

# **Linking Knowledge with Action: The Role of Boundary Work**

**Preliminary findings from an international research program:  
Sustainability Science Program, Harvard University  
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# Perceived Salience, Credibility and Legitimacy of Information

- Implementing effective policy for poverty alleviation is a knowledge-intensive activity.
- For science, the challenge is not simply producing more info, but rather about co-producing policy-relevant, and thus, useful info for stakeholders.
- The concept of boundary works shows promise as a way to produce useful information, linking knowledge with action.
- Previous research suggests that stakeholders perceive info to be useful when that information is salient, credible and legitimate:
  - Salient to the problem at hand.
  - Credible, meaning of high quality and accuracy
  - Legitimate, meaning that it is perceived as being produced with the best interests of stakeholders in mind.
- Consequently, useful information considers both *content* and *process*.
- Of these 3 attributes, legitimacy may be the most important, because of lack of trust and power asymmetries between various stakeholders.
- While information can be corrected and reworked to become more salient, trust and mutual respect must be present in the relationship at the beginning and all the way through the process for information to be used.

# Major Challenges to Linking Knowledge with Action

The research group has identified 5 major challenges for linking knowledge with action:

- 1) **Promoting use-inspired research:** How can we better inform research priorities through dialogues between decision makers and scientists?
- 2) **Mobilizing the knowledge we have:** How can K from scientific investigation, tradition, and practical experience be better integrated in research?
- 3) **Building Knowledge-Action Systems:** What sort of boundary work can help bridge K and A?
- 4) **Learning from Experience:** How can we design adaptive systems so that the experimental character of efforts to link K w/ A can be more meaningfully evaluated?
- 5) **Managing Power and Interests:** How can governance be forged and managed that responsibly and accountably guide the choice of which problems are addressed, of which knowledge is used, and of which decision makers are supported through science-based efforts

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# The Role of Boundary Work

## Focus on the third challenge: Building Knowledge-Action System

- What sort of **boundary work** can help bridge gaps in linking knowledge with action?
- Knowledge: research, observations, and innovation in tech dev
- Action: Changes over time in:
  - **behaviors** (including policies and practices)
  - but also the **participants** working on an issue
  - the **institutions** governing policy relevant activities
  - the **framing** of the policy discussion
  - the **ultimate impacts** of those behaviors

**Boundary-spanning work** is the work at the interface of knowledge and action.

# How Boundary Works Gets Done

- The most successful boundary work practices are *participatory, inclusive, and bottom-up* in nature, and thus include stakeholders in *problem identification, policy development, and implementation*
- *Two-way, iterative, and frequent communication* between and among stakeholders is essential
- Boundary works gets done in 3 ways:
  - by boundary organizations
  - by producing boundary objects
  - through boundary agents

# 1) Boundary Organizations

- Boundary organizations are mandated to act as intermediaries between knowledge and action.
- They involve specialized roles for managing the boundaries between cultures (e.g., science and experiential knowledge, research and policy making, local and global orgs, across disciplines)
- Cultures where communication and cooperation can be difficult and prone to misunderstanding.
- Boundary organizations treat boundary management seriously, recognizing that it is difficult and time consuming and invest in communication, translation, and mediation of that knowledge.
- Boundary organizations support, “safe spaces” where
  - politically sensitive questions and experiments can be pursued
  - innovative scientists are protected
  - evaluation is practiced not as a tracking mechanism for checking off completion of safe projects,
  - but rather as a learning device for better linking KA
- Boundary organizations recognize the difficulties of attributing ultimate impacts such as poverty reduction to a particular program or project, and focus instead on strategic goal and priority setting for measurable outcomes.
- E.g., The World Agroforestry Centre (ICRAF)’s Rewarding the Upland Poor for the Environmental Services (RUPES) they provide Program where staff actively work to facilitate negotiations for pro-poor outcomes (van Noordwijk)

## 2) Boundary Objects

- Boundary Objects are permanent products that are durable, lasting beyond the tenure of the individuals who created them. Even if people who created them move on, the object remains robust and useful to others.
- Boundary objects embody the knowledge and experiences of people who created them, and facilitate the sharing of that knowledge across boundaries that separate stakeholders.
- Boundary *objects*” can include assessments, models, or maps that are jointly produced by, “make sense” to, and are used to communicate between stakeholders on both sides of the boundary being spanned.
- E.g., a map that farmers created as part of the application process for a community forest permit for conditional land tenure in Indonesia with the assistance of ICRAF (van Noordwijk et al);
- a map showing fencelines of over 6,000 parcels of land in the middle of a major wildebeest migration route in Kenya with the assistance of ILRI (R. Reid, M. Said, et al).

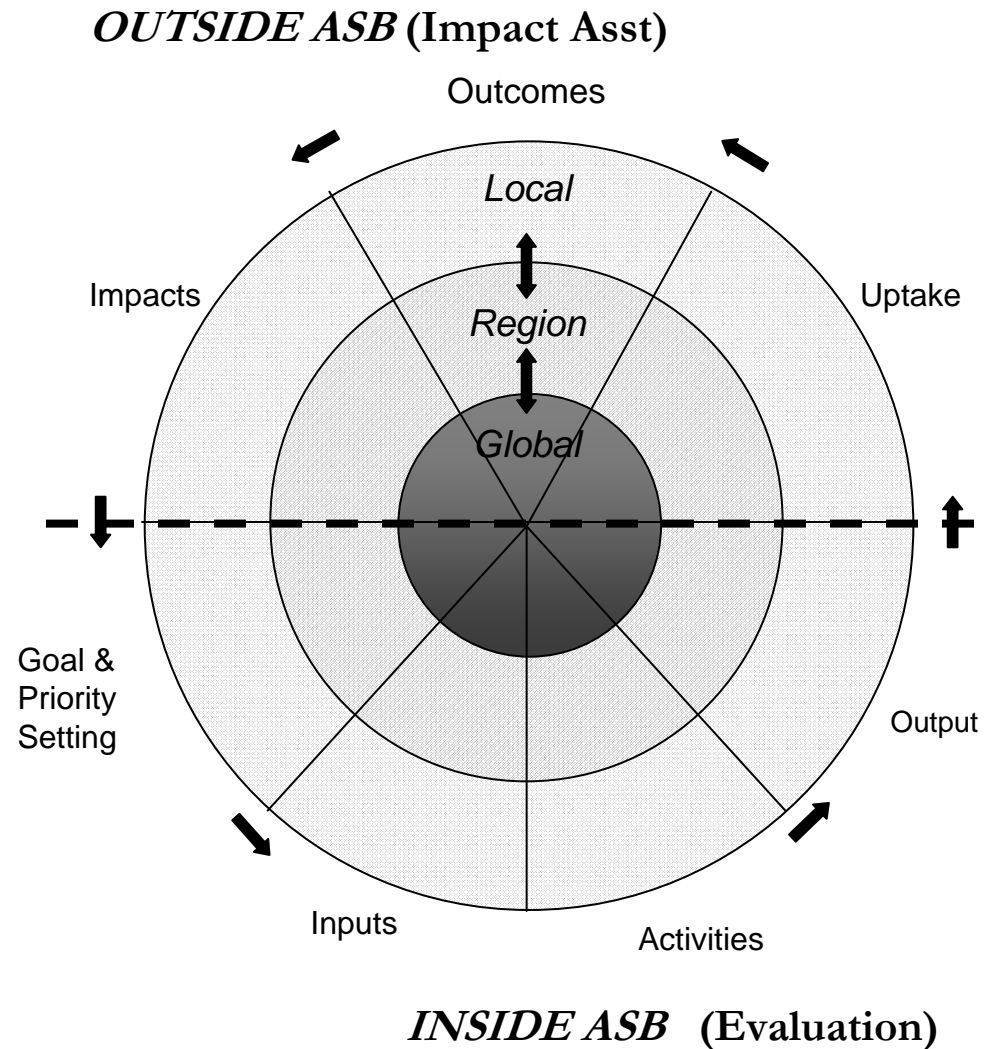
### 3) Boundary Agents

- Boundary organizations use professionals who are uniquely positioned to straddle the multiple and varied boundaries btw stakeholders, thus facilitating linkages between knowledge and action.
- One can think of boundary agents as translators, fluent in the languages of science on one side of the boundary and of community leaders on the other side, able to speak in the native language of each group.
- They are able to describe and explain to one set of stakeholders about the culture and politics of the other.
- E.g., ILRI's Reto-o-Reto project's facilitators (Reid, Said, et al).

# Boundary Work and Pro-Poor Development Outcomes

- The theory of boundary work (whether its bridging disciplines or experiential and research K) has primarily been developed on the *basis of “global science” and “national/global policy”*
- In these situations, the boundaries between K and Action are quite rigid to ensure that science is deemed credible.
- Boundary work in these circumstances has focused on trying to make that boundary more permeable
- In many organizations in developing countries though the need is to build space for autonomy, to make that boundary between K and A less permeable because of the intrusion of power and politics.
- The *tension* we see in an increasing number of innovative programs is when scientists acknowledge that they are biased towards getting the best pro-poor dev outcome.

# An Assessment and Evaluation Framework for the CG Alternatives to Slash and Burn Programme



Source: Clark et al. External Review of ASB, 2000  
[http://www.sciencecouncil.cgiar.org/publications/pdf/ASB\\_REPORT\\_website.pdf](http://www.sciencecouncil.cgiar.org/publications/pdf/ASB_REPORT_website.pdf)

# Metrics to Support Adaptive Management

- The Assessment and Evaluation Framework adapted from CIDA's Results-based Management Framework may be a helpful way to think about assessing impact.
- It was used in the review of the ASB Program whose goal is to raise productivity and income of rural households without increasing deforestation or undermining environmental services.
- The approach recognizes the difficulties of attributing **ultimate impacts** to a particular program by focusing on the broader category of **“results.”**
- A “result” is a describable or measurable change resulting from a cause-and-effect relationship.
- It then characterized programs in terms of a chain of results leading from initial problem formulation through results to ultimate impact.
- The conventional separation between impact assessment and evaluation has been an awkward one to bridge in many review. This framework offers a useful means of integrating the two tasks and perspectives.
- When speaking of impact asst, it focuses on the results of a program that take place outside the boundaries of a program and beyond its immediate control.
- The assessment thus includes the top part of the figure, and the latter three results in the sequence: uptake, outcomes, and ultimate impact.
- This “outside” perspective on assessment is an important means of implementing the CG view that research findings and innovation results do not become a public good until they are taken up by the broader global community.

# Results-based Management Causal “Chain” to Assess Impact

## Internal to a program (Evaluation)

Evaluation focuses on the sequence of results that take place inside a program and thus can be directly manipulated through program management:

- a) **Goal and priority setting:** problem framing and priority setting
- b) **Inputs:** organizational, human and material resources *inputs* assembled in response to its priorities, e.g., grants
- c) **Activities:** programmatic **activities** undertaken, resulting from its mobilization of inputs, e.g., research, coordination
- d) **Outputs** produced as an immediate result of the activities of ASB, e.g., reports posted to its web site, articles submitted to journals, innovations developed at its field stations (crops)

## External to a program (Assessment)

- e) **Uptake** of outputs by the outside world, e.g., decisions of journals to accept ASB papers for publications, or of farmers to adopt ASB innovations (e.g., crops)
- f) **Outcomes:** medium term, higher order **Outcomes** in the outside world that are the consequence of the combined uptake of multiple outputs, e.g., citation of ASB publications; recommendation of ASB innovations by one farmer to another; recognition by leading groups of ASB as the authority on a particular topic);
- g) **Impacts:** ultimate long term impacts relevant to poverty, conservation, and economy dimensions of ASB goals that follow from its outcomes, acknowledging that other factors may also be important, e.g., changes in practices of farmers, lending organizations, researchers.

# Iterative character of Causal Linkages

- The framework suggests the iterative character of causal linkages in the work.
- It captures the feedback of impacts (or lack thereof) on strategic goal- and priority setting.
- It emphasizes the possibility of adaptive feedback at each step along the causal sequence.

# In closing

- We need to support more systematic efforts to educate ourselves and the donor communities about the value of institutions that produce useful K that support close engagement between researchers and users at all scales.
- We also need to better prepare scientists to work across boundaries by teaching methods and learning from experiences that provide understanding, skills, and motivation to link knowledge with action in development for pro-poor outcomes.

# Further Reading

- Cash, D., W.C. Clark, F. Alcock, N. Dickson, N. Eckley, D. Guston, J. Jäger, and R. Mitchell. 2003. Knowledge systems for sustainable development. *Proceedings of the National Academy of Sciences* 100(14): 8086-8091, <http://ksgnotes1.harvard.edu/BCSIA/sust.nsf/pubs/pub81>
- Clark, William C. 2007. Sustainability science: A room of its own. *Proceedings of the National Academy of Sciences* 104(6): 1737-1738, [http://www.hks.harvard.edu/sed/docs/clark\\_sust\\_sci\\_2007.htm](http://www.hks.harvard.edu/sed/docs/clark_sust_sci_2007.htm)
- Clark, W. C., A. Contreras, and K. Harmsen. 2005. *Report of the External Review of the Systemwide Program on Alternatives to Slash-and-Burn (ASB): Evaluation and Impact Assessment of the ASB Programme*. CGIAR Science Council Secretariat, Washington, D.C.: FAO, [http://www.hks.harvard.edu/sed/docs/asb\\_review\\_0510.htm](http://www.hks.harvard.edu/sed/docs/asb_review_0510.htm)
- Clark, William C., and Nancy M. Dickson. 2003. "Sustainability Science: The Emerging Research Program." *Proceedings of the National Academy of Sciences* 100(14) (8 July): 8059-8061, <http://ksgnotes1.harvard.edu/BCSIA/sust.nsf/pubs/pub78>
- Guston, David H. 2001. Boundary organizations in environmental policy and science: An Introduction. *Science, Technology and Human Values* 26(4): 399-408.
- McNie, E. 2006. Reconciling the supply of scientific information with user demands: An analysis of the problem and review of the literature. *Environmental Science and Policy*. 10:17-38.
- Mitchell, Ronald B., William C. Clark, David W. Cash, and Nancy M. Dickson, eds. 2006. *Global Environmental Assessments: Information and Influence*. Cambridge, MA: MIT Press, [http://www.hks.harvard.edu/gea/pubs/geavol\\_info.htm](http://www.hks.harvard.edu/gea/pubs/geavol_info.htm)
- National Research Council, Roundtable on Science and Technology for Sustainability. 2006. *Linking Knowledge with Action for Sustainable Development: The Role of Program Management - Summary of a Workshop*. Edited by William C. Clark and Laura Holliday. Washington, D.C.: National Academies Press, [http://www.hks.harvard.edu/sed/docs/rdtbl\\_ws\\_06.htm](http://www.hks.harvard.edu/sed/docs/rdtbl_ws_06.htm)
- National Research Council, Roundtable on Science and Technology for Sustainability. 2005. *Knowledge-Action Systems for Seasonal to Interannual Climate Forecasting: Summary of a Workshop*. Edited by David W. Cash and James Buizer. Washington, D.C.: National Academies Press, [http://www.nap.edu/catalog.php?record\\_id=11204](http://www.nap.edu/catalog.php?record_id=11204)
- Reid, R. 2007
- Tomich, T.P., et al. 2007. Integrative science in practice: Process perspectives from ASB, the Partnership for the Tropical Forest Margins. *Agriculture, Ecosystems and Environment*, 121: 269–286 <http://www.worldagroforestrycentre.org/sea/Publications/files/journal/JA0253-07.PDF>
- van Kerkhoff, L., and L. Lebel. 2006. Linking knowledge and action for sustainable development. *Annual Review of Environment and Resources* 31: 445-477, <http://arjournals.annualreviews.org/loi/energy?cookieSet=1>
- van Noordwijk, M., T. P. Tomich and B. Verbist 2001. Negotiation support models for integrated natural resource management in tropical forest margins. *Conservation Ecology* 5(2), <http://www.ecologyandsociety.org/vol5/iss2/art21/>

# **Follow-up welcome**

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**Science, Environment & Development Group Collaborations**

<http://www.hks.harvard.edu/sed/collaborations.htm>

**US National Academies' Science and Technology for  
Sustainability Program, Linking K with Action Task Force**

[http://sustainability.nationalacademies.org/Linking\\_Knowledge.shtml](http://sustainability.nationalacademies.org/Linking_Knowledge.shtml)