Mobilizing Science and Technology for Sustainable Development

A Workshop Hosted by
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for
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Meeting Report
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The international workshop on *Mobilizing Science and Technology for Sustainable Development* was held on April 10-12, 2002 at Harvard University. It convened a unique cross section of approximately twenty senior civil servants, foundation officers, business executives, natural scientists and development scholars engaged in the design, financing, operation, and evaluation of research systems involved in linking knowledge production to sustainable development. The workshop built upon a series of fact-finding meetings conducted during the preceding nine months by the workshop sponsors in Abuja, Bonn, Chiang Mai, Ottawa, Paris, Santiago, and Trieste.[1] This broad consultative process has generated a wealth of practical perspectives and insights on the most urgent needs for enhancing science and technology's contribution to sustainable development in real world situations, the most constraining barriers to meeting those needs, and on the strategies that have been most helpful for surmounting those barriers in particular regional contexts.

Discussions at the Harvard workshop were structured around four themes, framed as dilemmas, which are often encountered in efforts to connect knowledge systems to sustainable development. Presented with an overview of each dilemma, workshop participants explored options for designing, financing and building the next generation of knowledge systems with a view toward identifying potential institutional arrangements that could effectively address each dilemma under varying conditions. The remainder of this report summarizes each of the four themes along with the most relevant findings that emerged during the workshop.

Theme 1 – Matching appropriate S&T to placed-based problems

The first of the four discussion themes focused on the dilemma of matching the most appropriate science and technology to address place-based problems. This dilemma stems from an observed frustration on the part of people working in the field of sustainable development with what are perceived to be donor-driven, science-driven, and technology-

[1] For additional information on these regional and cross-cutting workshops, as well as additional background on the international Initiative on Science and Technology for Sustainability, please see sustainabilityscience.org

driven programs. Though driven by good intentions, such programs can be overly constraining with respect to preferred issues and approaches in deploying science and technology for sustainable development. In addition to mismatches between specific problems and generic solutions, this theme highlighted frequent mismatches between the scale at which a problem manifests and the scale for which science and technology solutions are best suited.

Workshop participants endorsed the view that greater voice from those directly affected by sustainable development problems is necessary when aggregating demands on the next generation of S&T systems. They also noted that enhanced communication and collaboration are essential where traditional boundaries persist between scientific disciplines, between functional areas of research, assessment and policymaking, between environment and development missions, and between scales of operation. It was widely acknowledged that greater degrees of integration across what are now relatively segmented dimensions of existing S&T systems will be a key factor in matching the most appropriate science and technology solutions to specific problems in specific places. Segmentation of research domains was acknowledged as allowing for important scientific advances through specialization. Thus, wholesale integration of all facets of science and technology systems to a degree that would stymie specialization was cautioned against, but significant increases in integration still were viewed as necessary. Discussions of possible institutional mechanisms that would support various types of integration across disciplines, functions and levels centered on boundary spanning activities, or "boundary organizations"[2]. Such activities involve translating information (e.g., scientific and technological information and needs of potential beneficiaries of such information), facilitating two-way communication, and providing a site to "co-produce" knowledge.

In addition to greater integration, a broader distribution of decisionmaking authority and program accountability was cited as a potential design principle that could address the mismatches between problems and solutions in future S&T systems.

Specific proposals and/or examples programs that offer the potential to connect databases and research activity across spatial scales and accompanying functional boundaries included:

- Bolstering self-assessment capacity by building in situ databases and linking them to global data sources. Programs such as Mexico's CONABIO[3] and the Caribbean Ocean Resources Estimation project (CORE) represent successful efforts to build domestic capacity with the assistance of complementary global data sources and expertise. The Global Biodiversity Information Facility (GBIF)[4] cited as having the potential to achieve something similar on a much larger scale.

[2] Guston, D. H., ed., Special issue on "Boundary organizations in environmental policy and science," *Science, Technology & Human Values* 26(4) (2001)
[3] See www.conabio.gob.mx
[4] See www.gbif.org.

- Expanding the use of new tools and their products such as high-quality Global Information System (GIS) and remote sensing imagery. These tools must become more easily accessible to allow developing countries to understand and learn to manage and preserve their natural ecosystems. One of the more reliable and economical means of monitoring is to have satellite information that will allow assessing real-time changes of vegetation cover and other ecological indicators.

- Encouraging linkages between foundations, universities, industry and conservation organizations that support distributed networks, knowledge creation and sustained exchange of scientific information. A project sponsored by the Lemelson Foundation that provided timely information that Indian coastal communities could use to predict wave heights was cited as a simple yet effective example of downscaling data to fit community needs.

Theme 2 – Cultivating Institutional Flexibility and Stability

The second theme focused on the dilemma of building and funding S&T systems that are flexible and responsive to evolving problems yet durable and committed to programs that require longer periods of stability and support before realizing their potential. The countervailing pressures driven by the need to learn and adapt in a complex and rapidly changing environment coupled with glaring capacity deficiencies in particular regions of the world generates conflicting demands on the next generation of S&T systems: adapt but remain stable. In response to these competing demands, the second discussion highlighted some of the institutional responses that are being observed.

One such response attempts to reform existing research organizations in order to strike a better balance between flexibility and stability, allowing them to learn through time and adapt as necessary. Another response increasingly observed focuses on the use of task forces or ad hoc teams of expertise that are commissioned to address a specific problem in a timely fashion. Such teams of expertise are often disbanded upon completion of their mission. A third observation includes combinations of these two approaches that involve organizations with secretariats that provide permanence and/or organizational stability coupled with short-lived, ad-hoc teams that provide flexible problem-solving capacity.

Specific models cited that represent different institutional trends in reconciling these competing pressures include:

- The Consultative Group on International Agricultural Resources (CGIAR)[5], particularly its Alternatives to Slash and Burn (ASB)[6] program, and the International Council for the Exploration of the Seas (ICES)[7], particularly its dialogue meetings and committee structure. These examples are representative of internal arrangements that seek to stimulate learning and build adaptive capacity into robust, longstanding organizations.

[5] See www.cgiar.org
[6] See www.asb.cgiar.org
[7] See www.ices.dk

- The World Commission on Dams (WCD)[8] and the Millennium Assessment (MA)[9] are representative of task force arrangements, or ad hoc teams of expertise that are convened with the purpose of addressing an explicit problem.

- The former U.S. Office of Technology Assessment (OTA), the Canadian Policy Research Institute (PRI) and the InterAcademy Panel (IAP)[10] are all representative of hybrid arrangements which combine permanent structures – usually in the form of secretariats – with an accompanying capacity to convene ad hoc teams of expertise.

Workshop participants agreed that no single model was likely to be effective in all circumstances, and that the conditions associated with a given problem or region would dictate how the countervailing needs for flexibility and stability should best be addressed. Workshop participants also noted that while ad hoc arrangements can be highly effective, their effectiveness was likely contingent upon being embedded within a stable institutional environment that provided ad hoc arrangements with legitimacy, a receptive audience, and possibly more tangible forms of support. Given these perceived requirements for success, many of the participants felt that the latter "hybrid" model warranted further attention.

Theme 3 – Prioritizing Infrastructure Investment

The third theme focused on the dilemma of prioritizing investment targets when a multitude of targets exist. The discussions followed upon the insight from the second theme that varying conditions generated varying needs across issues and regions, and that varying needs shaped varying priorities for infrastructure investment. The third theme sharpened the focus on individuals, organizations and networks as the most critical components of a vibrant S&T system and charged workshop participants with specifying how the relative importance of targeting each of these components in S&T capacity building varied under different conditions.

Workshop participants responded with a number of observations. First, it was argued that in regions where basic S&T capacity – in the form of primary and secondary education systems – were most fragile, the necessity of building base capacity cannot be ignored. Second, it was noted that efforts in strengthen S&T capacity would be wise to identify and reinforce existing capacity strengths. Third, participants were reluctant to exclusively endorse the targeting individuals, organizations or networks in isolation under any conditions, i.e., development of individual core competencies, "Centers of Excellence," and effective networking arrangements needed to proceed in conjunction with one another. With this in mind, the importance of building "boundary-spanning capacity" through the cultivation of leadership skills, interdisciplinary centers and projects, and networking tools such as information communication technologies was endorsed.

[8] See www.dams.org
[9] See www.millenniumassessment.org
[10] See www4.nationalacademies.org/iap/iaphome.nsf/

Specific examples of effective capacity building programs and proposals for new initiatives included:

- Convincing international financial institutions like the IMF or World Bank to give greater priority to science and education, including capacity building programs in primary and secondary education and national academies of science.

- Expanding support for individual training programs like Leadership in Environment and Development (LEAD)[11], the International Foundation for Science (IFS)[12] and the Asian Institute for Technology (AIT)[13].

- Designing an integrative doctoral or post-doctoral program that would generate a growing cadre of boundary-spanning leaders.

- Supporting Centers of Excellence that generate value-added through interdisciplinary collaboration and policy relevance through explicit links with a receptive policy domain. The North American Commission for Environmental Cooperation (NACEC)[14] was offered as an example.

- Enhancing networking capacity by increasing access to information communication technologies and distance learning programs.

Theme 4 – Augmenting Resources

The final theme addressed the dilemma of insufficient resources and the need for securing additional resources and stimulating new investment in publicly accessible S&T for sustainable development. Possible avenues for augmenting resources that were discussed included tapping into latent innovative capacity at local levels, reinforcing incentives for private sector investment, and readjusting public sector spending. It was noted that successful partnerships and effective leveraging efforts were observable in small-scale initiatives, and workshop participants were asked to discuss the viability of scaling up these practices in larger scale initiatives. It was also widely acknowledged that a pivotal role could be played by philanthropic foundations in catalyzing partnerships and creatively leveraging different forms of resources that exist among the variety of stakeholders in any given program.

Specific examples of successful partnerships and proposals for new partnerships included:

- Developing a Science and Technology Funding Facility: A general consensus is emerging that moving forward in supporting S&T development will require not only radical increases in investments in S&T, but a funding mechanism which is designed to be problem-driven and meet the unique needs of harnessing S&T for sustainable

[11] See www.lead.org
[12] See www.ifs.se
[13] See www.serd.ait.ac.th
[14] See www.cec.org

development goals. Such a facility would have a broad mandate for building social, human, and technical capacity, enhancing education, supporting research institutions, and improving technology innovation, development and dissemination. The characteristics of such a funding facility would include:

  - A diverse portfolio of products (e.g., innovation and venture capital funds, education funds, loans, grants, start-up funds, etc.) that could meet heterogeneous needs in different countries;
  - The ability to leverage resources to build countries' own research capacity and appropriate technology;
  - Engagement of multiple shareholders, including, foundations, NGOs, countries, private banks, the development banks;
  - An evolving and flexible structure; and
  - Responsibility for and authority in the management of the facility by the potential beneficiaries of S&T funding.

- Replicating the community development financial institutions (CDFIs) which have existed in the UK since the 1970s. CDFIs provide capital and technical assistance to enterprises in disadvantaged communities excluded from mainstream commercial finance. Individuals are encouraged to invest through loans or taking shares in CDFIs as well as equity. This has enabled CDFIs to raise more loan capital from banks and other lenders for developing businesses in their areas.

- Expanding multi-lateral cooperation among foundations in order to share risks. One example discussed was the Energy Foundation[15], a partnership of major foundations interested in sustainable energy.

- Providing more small-scale venture capital that would target local innovation such as the Indigenous Peoples Biodiversity Information Network (IBIN)[16] in Canada and the Honeybee Network[17] in India.

- Making use of Type II arrangements – or "coalitions of the willing" – currently envisioned for the upcoming World Summit on Sustainable Development as potential vehicles for catalyzing S&T partnerships. These could include multilateral arrangements with joint funding arrangements with a board and small secretariat that addresses a particular problem area like the InterAmerican Institute for Global Change Research (IAI)[18] and the African Initiative on Science and Technology for Sustainable Development.

- Clarifying new rules of engagement between the public and private sector that will encourage private industry to take a greater role in bringing S&T to bear on the most acute public sector problems.

[15] See www.energyfoundation.org
[16] See www.ibin.org
[17] See www.sristi.org/honeybee.html
[18] See ww3.iai.int

- Strengthening the S&T focus of successful institutions such as the Peace Corps that have not traditionally focused explicitly on S&T capacity building.

The closing plenary include brief remarks by representative from each of the three sponsoring organizations that reiterated the importance of re-centering the focus of S&T capacity building on the most pressing sustainable development problems as defined by those most directly affected by them. In particular, the sponsors emphasized the need to:

- Continue to support greater scientific integration and communication across boundaries.

- Sustain minimum S&T capacities in the poorest countries.

- Identify and build upon the comparative advantages that exist within current S&T infrastructure.

Appendix – Participants

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