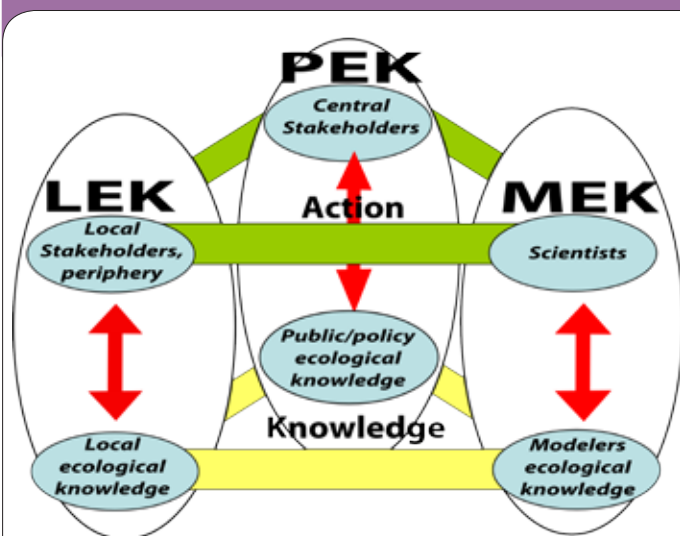


## Linking scientific knowledge with policy action in Natural Resource Management

Tropical forest margins are not just a constellation of tree species, but are social spaces where stakeholders contest over many issues, and use their knowledge, values and representations to plan and justify their actions.



LEK: Local ecological knowledge

PEK: Public space/policy ecological knowledge

SEK/MEK: Scientific, researchers or modellers' ecological knowledge



Figure 1 - The actors have individual "knowledge-action pairs" with regard to the dynamics of tropical forest margins

### Main questions

**1** How can independent scientific inquiry add value to an already complex situation?

**2** How can 'boundary work' in the tropical forest margins be done effectively?

**3** How can progress be made, when boundary work involves multi-stakeholder negotiations in the midst of conflicts and widely divergent ambitions?

**4** Isn't all this 'natural resource management' work too site-specific for 'international public goods' production?

### Take-home messages

Scientific knowledge is more likely to be integrated into other actors' decision making when it is perceived by them to be Salient (relevant), Credible (true) and Legitimate (unbiased) - SCL. Achieving shared 'SCL' perceptions requires active management of the science-action boundary. Management of the science-action boundary is needed for free flow of ideas and evidence, but with restrained levels of 'control.'

Boundary agents play crucial roles in effective boundary work. Pointers are provided to boundary agents who want to build and maintain shared perceptions of the SCL of actors' respective knowledge contributions.

Dynamic knowledge-action linkage may need to build a shared understanding of the landscape and a facilitated process of negotiations, initially in a 'safe space' protected from external interference.

Tools and approaches used are usually replicable while lessons learnt and 'boundary objects' created in one location can speed up the learning and negotiation processes elsewhere; there is, however, no substitute for self-discovery as a way of internalizing knowledge.

Three main groups of actors are: local people; government, including associated leaders of public opinion; and scientists. Each actor draws on available knowledge to manage forest margins, while struggling to define and defend their actions, cultural boundaries, and positions within the wider power structure (Figure 1).

Sometimes they also interact, mobilize social relationships and deploy various discursive means to attain specific goals. The interaction of several actors through their knowledge, interests, values, available resources and the structures to facilitate such interaction are crucial considerations in sustainable forest management.

Progress in bridging the knowledge with action gap can be achieved through effective strategies that actively engage the three groups.

If science is to secure the future of forest margins, assist in reducing poverty and enhance the long-term conservation of forest resources, it has to communicate effectively with the two other knowledge - action pairs (Figure 1), and with the many shades of opinion within their group. A persistent challenge is on how to better integrate the knowledge - action pairs of the three main actors.

For more than a decade, the ASB Partnership has tried various approaches in the tropical forest margins. A recent effort to take stock, reflect on what has worked well, and identify the main challenges enabled scientists to distinguish three types of knowledge that reside with the three main actors:

1. **Local ecological knowledge (LEK)** resides among local people and is embedded in local 'context';
2. **Public space/policy ecological knowledge (PEK)** is concerned with immediate 'impact'; and
3. **Scientific, researchers or modellers' ecological knowledge, (SEK/MEK)** is seeking generic 'mechanisms'.

Two simple approaches have not worked:

- (1). Scientists and farmers generating new technology will not in itself lead to forest conservation.
- (2). Scientists (or NGO advocates) advising policy-makers on how to handle the situation in forest margins for global benefits.

**// The linkage between knowledge and action thus needs to be evaluated as a two-way process where the capacity for science to come up with new analyses of problems and their potential solutions depends on arrangements at the boundary."**

## Virtues and risks of independent scientific inquiry

Linking knowledge, whether newly acquired or well-established, with appropriate actions for sustainable development can only work where the lack of knowledge is among the key constraints. Scientists have in the past explored different ways of linking knowledge with policy (Figure 2).

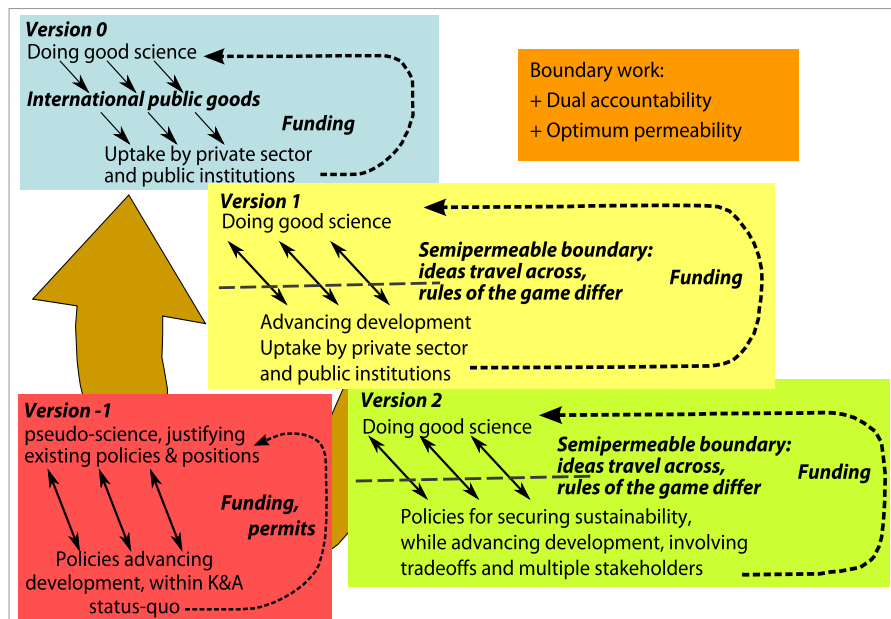


Figure 2 - Versions of efforts by scientists to link their knowledge with users

In the past, the model (Version 0) where science leads to international public goods that will be spontaneously taken up by well-intentioned private sector or public institutions had its advocates.

With an increase in the two-way interaction between science and practice, uptake of results increased, alongside direct rewards for scientists who promised to deliver exactly what was demanded. Such 'demand driven' research may require some form of protection from interference. Institutions managing the semi-permeable boundary arose, stimulating the flow of ideas but protecting science from 'interference' (Version 1).

In actual fact, while applying new knowledge, the diversity of local stakeholders and the scarcity of 'win-win' solutions, make the uptake of new ideas more complex, requiring negotiations along the various tradeoffs (Version 2). Tradeoffs increase the complexity for 'boundary agents' who may need to understand and manage the biases in accessing external knowledge by less-empowered local actors.

In confronting these models with recent experience in developing countries, a fourth model appeared (version -1) in which there is no 'boundary problem', as there is no independence of research. Only statements supporting the status quo will pass the acceptability test. This is the version that has dominated in human history, and has only been slowly (and partially) abandoned in some societies.

The linkage between knowledge and action thus needs to be evaluated as a two-way process where the capacity for science to come up with new analyses of problems and their potential solutions depends on arrangements at the boundary. Two possible pitfalls are:

- (1) complete independence will lead to missed opportunities for early application; and
- (2) strong control will suppress independence.

Management of the boundary is urgent and may require more explicit recognition than what currently exists.

## Multi-actor negotiations in the knowledge + action world

A 'Negotiation Support System' was developed by ASB scientists to assist communities living at the forest margins and government authorities to step outside of their history of conflict and agree on secure land tenure for squatter groups. This would be in exchange for the communities protecting the remaining forest and transforming monoculture coffee farming to multi-strata coffee gardens.

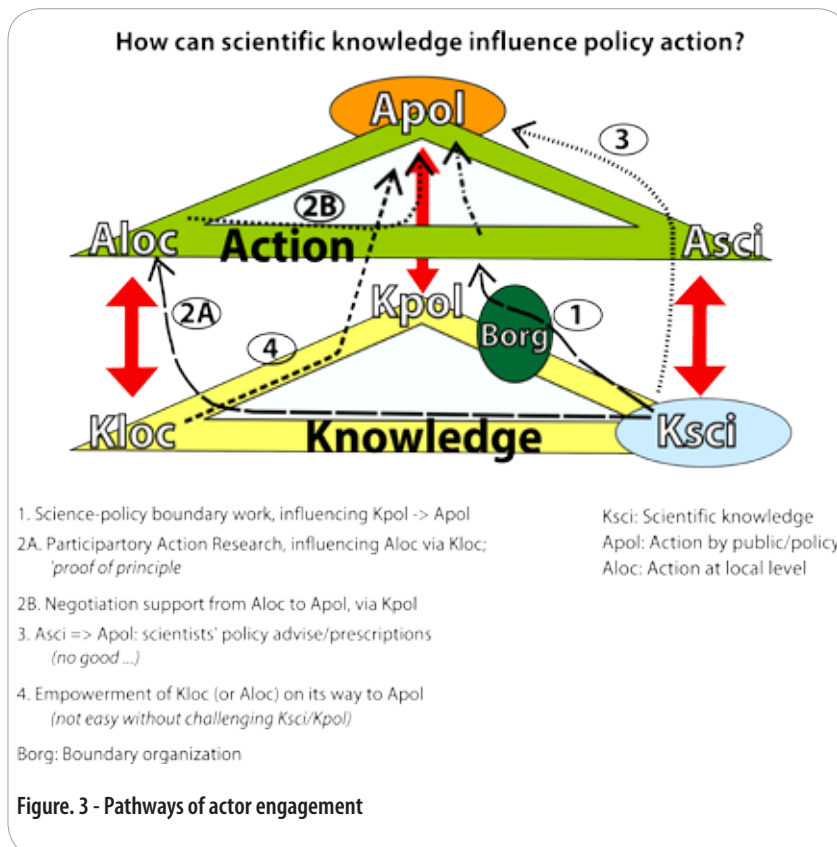
ASB's Negotiation Support System engages all parties in the creation of a new 'reality' that challenges existing paradigms in the local context. - For example, in the government's initial view, all types of coffee destroy watersheds and only natural forest or trees planted by foresters can secure water flows. Scientific data can provide evidence debunking this view, and therefore create new room for understanding change, at least at the local level.

Subsequent change at the central government level will require the engagement of both these local and scientific actors, to address the rationale and formats of regulation and create space for learning (Figure 3).

This example shows a new way for scientific knowledge (Ksci) to influence action at the public/policy level (Apol).

Previous approaches had focused on pathway 3 (scientists advising policymakers on what to do) and pathway 1 (scientists assisting policymakers to learn and chart their course of action). Pathway 3 rarely works; pathway 1 requires 'boundary organizations' to manage the interactions.

A fourth pathway aims at 'empowering' local stakeholders in their interaction with central policy knowledge - action pairs. However, this may not work where existing policy has a monopoly



over the use of 'science' to justify its positions. Pathways 1 and 2 are not mutually exclusive, and may well be tried in conjunction.

Supporting change at local level probably lowers the threshold for supporting change at a more central level – as long as it is not seen as too much of a threat for the powers that be. Combining the pathways of actor engagement with shortcuts into the public debate may work, depending on the urgency of the issue.

## How to be effective in doing boundary work

By reflecting on ongoing experience, the following list of ten points of advice emerged for persons or organizations that want to link scientific analysis and knowledge with change and local action.

### Ten pointers in preparing for boundary work

- 1). Expect complex cases of multiple actors, each with their associated knowledge, contesting at both action and knowledge levels using their own version of 'history' as justification. Never underestimate nor over-estimate the ability of stakeholders to set their own course of actions.
- 2). Engage in interdisciplinary and collaborative consultations with all actors. Create open, safe spaces for intellectual enquiry. Appreciate diversity, as long as it does not result in clashes. Refrain from value statements about alternative knowledge. Respect community norms and rules in use.
- 3). The meaning of words lies in the context of their use: don't expect that the meaning of words is the same across different groups.
- 4). Learning will often require direct experience and empirical confirmation that alternative options do exist: salience ('so what' outcomes), credibility ('how does it work' mechanisms) and legitimacy ('here, now and us' context, the absence of foreign agendas).
- 5). Provide time for building trust: often a technical entry point can help to provide legitimacy to your engagement. Willingness to listen and answer questions from local stakeholders goes a long way in establishing a two-way relationship.
- 6). Every type of boundary work requires double accountability,

in moral if not formal sense. Ensure backing and understanding at higher levels, as there may be times that the 'safe space' isn't quite so safe. Organizations may need to embed boundary agents in appropriate structures and provide incentives to individuals to go beyond the call of duty, explore ways of continually improving practice, and encourage people to listen.

7). Guard the permeability of the boundary: ideas can flow freely when politically incorrect views or conclusions emerge. Clarity is needed on the separate domains of scientific knowledge and knowledge already in the public domain.

8). Knowledge sharing may aim, not for maximum clarity (the researchers' aim), but optimal ambiguity. Multiple interpretations can coexist at the knowledge level, as long as they do not clash at the action level.

9). Live and walk the talk about separating scientific knowledge from biased conclusions such as: "although I had hoped otherwise, the outcome of the analysis is ...". Ensure that content and the process of engagement are compatible.

10). Once there is awareness and appreciation of the relativity of all knowledge systems, jointly explore how knowledge to action linkages may have co-evolved. This process is as important as the technical content of the boundary work. Build a matrix for measuring program success.



## Replicability via 'boundary work' and training of 'agents'

If change at any location requires an elaborate process with full scientific analysis and engagement, it becomes too costly and lengthy for investors in development. They may revert to the 'Version 0' of Figure 2, investing in science that just produces 'international public goods', or the politically less complex 'Version 1' of generating technology that is supposedly value and scale-neutral. The argument that the knowledge generated is too local in its impact has deterred investment into Integrated Natural Resource Management in international agricultural research. Is there a counter-argument?

Boundary work of the type described so far will often produce a boundary marker or boundary object that represents the negotiated, shared understanding of multiple actors. These boundary objects can be of many shapes and forms: words, phrases, diagrams, legal contracts, maps, or operational models. The more these objects

truly represent the varied perspectives, the more likely they are to endure.

Boundary objects can also be of great help for adjacent negotiation processes as long as local stakeholders recognize the similarity. A collection of such boundary objects provides the experience required by organizations and agents to replicate success – but never in a prescriptive manner. The type of boundary object that will work and provide shortcuts for local learning will remain difficult to predict.

ASB scientists in South East Asia have developed a suite of diagnostic, interactive and communication tools based on the analysis of the three knowledge types, their overlaps and contradictions. Experience suggests that this can be a cost-effective way of linking scientific understanding and knowledge to local action as a step towards redirecting global change in more desirable directions.



Forest margin in Uganda  
PHOTO: Vanessa Meadu

The ASB Partnership for the Tropical Forest Margins is working to raise productivity and income of rural households in the humid tropics without increasing deforestation or undermining essential environmental services. ASB is a consortium of over 90 international and national-level partners with an ecoregional focus on the forest-agriculture margins in the humid tropics, with benchmark sites in the western Amazon basin of Brazil and Peru, the Congo Basin forest in Cameroon, southern Philippines, northern Thailand, and the island of Sumatra in Indonesia.

ASB Policy briefs aim to deliver relevant, concise reading to key people whose decisions will make a difference to poverty reduction and environmental protection in the humid tropics.

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