investigate the roles of co-production, trust, and boundary organizations in creating influential knowledge. And we consider how power shapes whose knowledge counts and how knowledge itself can become a tool for challenging or reinforcing existing development pathways.

Preparation for class: To prepare for this Unit, please:

a) **Read**: Matson, P., Clark, W. C., & Andersson, K. (2016). *Pursuing Sustainability: A Guide to the Science and Practice*. Princeton University Press..
    - **Read**: "Linking knowledge with action," Ch. 5, pp. 105–128.
    - **Read:** The case study "The Yaqui Valley: Moving toward sustainability with imperfect but persistent interdisciplinary research" Appendix A. pp. 172–179.
    - **Review:** The case study "An international success amid uncertainty: Ozone and the Montreal Protocol. Appendix A, pp. 179-186.

b) **Watch**: Pamela Matson (Director). (2014, January 10). *Linking Knowledge to Actions in Mexico's Yacqui Valley* [Video recording]. https://www.youtube.com/watch?v=TqBmeP0udFU. **Watch minutes 12:25–45:35** (the Yaqui Valley story).

Study Questions to help you get the most out of the readings:

I.   **Applying the SCL Framework to Yaqui Valley:** According to Matson et al., for knowledge to influence action it must be salient (relevant to users' decision needs), credible (meeting standards of scientific adequacy and technical competence), and legitimate (produced through processes that consider the values and perspectives of different actors). Analyze the Yaqui Valley case using this

framework. Why did the Stanford team's initial efforts (publication in elite science journal *Nature*, workshops) fail to change farmer behavior despite presenting win-win opportunities? What does this case reveal about how SCL actually works in practice?

II. **The Four Enterprises in Yaqui Valley:** Matson et al. argue that linking knowledge with action requires seeing the work as collaborative, systems-oriented, adaptive, and political. Trace how each of these dimensions appeared in the Yaqui Valley project. Which dimension did the team initially underestimate? What were the consequences of this underestimation, and how did their approach change once they recognized what they had missed?

III. **Boundary Work in Different Contexts:** Analyze the boundary work in both the Yaqui Valley and Ozone cases. In Yaqui Valley, what forms of boundary work did the Stanford team attempt, and why did their initial efforts fail? What did they learn about the actual knowledge system? In the ozone case, Benedict emphasizes that scientific assessments were "critical to the Montreal Protocol discussions." According to the case, what did these coordinated assessments accomplish that individual scientific papers did not?

IV. **Power and Knowledge in Action:** Both cases illustrate how power shapes whether knowledge influences action. In Yaqui Valley, analyze the different forms of power at play in determining whose knowledge farmers followed. In the ozone case, Benedict notes that US chemical companies eventually supported international regulation while European companies resisted. According to the case, what factors explain these different positions, and how did this affect the negotiations? What role did the Montreal Protocol's design features play in managing these dynamics?

V. **Your Case:** Think about a sustainability challenge you're familiar with where scientific knowledge could in principle inform action. In what ways and to what extent was that potential realized? What actors control the channels through which knowledge reaches decision-makers? How do existing power relationships shape what knowledge is considered legitimate or actionable? What forms of boundary work might help bridge the knowledge-action gap in this case?

Digging deeper (optional materials for further exploring frontiers in the pursuit of sustainability):

c) **Watch**: The full Matson lecture from reading 'b' (especially minutes 0:00–12:20) which provides valuable context on how to be both a scholar and an agitator in sustainability science.

d) **Read:** Clark, W. C., Tomich, T. P., Noordwijk, M. van, Guston, D., Catacutan, D., Dickson, N. M., & McNie, E. (2016). Boundary work for sustainable development: Natural resource management at the Consultative Group on International Agricultural Research (CGIAR). *Proceedings of the National Academy of Sciences*, *113*(17), 4615–4622. https://doi.org/10.1073/pnas.0900231108
     This paper presents a sophisticated framework for understanding how different contexts (sources and uses of knowledge) require different strategies for linking knowledge with action.

e) **Read**: Wyborn, C., Datta, A., Montana, J., Ryan, M., Leith, P., Chaffin, B., Miller, C., & van Kerkhoff, L. (2019). Co-producing sustainability: Reordering the governance of science, policy, and practice. *Annual Review of Environment and Resources*, *44*(1), 319–346. https://doi.org/10.1146/annurev-environ-101718-033103
     A comprehensive review of co-production scholarship that critically examines both opportunities and challenges.

f) **Read:** Cash, D. W., Clark, W. C., Alcock, F., Dickson, N. M., Eckley, N., Guston, D. H., Jäger, J., & Mitchell, R. B. (2003). Knowledge systems for sustainable development. *Proceedings of the National Academy of Sciences*, *100*(14), 8086–8091. https://doi.org/10.1073/pnas.1231332100
     The foundational paper on salience, credibility, and legitimacy in knowledge systems.