
Communicating Agricultural Science and Technology Indicators: Lessons Learned

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Abstract

This paper discusses the strategy of the Agricultural Science and Technology Indicators (ASTI) initiative toward communicating agricultural S&T information and trends at global, regional, and national levels. To understand the contribution of agricultural S&T to agricultural growth, quantitative information is fundamental. Indicators derived from such information allow the performance, inputs, and outcomes of agricultural S&T systems to be measured, monitored, and benchmarked. These indicators assist S&T stakeholders in formulating policy, setting priorities, and undertaking strategic planning, monitoring, and evaluation. One of the few sources of information on agricultural S&T statistics in low and middle income countries is the Agricultural Science and Technology Indicators (ASTI) initiative. Since 2001, ASTI has been active in compiling, analyzing, and publicizing data on institutional developments, investments, and capacity trends in agricultural S&T in low- and middle income countries worldwide. ASTI is generally recognized as the most authoritative source of information on the structure, financing, and capacity of agricultural S&T worldwide, and its outputs have been widely cited in international agricultural research policy documents. Based on lessons learned since the inception of the ASTI initiative, a number of approaches have been developed to enhance the dissemination and usage of ASTI outputs, including the formation of strong partnerships, the tailoring of information to different stakeholders, and the creation of an interactive data tool on the ASTI website.

Résumé

Cet article discute de la stratégie des Indicateurs relatifs aux Sciences et Technologies Agricoles (ASTI) pour communiquer l'information agricole scientifique et techniques (S&T) ainsi que des tendances au niveau mondial, régional et national. Pour comprendre la contribution des S&T agricoles à la croissance agricole, les informations quantitatives sont fondamentales. Les indicateurs dérivés d'une telle information permettent l'exécution, les entrées et les résultats des informations S & T agricoles destinées à être mesurées, surveillées et évaluées. Ces indicateurs aident les intervenants en S&T à

formuler des politiques, établir des priorités et entreprendre la planification stratégique, le suivi et l'évaluation. L'ASTI est une des rares sources d'information en statistiques S & T sur les produits agricoles dans les pays à revenus faibles et intermédiaires. Depuis 2001, l'ASTI a été actif dans la collecte, l'analyse et la publication des données sur l'évolution institutionnelle, les investissements et l'évolution des capacités en S & T agricoles, dans le monde entier, pour les pays à revenus faibles ou intermédiaires. L'ASTI est généralement reconnu comme la source d'information qui fait autorité sur les structures, les financements et les capacités des S & T agricoles dans le monde entier ; ses résultats ont été largement cités dans les documents internationaux de politique de recherche agronomique. Sur la base des leçons apprises depuis le début de l'initiative ASTI, un certain nombre d'approches ont été développées pour améliorer la diffusion et l'utilisation des données de l'ASTI ; elles comprennent la formation de partenariats solides, l'adaptation de l'information aux différentes parties prenantes et la création d'instruments de données interactifs sur le site Internet de l'ASTI.

Resumen

Este artículo trata la estrategia de la iniciativa Indicadores de Ciencia y Tecnología Agrícola (ASTI, su sigla en inglés) para comunicar información y tendencias de ciencia y tecnología (C&T) agrícola a nivel mundial, regional y nacional. La información cuantitativa es fundamental para comprender la contribución de la C&T agrícola al crecimiento agrícola. Los indicadores derivados de tal información permiten medir, hacer seguimiento y comparar con la competencia el desempeño, los insumos y los productos de los sistemas de C&T agrícola. Estos indicadores ayudan a los interesados directos en C&T a formular políticas, establecer prioridades y abordar la planificación, el seguimiento y la evaluación de manera estratégica. La iniciativa ASTI es una de las pocas fuentes de información sobre estadísticas de C&T agrícola en países de bajos y medianos ingresos. Desde el año 2001, la ASTI ha sido activa en compilar, analizar y divulgar datos sobre desarrollos institucionales, inversiones y tendencias de capacidad en C&T agrícola en los países de bajos y medianos ingresos a nivel mundial. La ASTI es reconocida, en general, como la fuente de información más fehaciente sobre estructura, financiamiento y capacidad de C&T agrícola en todo el mundo, y sus resultados han sido ampliamente citados en documentos de políticas de investigación agrícola internacional. Con base en las lecciones aprendidas desde el inicio de la iniciativa ASTI, se han desarrollado varios enfoques para mejorar la difusión y el uso de los productos de ASTI, incluyendo la formación de alianzas sólidas, la adaptación de información a diferentes interesados directos y la creación de una herramienta interactiva de datos en el sitio Web de ASTI.

Introduction

One of the few sources of information on agricultural science and technology (S&T) statistics in low- and middle-income countries is the Agricultural Science and Technology Indicators (ASTI) initiative. Since 2001, ASTI, facilitated by the International Food Policy Research Institute (IFPRI) has been active in compiling, analyzing, and publicizing data on institutional developments, investments, and capacity trends in agricultural S&T in low- and middle income countries worldwide. ASTI has published sets of country briefs and regional synthesis reports that have been widely and frequently cited in both national and international agricultural research policy documents. ASTI outputs describe trends (progress of human and financial capacity in agricultural research over time) and comparative information (performance of a country or region compared to others). The initiative entails a large amount of original and on-going survey work focused on developing countries, but also maintains access to relevant data for developed countries. In addition to providing statistics, ASTI is also a comprehensive source of qualitative information relating to the history of national agricultural R&D systems, changes in institutional setups, and constraints faced by agencies and researchers in undertaking agricultural R&D. Data collection, analysis, and dissemination are conducted through a network of national, regional, and international agricultural R&D agencies.

Based on lessons learned since the inception of the ASTI initiative, a number of approaches have been developed to enhance the dissemination and usage of ASTI outputs, including the formation of strong partnerships, the tailoring of information to different stakeholders, and the creation of an interactive data tool on the ASTI website. This paper will discuss ASTI's strategy toward communicating agricultural S&T information and trends at global, regional, and national levels.

ASTI Data in the Context of Agricultural S&T Policy

In recent years, there has been increased emphasis on the critical role of S&T in promoting economic growth, food security and poverty alleviation in the developing world, particularly in the field of agriculture. Well-funded and staffed agricultural research systems and new and better-targeted technologies are important prerequisites for successful innovations in agriculture. Unfortunately, investments in agricultural research and development (R&D) in many developing countries have stagnated over time, despite the fact that numerous studies have repeatedly linked agricultural productivity improvements with increased investments in agricultural R&D. Moreover, agricultural R&D systems in many countries have become increasingly complex with new organizational structures to manage and allocate public funding, increased participation of the higher-education and private sectors, and diversification in funding sources. Finally, there has been an increasing diversity in the structure, investment trends, and functioning of agricultural R&D systems across countries and regions (Pardey et al., 2006).

Data on the size, scope and institutional changes of agricultural research agencies informs understanding of the contribution of agricultural S&T in promoting agricultural growth. Indicators based on such quantitative information assist in measuring, monitoring, and benchmarking the performance, inputs, and outcomes

of agricultural S&T systems (Spielman and Birner, 2008). Institutional capacity and methods of collecting national S&T indicators have been developed by industrialized countries in the past few decades, mostly as a result of the advocacy efforts by the Organisation for Economic Co-operation and Development (OECD) and the United Nations Educational, Scientific and Cultural Organization (UNESCO). However, national S&T indicators, agriculturally related indicators in particular, are still scarce in developing countries, except for some Latin American and Asian countries that have developed their own national S&T indicator capacity and databases. South Africa is the only country in Sub-Saharan Africa that produces national S&T indicators, although the New Partnership for Africa's Development (NEPAD) has recently initiated the African Science, Technology and Innovation Indicators Initiative (ASTII) program aimed to build capacity to develop African S&T indicators. Although these national S&T indicators include the agricultural sector, no suitable provisions are available to extract a full set of agricultural S&T indicators that encompass all activities in the agricultural sector.

ASTI fulfils a unique role in providing the information needed for understanding the current status and direction of national agricultural research systems in developing countries. In a framework of policy change, these types of information provide a foundation for developing policy options (Traxler, 2008). However, data and statistics need to be developed as part of a system that ensures accessibility of the information as well as the capacity to collect and use the data. In the policy cycle, policy analysis takes that information a step further by advancing understanding of and weighing of policy options. Data and policy analysis can provide the basis for advocacy of these policy options (see also Tijssen and Hollanders, 2006; NEPAD, 2007). At this stage, communication is most important to strengthen the links between networks of policy researchers and policymakers. Data, statistics, and analysis can also inform the policy implementation and monitoring and evaluation stages of the policy change cycle by providing a baseline with which to measure performance. The final outcomes and evaluation of the policy change then inform the next round of priority-setting, which can influence the development of future data collection and policy analysis.

Communicating ASTI

ASTI information is provided at the global, regional, and national levels, meaning that it can be applied to a wide range of agricultural policy issues and is used by a diverse set of stakeholders. Communication of such information can therefore be a challenge. After almost a decade of operation, a number of insights have been gained into how to communicate ASTI information more clearly and reach a wider audience. In the following sections, we review the main components of ASTI's communication strategy and experiences in implementing communication activities.

What to communicate?

The ASTI datasets and reports feature a wide range of indicators and time-series data across countries, regions, and at the global level, including:

- Levels and trends in agricultural research investments
- Levels and trends in agricultural research capacity

- Developments in the institutional arrangements surrounding agricultural research
- Agricultural R&D funding levels and donors
- Degree levels of agricultural research capacity
- Proportion and degree levels of women participating in agricultural research
- Proportion of research capacity allocated to crop, livestock, and other agricultural areas

Target Groups

ASTI has a large set of stakeholders at the national, regional, and international level including:

- National agricultural research agencies and policymakers in developing countries
- Regional and sub-regional agricultural research organizations such as the Asia Pacific Association of Agricultural Research Institutions (APAARI), the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), West and Central African Council for Agricultural Research and Development (CORAF/WECARD), the Forum for Agricultural Research in Africa (FARA), and the Forum for the Americas on Agricultural Research and Technology Development (FORAGRO)
- Multilateral organizations such as the World Bank, InterAmerican Development Bank, the African Development Bank, the Asia Development Bank, OECD, UNESCO, Food and Agriculture Organization, and other UN organizations
- Donor organizations involved in funding agricultural R&D in developing countries
- International agricultural research consortiums and forums such as the Consultative Group on International Agricultural Research (CGIAR), including its 15 International Agricultural Research Centers, and the Global Forum on Agricultural Research (GFAR)

Since its inception, ASTI's audience has not changed significantly. Some users draw on only a portion of ASTI's outputs (e.g. specific gender data or R&D spending totals for a specific country or region), while others use the indicators more intensively to analyze the institutional structure, funding, or impact of agricultural R&D in a particular country or region. Generally, ASTI information has been more likely used by its international and regional audience. When cited or used for analysis, ASTI data has usually been presented at the aggregated global and regional levels. The initiative's primary methods of disseminating data and information through its website and publications have been more likely to reach these types of stakeholders. In comparison, ASTI has been less successful reaching national level stakeholders. One of the biggest communication challenges for the initiative has been in trying to enhance the relevance of its information for national policymakers and R&D managers.

Vehicles and Channels of Communication

Each group of stakeholders has different needs and the use of ASTI information might differ widely from one stakeholder group to the next. Because of this diversity of stakeholder groups, a clear approach as to how to reach each group needed to be defined. For certain stakeholders, the traditional ASTI outputs, which have included country briefs/fact sheets, regional reports, presentations, and other publications, would suffice. Other stakeholders, however, might require custom-made publications and presentations and special events that would focus on issues most relevant to them. In Table 1, we present these audiences and vehicles that have been identified to reach them.

Table 1: ASTI Audiences and Vehicles of Communication

Audience	Vehicle(s)
<i>National</i>	
National policymakers and advisors	<ul style="list-style-type: none"> • Concise publications for quick outreach • High-level events for visibility • Interviews and mentions in local media • Newsletter announcements
Policy stakeholders and researchers at national research agencies, universities, NGOs, and producer organizations	<ul style="list-style-type: none"> • Publications with national focus including training documents and manuals targeted to local needs and issues, in local language if possible • Workshops, training events • Website: Datasets, tools, online instructions, contact information
General public	<ul style="list-style-type: none"> • Local media interviews, press releases
<i>Regional</i>	
Regional and sub-regional agricultural research organizations (e.g., APAARI, ASARECA, CORAF, FARA, FORAGRO)	<ul style="list-style-type: none"> • Publications with regional or sub-regional relevance • Events with collaborators and other stakeholders for visibility • Website: Success stories, access to research and to researchers' bios, etc. • Newsletter announcements

Table 1: ASTI Audiences and Vehicles of Communication (cont'd)

Global	
International policymakers, advisors, and donors to agricultural S&T	<ul style="list-style-type: none"> • Publications: Concise publications for quick outreach, research reports of results • High-level events for visibility • Website: Success stories, publications available online, access to researchers and program managers (bios, publication lists, etc.) • Interviews and mentions in local media • Newsletter announcements
Universities, NGOs, and multilateral and bilateral organizations	<ul style="list-style-type: none"> • Publications • Website: Interactive data tool to allow for easy access to data • Events, workshops with collaborators and other stakeholders for visibility • Publicize research, reports, success stories, events on various web platforms • Newsletter announcements
UNESCO Institute for Statistics, OECD, and other S&T indicator developers	<ul style="list-style-type: none"> • Engagement in S&T indicator methodology and data collection procedures
General public	<ul style="list-style-type: none"> • Publications: Summaries of reports • Website and other web platforms: Publicize research, reports, success stories, events • International media: interviews, editorials, press releases

We will focus on three of the major vehicles for communication of ASTI data and analyses: publications, datasets, and website. These three elements have been in place since the beginning of the ASTI project. However, over time, they have been modified to more effectively reach the target groups.

Publications

Publications have always been a primary means of transmitting analyses of agricultural S&T indicators. A typical ASTI publication is the country brief, which provides those stakeholders interested in a particular country with an overview of trends of national agricultural research agencies over time. Other reports present regional and global analyses of agricultural R&D investments. For the second round of ASTI surveys, rather than repeating the information found in the original brief, the new briefs were shortened and focused more on trends occurring since the last survey. Although the longer in-depth reports are of interest to researchers, the more concise, to-the-point briefs have been found to be most useful for policy stakeholders who are concerned with having the most recent data available. The most recently designed briefs will have hyperlinks to more data analysis available on the website, to make additional information easier to find. These briefs and factsheets are then followed by reports with more

in-depth analyses of the trends underlying key ASTI data, at the global and regional levels, and also at the national levels for select countries.

Datasets

Datasets are usually most relevant to researchers conducting analyses on global, regional, or comparative country trends. The ASTI datasets include data on numbers of agricultural scientists and total investments in agricultural research by the government, higher education, and nonprofit sectors of developing countries; yearly short-term data on numbers of scientists by degree status and gender, support staff numbers, funding sources, categories of spending, and research focus by agricultural subsector and by crop and livestock item. The choice of data to include within the dataset, the way it is presented, and its accessibility are all factors that affect the usefulness of the data to stakeholders. When ASTI first began and web technology was more limited, data was simply presented on the website as a table. Next, an interface was developed that allowed users to download the specific data they needed in a spreadsheet format. Last year, an interactive data tool was launched that allows the data to be presented in different ways based on user-selected indicators and formats. The tool presents mapping and graph features that offer greater capabilities for analysis by users. The full datasets are, of course, still available to download as spreadsheets. Additional datasets will be made available through hyperlinks in the country fact sheets.

Website

The ASTI website currently provides access to ASTI datasets and other outputs. Based on survey feedback by users, it was recently redesigned and expanded to make it more user friendly and readily accessible to all stakeholders. The interactive website allows users to

- Map, view, and compare agricultural S&T data from over 60 low and middle income countries
- Download and export national, regional, and global investment and capacity time series datasets
- Access the ASTI Website Directory, which provides links to a large and growing number of agricultural R&D agencies worldwide
- Develop country web pages that provide links to all relevant ASTI publications, datasets, and other ASTI information; the country pages will also provide links to non-ASTI datasets and relevant information on agricultural and food R&D for the specific country
- Download national, regional, and global ASTI publications

Given that internet connectivity is still difficult in many developing countries, improving the use of ASTI outputs at the national level requires additional efforts at outreach. Raising awareness of the initiative through national forums and media, and building capacity to use agricultural S&T indicators, whether for research, advocacy, or policymaking, are all key components of establishing a national presence. ASTI has always developed national partnerships in the collection of its data, usually working with the country's main government agricultural research agency. However, dissemination of the information collected usually does not spread far beyond that agency.

Next Steps for the Communication Agenda

ASTI's communication activities have evolved with these lessons learned in mind:

- It cannot be assumed that data is used simply because it is available. Data providers must take the next step of communicating the data to stakeholders.
- Communication should not be one-way only. Encouraging feedback and input from stakeholders improves the quality and use of the data.
- Working with national and regional partners is essential in data collection and dissemination. These partnerships help to improve the quality of the data provided and build capacity for both supply and demand of the data.
- Data should be tailored and presented in various formats and venues to target different stakeholders.
- Resources and time must be allocated to developing and thinking through data communication activities from the very beginning. Communication should not be an afterthought.

The ASTI initiative has sought to increase the usage of its datasets for analytical purposes at the national, regional, and international levels. In addition, increasing the role of its materials in advocacy and priority setting activities by others requires a different mode of interaction than the initiative has used in the past. Going forward, it has identified these next steps for its communication agenda:

- Develop regional, sub-regional links/partnerships to enable a decentralized data collection system with a stronger ownership by national and regional partners. This decentralized system could be initiated in close partnerships with FARA, APAARI and other regional organizations, and CGIAR centers. These partnerships are also critical to support dialogue on agricultural S&T policy.
- Develop capacity building activities through the establishment and maintenance of a clear set of standards and definitions that will be shared with national and regional partners in order to improve the usage and understanding of ASTI data.
- Improve visibility and usage of the ASTI outputs by expanding the available datasets on the ASTI website, targeting publications and events for different stakeholders, and presenting research agenda and results at upcoming international and regional conferences.
- Sponsor more in-depth studies of agricultural S&T indicators that analyze the underlying trends and issues related to agricultural research capacity and investments.
- Establish internal analytical capacity to improve the use, understanding, and expansion of ASTI data collection and address S&T policy questions critical to the development of effective national agricultural research systems.

Conclusion

To be useful as input for the development of policy options and priority setting, data and data analyses must be actively communicated to the policy holders. Data collection and dissemination should also be informed by the needs of the policy stakeholders. With an increasing gap in agricultural S&T capacity and investment in developing countries, the need for more attention to agricultural S&T policy is clear. The ASTI initiative has recognized that its function as a data source requires a greater focus on communication to reach those audiences that are informing and setting agricultural S&T policy. As a result, ASTI has expanded its communication activities in a number of ways in an effort to improve its policy relevance.

References

Article

NEPAD (New Partnership for Africa's Development). 2007. *African Science, Technology, and Innovation Indicators (ASTII): Towards African indicator manuals*, Pretoria, South Africa: NEPAD, mimeo.

Pardey, P.G., Beintema, N.M., Dehmer, S., and Wood, S. 2006. Agricultural research: A growing global divide? *Food Policy Report*, Washington, D.C., USA: International Food Policy Research Institute.

Spielman, D.S. and Birner, R. 2008. How innovative is your agriculture? Using innovation indicators and benchmarks to strengthen national agricultural innovation systems, *Agriculture and Rural Development Discussion Paper 41*, Washington, D.C., USA: World Bank.

Tijssen, R. and Hollanders, H. 2006. Using science and technology indicators to support knowledge-based economies. *Policy Brief No. 11*. Maastricht, the Netherlands: United Nations University.

Traxler, G. 2009. Agricultural Policy and Statistics, *Farmer Focus to Improve the Lives of the Poor in Africa conference*, 3-5 November 2008, Nairobi, Kenya.

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