

Linking Knowledge to Action for Sustainable Development in India

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Sustainable development is driven by knowledge because progress of society towards sustainability is a knowledge-intensive enterprise. Investing in creation, communication and linking knowledge to field and policy action is therefore necessary for ecological, economic and social well-being. While India ranks very high in terms of number of research paper published annually, when it comes to linking that knowledge to action for bringing human development it ranks very poorly— the Human Development Index (HDI) for India is 0.611, which gives India a rank of 126th out of 177 countries. Drawing on the pioneering efforts on linking knowledge to action, here we argue that in order to reduce poverty and bring sustainable human development a concerted effort is required to design and implement strategies for connecting science to decision making across scales and sectors in India. We present a potential strategy for connecting science to decision-making. Good research is required to produce knowledge and robust knowledge supply-chain is essential to link knowledge to policy and field action. We call upon the scientists to employ strategies for co-production of knowledge, and to people engage in capacity building programme to employ co-synthesis of knowledge useful to solve the field problems. Practitioners and policy makers on their part are expected to link that knowledge to both field and policy to design and implement interventions for sustainable development.

Keywords: Co-production of knowledge, Co-synthesis of knowledge, Evidence-based decision making, Knowledge systems, Knowledge networks, Facilitated social learning, Peer-to-peer learning

1. Introduction

Sustainable development is driven by knowledge because progress of society towards sustainability is a knowledge-intensive enterprise. Investing in creation, communication and linking knowledge to field and policy action is therefore necessary for both poverty reduction and ecosystem sustainability¹⁻⁴. While India ranks very high in terms of number of research papers published annually, when it comes to linking that knowledge to action for bringing human development it ranks very poorly— the Human Development Index (HDI) for India is 0.611, which gives India a rank of 126th out of 177 countries⁵.

Science and technology are increasingly recognized as essential for sustainable development. However, much of the knowledge generated by research institutions is either not efficiently used, or is not usable in the form it is produced. For instance, an influential study⁶ in England suggests that much of current conservation practice is based upon anecdote and myth rather than upon the systematic appraisal of the evidence. Only 2% interventions were based upon verifiable scientific evidence. The study suggests that this is a major problem for conservationists and requires a rethinking of the manner in which conservation operates. Another study⁶ notes that a large number of research papers are published by scientists that have messages for addressing the issue of desertification. It is sometimes with the encouragement of the United Nations Convention to Combat Desertification and its Committee on Science and Technology, and some times through local support. The expectation has been that the research will contribute to combating desertification. However, little of this research has been applied in drylands for its identified purpose. There are many reasons for this including the limited translation of scientific research into an accessible format for application by practitioners, development agencies or rural communities⁷. In India, there are no such studies and the issue is only slowly being recognized now.

Sustainability can not be achieved without reducing poverty and provisioning for the just and dignified improvements in livelihoods. Likewise, nor can sustainable human well-being be achieved without sustainable environmental management. And none of this is achievable without linking knowledge to policy and action. This article draws on the pioneering efforts to argue that in order to reduce poverty and bring sustainable human development a concerted effort is required to design and implement strategies for connecting science to decision making across scales and sectors. Based on the experiences in Rajasthan and elsewhere the article also presents a potential strategy for connecting science to decision-making.

2. Some pioneering efforts

The management innovations⁸ that help in linking knowledge to action may be found in the efforts that are now specifically addressing the issue of knowledge systems for sustainable development⁹. There are some noteworthy and pioneering initiatives. The most noteworthy efforts include the multi-institutional Sustainability Science¹⁰ initiative (also, Forum: Science and Innovations for Sustainable Development). National Academies of USA have established a Science and Technology for Sustainability Program (STS) to encourage the use of science and technology to achieve long term sustainable development including increasing incomes, improving public health, and sustaining critical natural systems. One of the most influential programme on efforts to mobilize science and technology is being organised under the leadership of John F. Kennedy School of Government of the Harvard University¹¹.

Among the pioneering efforts in India include the efforts by a small group of concerned practitioners working on forests and livelihoods³. Another initiative by Forestry Training Institute (FTI), Jaipur, Rajasthan is working on strengthening

science-based decision making in Indian forestry through offering state-of-the-art training programmes specifically aimed at preparing the forest managers for connecting science to decision making. FTI has designed innovative training methods including peer-to-peer learning and facilitated social learning to enhance the use of science by decision-makers¹². The Knowledge-Action Network (KAN) has been established to promote sustainable forest management and livelihoods improvement through enhanced use of scientific knowledge in decisions related to policy and practice.

At the apex level the National Knowledge Commission (NKC) is a high-level advisory body to the Prime Minister of India, with the objective of transforming India into a knowledge society. While NKC recognized that “our future prosperity depends upon the policies, programmes and people that can foster continuous generation and application of knowledge in the pursuit of learning”¹³, yet the issue of application of knowledge has been given a very cursory treatment in just one page of the report. Even in that discussion, the NKC report does not go beyond the ritual rhetoric. Indeed, the NKC notes that “while making the recommendations we have been guided by how knowledge will impact the lives of people, ordinary people, of India”¹³; yet, there is no clear guidance on methods and modes to gather the best available science and give it to those ordinary people—citizens, policy makers, practitioners—who can use it to make the difference on the ground, routinely.

3. Determinants of science—management divide

It is a common understanding that the three classical approaches on linking knowledge to action have essentially failed. First, trickle down approach that assumed that good research will be used by the society without additional efforts from scientists had been a futile effort. Second, transfer and translate approach which assumed research should be given to practitioners in the form they can understand and use has also failed. And, third, push and pull approach where scientists push whatever knowledge they produce to practitioners’ domain, and practitioners pull the required knowledge they need, has also failed, because efforts are often incoherent.

This failure has many other reasons^{14,15}. One, trickle down, transfer, and push & pull approaches assume the independence of research product from research process. Thus, the work that goes into setting of research problems and doing science itself matters to its eventual application. It is very clear now that supply-chain of knowledge production, communication and application is not linear. Two, knowledge is produced in societal and institutional settings where conflicts of interest influence doing science. Science is thus also influenced by cultures within which it is done. Three, although science is widely assumed to be truth, it is often nothing more than approximation. Can scientists alone generate knowledge to solve complex problems of sustainable development? Within a reasonable framework of knowledge systems, experiential and traditional knowledge too matter. Four, boundary between science and society is created by dynamic social, economic, and

political processes. Thus science is prone to be used as power balancing tool¹⁵, and therefore, equity of knowledge is a critical concern for sustainability¹⁶.

Even in contexts where science is used for decision making the incorporation of scientific information into national policies and local actions is not uniform. Political and financial, rather than scientific, forces have a greater influence on decisions about NRM and human development. We thus need to invest in understanding the determinants of using science in field action, analyzing the variability in interventions and impacts as a function of linking knowledge to action, and design a robust knowledge supply-chain management to make an impact on the ground.

4. When is knowledge most likely to be linked with action?

Some of pioneering and emerging approaches suggest that science is most likely to be connected with decision making when the scientists, practitioners, policy makers and citizens engage in co-production and co-synthesis of knowledge^{11,12}. Such co-production and co-synthesis is possible only when:

- we manage boundaries between knowledge and action, and practitioners, policy makers and researchers
- the research process concurrently enhances the relevance, credibility, and legitimacy of the knowledge that is produced, and
- the process of knowledge production and knowledge synthesis succeeds in integrating scientific, political, experiential, and traditional knowledge.

Active, iterative, and inclusive communication between scientists and decision makers helps in mobilizing knowledge that is seen as relevant, trustworthy, and legitimate among the practitioners. Linking knowledge to action also calls for the participants in the resulting dialogue comprehend each other. Mutual understanding between scientists and practitioners is often hindered by jargon, language, experiences, and pre-conceived notions. Translations—both of text and context—facilitate mutual comprehension in the face of such differences. In multi-stakeholder contexts, conflicts are a reality. Mediation can enhance the legitimacy of the process of production and use of knowledge through increasing transparency, bringing in all perspectives, designing rules of conduct, and establishing criteria for decision making¹¹.

Research on sustainability science suggests that the “boundary management” functions—convening, communication, collaboration, integration, translation, and mediation—can be performed effectively through various organizational arrangements and procedures¹⁷.

Boundary organizations: *(i)* involve specialized roles within the organization for managing the interface; *(ii)* have clear lines of responsibility and accountability to different stakeholders on both sides of the boundary; and *(iii)* they provide a platform in which information can be co-produced by stakeholders from different sides of the boundary through the use of boundary-objects (accessible reading

material, policy-briefs, peer-to-peer-learning in training etc.). As Cash et al.¹¹ note, "...all else being equal, those systems that made a serious commitment to managing boundaries between expertise and decision making more effectively linked knowledge to action than those that did not. Such systems invested in communication, translation, and/or mediation and, thereby, more effectively balanced salience, credibility, and legitimacy in the information they produced".

Boundary management (i.e., interface management) is a complex task. The interface managers often indulge in participation and networking across multiple interfaces/boundaries, they provide effective leadership for bridging the boundaries; they are committed to innovations and interface management, and enthusiastically engage in collective production of interface objects that both practitioners and scientists can understand. The quality of linkages between the science provider (researchers) and their end-users (policy makers and practitioners) is crucial for improving the utility of science. The quality of linkages is determined by several factors including (i) the nature of the personal relationships between them, (ii) how the information meets the needs of the end-users, (iii) the end-users' perceptions of the science provider, and (iv) the culture and structure of the end-user organisations¹⁸. In addition, a strong leadership at the program management level is a common characteristic of most successful efforts to link knowledge with action¹⁹.

5. Experiences in Rajasthan

This section draws on the strategies successfully employed in Rajasthan Forestry and Biodiversity Project (RFBP) to connect science to decision making^{2,12}. It also draws on the available literature globally³. There are several lessons for linking knowledge to action:

(i). *Inculcating the habit of evidence-based decision making among the practitioners:* It is understandable that when field managers act on better logic and strong evidence, derived from science, experience and traditional systems of knowing, their work will be better than those who rely on anecdotes and outdated knowledge. Management is learned through practice and experience, which is enhanced through the use of new knowledge. Managers work more effectively when they persistently seek new knowledge and insight, from both science and experience, and keep updating their assumptions, skills, and knowledge²⁰. A greater shift to evidence-based forest management is very effective, and often leads to enhanced project impact, as is the case with RFBP. A habit of evidence-based decision making also encourages practitioners to remain open to social learning from peers facing similar challenges^{21,22}.

(ii) *Production of problem-based knowledge:* Policy makers and practitioners around the world are calling for the production and diffusion of more useful information for environmental decision-making. Ideally, information is useful when it expands alternatives, clarifies choice and enables policy makers and practitioners to achieve desired outcomes²³. Practitioners often have specific information requirements that go unmet, or they may not be aware of the existence of potentially

useful information to solve the problem they face in field. An active, iterative and inclusive communication across scales, disciplines and stakeholders ensures that scientists willing to produce knowledge for decision making are informed about the problems in the field that require solution. Practitioners on their part are able to learn and apply new knowledge that they find relevant, credible and legitimate.

(iii) Co-production and co-synthesis of knowledge: Experience suggests that systems need to deliberately support the co-production and co-synthesis of knowledge. A critical component of co-production is managing the boundaries/interfaces between science, policy and practice, and across disciplines, scale, and knowledge systems to create information that is relevant, credible, and legitimate to multiple audiences. Institutional mechanisms that appear to be useful in managing such boundaries include procedure for structuring convening, translation, collaboration, and mediation functions¹⁷. Likewise, co-synthesis of knowledge is attempted often in capacity building programmes when scientific, experiential and traditional knowledge dispersed among the participants and peers is pooled together through scenario-building in training sessions¹².

(iv) Integration of scientific, experiential and traditional knowledge systems: Traditional skills, local techniques and experience of practitioners—together with science—provide a wide spectrum of knowledge. Integration of different kinds of knowledge systems—scientific, experiential, and traditional—is vital for sustainable development (See figure 1). Such integrative framework has often yielded innovative solutions to the challenges faced by practitioners. There are numerous tools and techniques for incorporating local knowledge, preferences, and values into decision making in natural resources management²⁴ and developing the capacity for individuals to learn effectively from their experiences²⁵. While experience has value, experiential knowledge must be used in integration with scientific and traditional knowledge to guide effective actions²⁶. Likewise, science can inform policy debate on natural resources and livelihoods but may not control its outcome. Scientists can generate knowledge, but can seldom force practitioners to use it. It is the combination of science, experience and traditions, and not substitution of one for the other, that yields usable knowledge.

(v) Easy availability of knowledge: Easy availability of knowledge to practitioners and policy makers is necessary for it to become usable, although as discussed earlier relevance, credibility, and legitimacy of information in the eyes of users must also be ensured. There are numerous ways to gather relevant knowledge and give it to practitioners. But establishing a knowledge-supply chain is of fundamental value for seamlessly connecting science to decision making.

6. Conclusion

Drawing on the literature and experience we have argued that linking knowledge to action requires deliberate and purposeful co-production of knowledge during the research, and Innovation in pedagogy aimed at co-synthesis of knowledge in training programmes. Co-production and co-synthesis require interface management between

science and practice and across disciplines, scale, and knowledge systems in order to create information that is relevant, credible, and legitimate to stakeholders.

The scientific information now available concerning ecosystems and human well-being holds the promise of significantly improving the choices that the public and decision-makers take concerning the environment. But for that promise to be fulfilled, a bridge needs to be built between the research community holding this information and the decision-makers seeking it²⁷. The best way to do this is by setting the stage for the flow of knowledge between researchers, policy makers, and resource managers²⁸. Implementing effective developmental action requires that production of knowledge through monitoring and assessments be integrated functionally with a process for developing an implementation strategy and processes for stakeholder collaboration while maintaining a broad focus on the implementation of conservation and development action. Operational models²⁹ that take care of stakeholder collaboration, link with land-use planning, social learning, and action research are more successful. Some of the emerging new approaches and innovations³⁰ in this field of knowledge management need to be taken into consideration³¹⁻³⁹.

In order to strengthen the science-based decision making a concerted effort is called for in India to:

- Increase the use of science by decision makers in policy and practice
- Encourage the incorporation of decision-makers' needs of knowledge in research priorities so as to facilitate the production of problem-based science
- Enhance doing science by researchers who are informed by problems faced by practitioners
- Identify the gaps between the needs of decision-makers and scientific research priorities in research institutions
- Improve communication between the scientific community and decision-makers to increase professional interaction and connection among the scientists, policy makers and practitioners
- Promote a philosophy of linking knowledge to action (connecting science to decision-making) among the stakeholders working on forests and livelihoods in India

In conclusion, scientific perspectives will not prevail always, but we must sincerely engage nonetheless; for it is highly unlikely to achieve secure livelihoods or sustainable ecosystems without linking knowledge to action. Good science is required to produce knowledge and useful linkages are essential to link knowledge to policy and field action. We call upon the scientists to craft innovations by doing problem-driven science. Practitioners and policy makers on their part are expected to link that knowledge to both field and policy to design and implement interventions for sustainable development.

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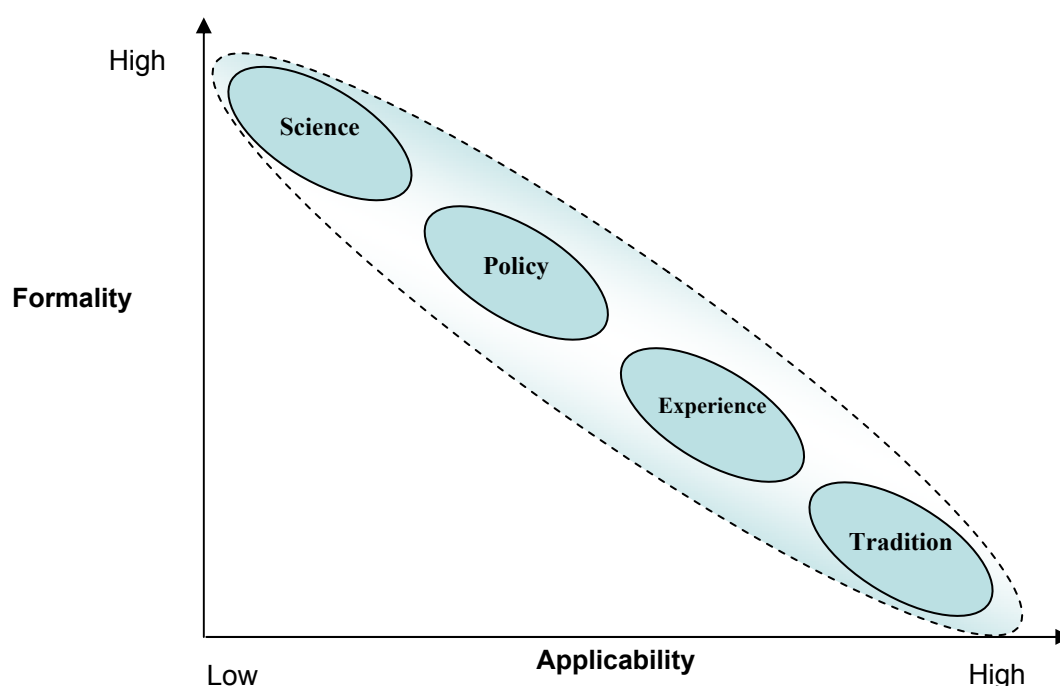


Figure 1: Integrating science, policy, experience and traditions, and linking the knowledge so gained to field action.

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