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Science and technology for development in Bangladesh and Nepal: Key topics, challenges and opportunities

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SciDev.Net Learning Series

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February 2015

Acknowledgements

Contents

List of boxes and tables

Summary

SciDev.Net's focus group discussions in Nepal and Bangladesh are part of a global research programme that aims to understand regional needs and contexts for science and technology (S&T) in development. The programme started in 2012 in South East Asia and the Pacific, reports are available online at:

http://www.scidev.net/global/content/learning-series.html

This report highlights key areas identified by participants for ensuring S&T drives equitable and sustainable development and barriers and gaps in the use of S&T evidence, in Bangladesh and Nepal. It is for stakeholders who are interested in research uptake for policy and development. It also provides suggestions for how communications about S&T can be improved.

Chapter 1 outlines details of the process used in our own research. The countries and organisations we engaged with were selected in consultation with our local freelancers, our South Asian regional coordinator and SciDev.Net's senior management team. The two-day focus groups had about 12 participants per event, who were drawn mainly from the following sectors:

- Policy
- Academia and research
- Science communication
- Private sector
- NGOs (non-governmental organisations).

The report has been reviewed by participants and by an independent consultant for quality assurance.

Chapter 2 profiles each country and situates them in regional and global contexts. Participants acknowledged that their countries share many priorities with developed countries, but some differences emerged:

- Limited enabling environment for S&T
- Weak legal and regulatory frameworks
- Technological and infrastructure divide
- Limited access to information
- Knowledge and skills divide
- Limited financial resources and donor-driven research
- Fewer S&T outputs.

Chapter 3 presents key S&T topics for development that emerged from our discussions in the two countries. These include:

- Health
- Food security
- Environment
- Education
- Technology and innovation
- Energy
- Infrastructure.

All these topics are interrelated. Lack of access and good quality are common issues across all themes, particularly for women and rural populations.

Chapter 4 summarises the capacity building needs of policymakers, academics, researchers and journalists, and describes the channels that each sector uses to find and disseminate S&T information.

Government structures should support policymakers in accessing, understanding and applying new S&T knowledge. NGOs/the civil society sector want support to integrate new technologies into the way that they deliver and communicate their work. Meanwhile, the media would like to remove barriers to high-quality science reporting. Academics want support in communicating science, and an education system that supports applicability to industry and benefits to society.

Chapter 5 has a set of recommendations on how to improve S&T for development. Three strategic visions emerged from the focus groups:

- S&T could be used to meet basic needs and ease the burden of daily activities — improved health, food security, and access to technology, energy, information etc.
- Using S&T to create value-added products and services could provide a competitive advantage and increase opportunities for economic and social growth
- Focus on sustainability and inequality to reduce reliance on natural resources and tackle issues related to climate change.

For these visions to be realised, participants say there is a need to strengthen the links between research, policy and the media with a focus on innovation and local relevance, as opposed to imported solutions. Knowledge management to increase the use of S&T is also important. Participants felt that it is crucial to adopt innovative approaches to research, science communication and policymaking, including partnership building to tackle complex issues and multidisciplinary research.

For this to occur, the capacity of different actors needs to increase and the communication structures that they are working in should be strengthened. This requires:

- Improvements in the science communication capacity of journalists, academics and researchers
- Better capacity among policymakers for using S&T information
- An improved environment for research uptake.

It is important to focus on gender relations and the role of women, young people and other marginalised groups such as the rural poor to ensure equal benefits across society.

This report also recommends developing strategies aimed at breaking 'silos' and generating multidisciplinary and multi-sectorial partnerships that might be more effective when aiming to increase the use of S&T for development.

Chapter 5 also includes a case study from Nepal on a partnership between two NGOs that is providing local people (mainly women who are small-scale farmers) with access to S&T knowledge and training on demand.

Chapter 1: Methodology

SciDev.Net's focus groups in South Asia are part of a global research programme that aims to understand the needs of developing countries to create environments that support science and technology (S&T), so that S&T drives equitable and sustainable development and poverty reduction. The programme started in 2012 in South East Asia and the Pacific, and reports are available online at http://www.scidev.net/global/content/learning-series.html

We use the findings to guide and prioritise the key S&T topics for our website and for developing training programmes. They also help us serve our regional audiences. A secondary goal is to recruit people for our regional advisory groups, which help us with long-term engagement with key audiences (particularly policymakers and development practitioners) and with quality assurance for our work.

Focus group process

SciDev.Net's monitoring and evaluation (M&E) coordinator designed the focus group programme following wide consultations with our staff. The main research questions we raise during the focus groups are:

1. The S&T topics most relevant for development according to participants' opinions or experience

2. Whether there are gender-related topics in S&T for development

3. If there are new areas of research, science communication and science policy that we should take account of

4. The appropriateness of formats used for S&T communications according to different audience needs

5. The value of SciDev.Net's regional and topic-specific coverage based on participants' needs

6. Preferred formats and technology platforms for accessing S&T information by sector

7. Capacity building and science communication training for all groups.

The focus groups are designed to stimulate dialogue among stakeholders working in different sectors (policy, development, media, academic and research) to uncover similarities and differences in their viewpoints. This is a key component of the methodology as it provides a wide range of experiences and opinions about science outside the academic world, and results in a more holistic, multi-stakeholder view of how science can be better used for policy and development.

We use various ways to maximise participation in the group discussions. For example, we start with a brainstorm at a plenary session, after which participants are split into smaller working groups using a World Café approach[1] as well as other interactive activities. The M&E coordinator runs the groups, with the help of consultants in each country who help with logistics and administration.

The consultants help to write down the main ideas during the plenary session and then participants create their own notes when working in groups. The M&E coordinator also takes notes, which serve as a cross-reference when processing the evidence used to write the report. This means that at the end of all events there are comprehensive sets of notes for each focus group, which are then used by the report author to identify themes and ideas.

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[1] This is a simple, flexible format for running large groups. Participants start at small discussion tables, each with a table host, and then move to a different table, until all participants visit all tables. For more information see: http://www.theworldcafe.com/method.html

Before publishing the report a draft is sent to all participants, allowing them to revise it for accuracy and quality. Additionally, an independent professional, Kate Hawkins (director of Pamoja Communications), reviewed this report for structure and social research focus. The report author receives and integrates any appropriate comments as submitted by participants and the independent reviewer, making changes or adding information as needed.

Participants

The countries were selected in consultation with our South Asian regional coordinator, Ranjit Devraj, and the SciDev.Net senior management team. Considerations include population size, economic development and the country's regional significance. For practical reasons we only screened English-speaking countries for this project. For country profiles see Chapter two.

A wide range of organisations were represented, and we usually only allow one representative per institution to attend the focus groups. The M&E coordinator worked with the local freelancers to draw up a list of the most prestigious organisations in each country, which was then evaluated with the help of the South Asian regional coordinator. A final list of organisations was then shared with the local freelancers and they were asked to reach, within each organisation, the most senior people to attend our focus groups so we could tap their knowledge and experience.

The two-day focus groups had about 12 participants per event. Participants were drawn from the following sectors:

- Policy (civil servants, policy advisors, policymakers, policy administrators at local and national levels)
- The academic and research community (scientists and researchers, teachers)
- Science communicators (science journalists, press officers working for science or research organisations)
- NGOs (development practitioners working for non-profit organisations and NGOs)
- Private sector.

The focus groups also provide networking opportunities within the country and across sectors and organisations, so indirectly fostering partnerships in S&T for development. See Annex 1 for a list of participants.

Other sources of information

The report author visited Nepal with the help of the South Asia regional office of Practical Answers, part of Practical Action.[2] This included meetings with its partner, READ-Nepal,[3] and a visit to one of the communities both organisations work with. Insights can be found in the last chapter of this report.

Other references are included as appropriate in this report.

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[2] http://answers.practicalaction.org/about-us/our-country-offices
[3] http://www.readglobal.org/our-work/read-nepal

Limits of the research

The findings outlined in this report are based on a small sample of stakeholders and therefore are not necessarily representative of their sectors or countries. What the report does well is:

- Highlights key areas identified by participants for ensuring S&T drives equitable and sustainable development
- Uncover barriers to, and gaps in, the generation and use of S&T evidence
- Suggest how communications about S&T can be improved.

Chapter 2: Bangladesh and Nepal – country profiles

This chapter profiles Bangladesh and Nepal and presents a comparative analysis of local and global contexts. Participants acknowledge that there are many similarities in priorities and challenges between their countries and the developed world, which represent opportunities for collaboration. But some differences emerged:

- Limited enabling environment for S&T
- Weak legal and regulatory frameworks
- Technological and infrastructure divide
- Limited access to information
- Knowledge and skills divide
- Limited financial resources and donor-driven research
- Fewer S&T outputs.

Country profiles

In 2009 the gross expenditure on R&D (GERD) as a percentage of GDP for developing countries was 1.11 (excluding the least-developed), 0.2 for least-developed countries and 2.32 for developed countries[4] — around 343, 2.1 and 931 in US$ billion purchasing power parity (PPP) respectively. Estimates for researchers per million inhabitants are around 520 for developing countries, 47 for least-developed countries and 3,637 for developed countries (source: UNESCO Institute for Statistics).[5]

The boxes show how Bangladesh and Nepal compare with these figures. All data are from the UNESCO Institute for Statistics.

Box 1: Country profile – Bangladesh

Bangladesh is mostly surrounded by India but has a border with Myanmar in the southeast. The country is low-lying, traversed by the many branches and tributaries of the Ganges and Brahmaputra Rivers. Islam is the state religion.

Bangladesh is the eighth-most populous country in the world, with a population of about 157 million (2013), who are mainly rural (72.5% in 2013) and dependent on agriculture for survival. It is also among the most densely populated countries. The GDP per capita (current US$) is $762 (2012) and the gross expenditure on R&D (GERD) as a percentage of GDP is about 0.4%.

No data was found for the estimated number of researchers per million or the percentage of female researchers.

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[4] For definitions of developed, developing and least-developed countries see:
http://www.princeton.edu/~achaney/tmve/wiki100k/docs/Developing_country.html
[5] UNESCO Institute for Statistics: http://data.uis.unesco.org/#

Box 2: Country profile – Nepal

Nepal is a landlocked country, surrounded by China, Bhutan and India. Until Nepal became a republic in May 2008, it had been ruled by monarchs or a ruling family for most of its modern history, in relative isolation. The main religions are Hinduism and Buddhism.

It has a population of about 28 million (2013), of whom 83% are rural, and reliance on agriculture and forestry for subsistence is high. Its GDP per capita is US$690 and the gross expenditure on R&D (GERD) as a percentage of GDP is about 0.3% (2010).

No data was found for the estimated number of researchers per million or the percentage of female researchers.

Bangladesh and Nepal and the global context

We asked participants to reflect on the differences between their country and the global context. Analysis of the responses indicates that the 'global' context is generally seen as the global North or the developed world.

Participants acknowledged that their region has similar priorities and challenges to the global context. But there are also differences that are discussed in the following sections.

Limited enabling environment for S&T

Participants believe that in most developed countries there is a secure and peaceful research environment. This contrasts with Bangladesh and Nepal, where political and in some cases religion-related turmoil disrupts work. This hampers progress and reduces productivity according to participants.

In the view of participants, developed countries have stronger governance whereas in Bangladesh and Nepal there is a lack of transparency, weak governance and a lack of social and political vision and commitment, which obstructs strategies and incentives to tackle development issues more effectively.

Participants mentioned that national policy is not sustainable and stable, comparing their countries with China and India, which they believe have been more successful in developing policy that has longstanding impact. They believe that in Bangladesh and Nepal, S&T is not seen as an important factor for development and planning and that there is no enabling policy environment, which in many countries would include support for startups and science innovation centres. Raising awareness of the importance of S&T is crucial for evidence-based policy, participants said. Those in Nepal said that interest in S&T could be raised by linking it to economic concerns.

There are some promising structures in place. For example, in Nepal there are plans to create policy advisory committees for biotechnology, nanotechnology, nuclear power and IT, and the Nepal Academy of Science and Technology (NAST) is a national body that works directly with ministries and a science and technology council.[6] The council is part of the Ministry of Science, Technology and Environment and is expected to help prioritise S&T in the political agenda. But participants mentioned that this ministry is one of the lowest ranked in terms of political clout and funds, which exemplifies a common challenge in the developing world. Furthermore, the ministry's joint-secretary told us that the council is "currently inactive", but he and colleagues would like to strengthen it.

Some participants in Nepal said that more financial resources are needed and that policymakers have too many competing priorities.

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[6] Nepal Academy of Science and Technology. See: http://nast.gov.np/new

Weak monitoring, legal and regulatory frameworks

Participants felt that in the developed world there are good monitoring and evaluation approaches but that these are lacking or weak at home, particularly in research, policy and development work. For example, participants in Nepal said there is no copyright law enforcement, which results in much plagiarism among media organisations.

Lack of monitoring in Nepal also leads to the duplication of research efforts and misuse of S&T. For example, food contaminated with pesticides and chemicals is a problem that could be better monitored and regulated. Indeed, one participant in Nepal said that S&T could be better integrated into the legal system.

An emerging concern, particularly in Bangladesh, is regulation of information and communications technology (ICT), needed to ensure data confidentiality and prevent ethical misuses.

Technological and infrastructure divide

Participants in both countries say there is a lack of physical infrastructure and limited access to existing facilities and technologies, and a digital divide compared with the developed world. In the developed world, digital and technology approaches and tools are used more, such as for electronic commerce and in education (such as with research in education — see researchED).[7]

In Nepal, participants said there is a huge technology transfer gap from the developed world to regional and local levels in Nepal and little focus and investment on infrastructure. There is a need to create central databases to improve data access and quality control — such as by the Nepal Health Research Council, which is working on a health database of formal and informal sources and partnerships. But a barrier is people's low trust and slow adaptability to new technology.

Participants said that the internet is not yet being used strategically for education and that there is low internet literacy, particularly in rural areas. Other insights are in Chapter 3: Education.

See also Chapter 3: Technology and innovation.

Limited access to information

A significant barrier to the use of evidence is poor access to information and new knowledge. Availability of evidence for policymaking is key to increasing use, but it remains a challenge. Participants said that data exists but they is highly fragmented.

Participants also reported that there are not many slots in traditional media (TV, radio and newspapers) for science in their countries, and there are few science-related movies and documentaries compared with some developed countries. In Bangladesh, participants mentioned that science news has given way to tech-related news, aided by increased private sector funding of this sector. As a result, viewers are only provided with a partial view of the evidence. Participants called for better quality science information, so that it is easy to understand and is engaging to different audiences. The low number of capable science journalists in the country was also highlighted.

There was a long discussion in Nepal about radio. According to participants, there are more than 600 registered radio stations (the highest number in Asia) of which around 250 are currently running. This is an important opportunity for science communication for rural and remote areas. Radio could be used more to provide crop information to farms, for example. One reason for the paucity of science broadcasts is because their budgets are small, partly because community radio charges low advertising fees,. There are also not enough listeners, as they are opting for commercial radio instead, and programmes may not be in dialects used in the communities where S&T information might be most needed.

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[7] researchED is a teacher-led organisation that aims to improve research literacy in education and provides a platform to discuss what does and doesn't work. See: http://www.workingoutwhatworks.com

Participants believe it is more difficult to access experts and scientific sources (such as scientific journals or government data) than in the developed world. Journals are too expensive and the government too secretive.

Another concern is the reach of science journalism. Most journalists live in capital cities, and so tend to report on urban issues. A lack of transport to rural areas and a multitude of local languages restricts wider coverage.

Knowledge and skills divide

Participants felt there are too few home-grown academics and researchers, which increases the amount of research that is done by non-natives. Outsiders often lack understanding of local contexts and their findings may not be as relevant as they could be. This hinders the uptake of research. Moreover, some participants in Nepal felt that it is unethical for foreigners to enter on a tourist visa with the purpose of carrying out research, taking with them samples and knowledge when they leave. They stated that there are many Indian researchers in the country and cases where research is managed by a local university but with foreign professors.

A lack of skilled science journalists and development practitioners was also highlighted in both countries.

A lack of knowledge and skills can be linked to fewer employment opportunities and low remuneration, which result in a 'brain drain' of specialists. Participants suggested there should be more student and graduate training, as in the developed world. Another factor potentially contributing to brain drain is an increase in hiring more people but at a lower salary in the policy, education and research sectors.

Participants in Bangladesh disagreed on whether there is a lack of opportunities or whether graduates are just not willing to take existing jobs. A private sector representative suggested that employment is widening as the country is now an emerging economy. But jobs abroad are often considered more attractive. This could explain why some recruiters feel that even when they offer a good salary there is not a good, young pool of national candidates to fill the roles.

Participants mentioned that entrepreneurship is not widely practised and that few people want to obtain finance to commercialise their findings. This may also contribute to brain drain.

Migration is not restricted to well-educated citizens. Many rural men migrate to countries such as Malaysia to work in farming. This affects national agriculture outputs, as many rural areas lack workers, and land is left uncultivated or used only for subsistence rather than commercial agriculture. This may lead to a demand for people-smuggling to overcome restrictive immigration laws, participants added.

Overall, participants in Nepal estimate that about 1,500 people emigrate to Gulf countries every day.[8] Migration is not all bad news as money sent home has raised disposable income. But participants fear it also increases migration within Nepal, from rural to urban areas (as families with more cash migrate to find better services and opportunities). Participants also worry that funds are mainly used for subsistence (to buy food and other necessary expenses) as opposed to investments to generate more income (such as through crop production), or as savings. Saving rates, according to participants, are the lowest in the region.

Limited financial resources and donor-driven research

Participants from Bangladesh explained how a change in mind-set is needed so that resources and technology are made available to support economic growth. Currently, ICT is considered an expense not an investment by decision-makers. They felt that in the developed world there are more public-

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[8] Nepal Migration Yearbook 2010 (2011). Nepal Institute of Development Studies (NIDS).

private and academic-private partnerships and more innovative financial ecosystems for S&T. In Nepal, a lack of formal structures make access to finance more challenging for people in general, one participant said. Compared with the developed world, where raising capital is a formal process in regulated markets and creates trust between strangers, in Nepal it is heavily dependent on personal networks, which lack transparency. Initiatives such as Startup Dhaka[9] in Bangladesh provide mentoring but do not disperse funds, and this creates frustration.

Private sector participants in Bangladesh believe that the cost of doing basic research is high compared with the developed world. They and their counterparts in Nepal added that tax exemptions — considered as an enabling policy — are non-existent in both countries and this limits R&D.

But some participants said that the private sector could make more effort to help commercialise innovations. A case in point is a robot built by students at BRAC University in Dhaka, which received many awards, one from NASA.[10] Yet years later the invention has not been commercialised.

There are encouraging initiatives that aim to create links between researchers, the private sector and government. In Bangladesh we heard about Data Science Bangladesh, which is a LinkedIn group that encourages new contacts and partnership building.[11]

The low availability of funds for S&T can be linked to another point raised by participants: research in both countries is typically donor-driven and not focused on local needs. Participants in Nepal also reported that there are few public grants for science and investigative journalism and more NGO-driven journalism as a result (see also 'Too many Southern NGOs follow foreign agendas').[12]

Participants in Bangladesh said that when people become used to free funding from donors they become less inclined to do things themselves and to consider what they really need. This is particularly harmful to development initiatives that cultivate self-reliance, participants in Bangladesh said, as they can be crowded out by interventions that employ business models that generally include free handouts. For private sector stakeholders, this situation discourages R&D and commercialisation. Participants added that an economy needs a sustainable model not a subsidised one.

Fewer S&T outputs

Participants considered the barriers mentioned above make their countries less productive in S&T. They added that in the developed world much of the original research produced is done at a global level and in some cases it is interdisciplinary; this contrasts with community-based research in Nepal that can be poor at integrating other disciplines.

Bangladeshi participants feel they do better in technology than other countries in the region. But participants in both countries said there is a general lack of innovation or focus on science research, arguing that the focus has been on adaptation and replication, perpetuating users rather than creators of S&T. In addition, participants think that research findings are not used for policymaking nor transformed into products and services, owing to a lack of approaches to product development. This obstructs the scaling up of technologies, impedes continuity of important areas of work and contributes to the lack of awareness and investment in S&T.

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[9] http://www.startupdhaka.org
[10] http://teleinfobd.blogspot.co.uk/2012/05/brac-university-is-going-to-participate.html
[11] http://www.linkedin.com/groups/Data-Science-Bangladesh-6539543
[12] http://www.scidev.net/global/governance/opinion/too-many-southern-ngos-follow-foreign-agendas.html

Chapter 3: Key S&T themes for development by country and sector

This chapter highlights key areas identified by participants for ensuring S&T drives equitable and sustainable development — these are health, agriculture, environment, education, technology and innovation, energy, and infrastructure. Most of these themes are interrelated: for example, education can be seen as crucial to increasing agricultural production, conservation and the use of S&T.

Access and quality are common issues across all themes, with women and rural populations particularly affected. The following sections analyse each theme in more detail, providing overall views regarding each theme as discussed during the plenary. Each theme also has a table that summarises current areas of work in each country per sector and theme as reported by participants in our specialist groups.

Health

A big concern is poor access to services, particularly for women and rural populations. Both countries have particular concerns about maternal and child health, and about raising awareness about good health practices such as sanitation.

In Nepal, malaria and dengue fever at high altitudes are increasing concerns, as are contamination and poisoning resulting from:

- Abuse of pesticides and chemicals in food production

- Pharmaceutical (drug) use after expiry dates

- Pharmaceutical waste

- Lead poisoning from batteries.

In Bangladesh participants were concerned about saltwater and arsenic contamination of water.

In Nepal the role of traditional healers needs to be better understood (acknowledging they are a big influence on health-seeking behaviour) and health initiatives should involve them.

Current areas of health interest by sector and country are in the Table 1.

Table 1: Health-specific interests per sector/country

Sector	Bangladesh	Nepal
Policy	*(None given)*	• Public health: maternal and child • Nutrition • Sanitation • Infrastructure and technology plans (see other sections)
Academic and research	• Public health	• Public health: maternal and child • E-health services
NGO	• Geographic information system (GIS) mapping	• Sanitation • Maternal health • Nutrition • HIV/AIDS • Non-communicable diseases: hypertension, cancer, diabetes and kidney problems • Low health resources in villages • Epidemics: dengue and bird flu
Media	• Public health issues	• Public health • Nutrition • Beauty • Sanitation and hygiene • Indigenous plants/herbs
Private	• Health informatics • Pharmaceuticals • Medical accessories	• Pharmaceutical

Food security

Food security and the impact of climate change are priorities in Bangladesh and Nepal, with a particular interest in fast-growing crops (participants mentioned that Nepal imports some from China), water management, and using S&T in rural areas to provide crop-growing advice to farmers.

In Bangladesh, participants mentioned 'sustained nutrition', an idea that suggests a balanced distribution of production around the country to better meet the population's needs. Participants added that better quality control and soil management (particularly for the northern districts where outputs are declining) is a priority. There also seems to be a growing interest in organic agriculture in the country.

Particular concerns in Nepal are the misuse of pesticides and chemicals in agriculture owing to a lack of understanding of how they work. For example, participants stated that farmers are simply told that a certain amount of chemicals helps growth, and then they misuse a fertiliser thinking it is a linear relationship with no tipping point. Distributers do not make farmers aware that overuse has consequences for human health. Another worrying trend concerns what participants described as 'muscle drain' — where rural men migrate to countries such as Malaysia to work in farming. This has lowered national agriculture outputs. Land can be left uncultivated or used only for subsistence rather than commercial agriculture.

These and other food security issues reported by participants are in the table below.

Table 2: Food security-specific interests per sector/country

Sector	Bangladesh	Nepal
Policy	*(None given)*	• Production and market access • Reducing vulnerability • Increasing climate change adaptation
Academic and research	• Agriculture: stress and disease tolerant crops • High yielding varieties and livestock techniques • Increased shelf life • Organic farming	• Productivity and climate change • Agricultural technology • Homemade fertilisers
NGO	• ICT for agriculture	• Agriculture cooperatives • Livestock • Small-scale farming • Commercial farming: fish and mushrooms
Media	• Food safety	• Better farming practices • Agricultural technology • Food security/insecurity • Natural resource management • Fertilisers • Seed conservation • Indigenous plants/herbs
Private	• Agricultural services and inputs	*(None given)*

Environment

Climate change was a recurring theme when discussing the environment, and an issue that particularly affects rural people. Due to their geographical locations and vulnerability there is a focus on disaster risk reduction and climate change adaptation in both countries.

Natural resource management/conservation is a popular topic in Bangladesh and Nepal, particularly of forests and water resources, as are pollution and the impact of tourism.

Topics of interest in each sector are in the table.

Table 3: Environment-specific interests per sector/country

Sector	Bangladesh	Nepal
Policy	*(None given)*	• Forestry • Disaster management • Water • Strategic Programme for Climate Resilience: watersheds in mountain eco-regions, climate hazards, climate risk management and resilience through private sector participation
Academic and research	• Water • Natural resource management: soil • Climate change: flood and sea levels • Basic science	• Community management of natural resources; biodiversity • Alternative energy • Environment • Early warning information systems
NGO	*(None given)*	• Environment and climate change • Community forestry
Media	• Solar power	• Climate change adaptation • Biodiversity • Conservation: wildlife • Forestry: deforestation, land grabs, community management • Pollution • Disaster preparedness
Private	*(None given)*	*(None given)*

Education

The main interests in both countries are how to foster high-quality education and the potential of ICT. Educational quality and access are concerns, particularly for rural populations where the quality gaps are more evident. Many science students have never been to a lab or have had limited use of equipment, and IT students may never actually get to use a personal computer in schools. Some participants in Nepal suggested that it might be more efficient to invest in community skills in S&T for development rather than attempting to improve IT skills per head across a community.

Increasing science literacy to promote public understanding and attract more young people to science is a key challenge, particularly as some participants said that science is not highly valued in the academic curriculum. However, in Bangladesh, some participants said that there is interest in S&T but imagination and creativity are decreasing, and good science students are now opting for business studies and social or applied sciences instead of basic sciences. Participants pointed out that in previous generations there was a buzz around scientific innovation but that the current focus is on career development and less about innovating and advancing science per se.

A good example came from a scientist specialising in the jute industry in Bangladesh, who told us that in 1972 there were about 360 jute researchers in the country but now there are only 150.[13] This is despite the fact that the product is a huge commercial success (Bangladesh is the world's biggest exporter of jute)[14] and the demand is projected to be even higher.

In Nepal, participants said that students become disenchanted with science because many ideas go to waste due to lack of funding and support for prototyping. To help fill the gap, some participants recommended projects that identify and develop students with talent who did not receive proper schooling.

Some participants said that students are not aware of existing science resources such as the National Museum of Science and Technology in Bangladesh. Others pointed to young people who are enthusiastically taking advantage of local and international mathematics Olympiads and children's science congresses. It was suggested that the way to tackle the issue is by science communication that creates awareness of the opportunities afforded by science. Both the media and the private sector were identified as having a role, the former in promotion, the latter in funding. Of course, governments have a key role in providing better education and funding research and innovation, which in turn would provide real opportunities for young people.

Participants said that academic programmes from both government and private institutions do not match real-life needs nor are they updated at a speed that matches scientific developments. They tend to use teaching methods that emphasize memory, exam results and diplomas instead of fostering critical thinking and creativity.

Participants expect universities to create new knowledge and promote innovation. There is a need for more research institutes and qualified science teachers to accommodate students and teach them modern science. This led some to suggest that there should be interventions that encourage experienced professionals to volunteer for educational activities to help fill the skills and knowledge gaps.

Multimedia and technology adoption (particularly mobile phones) for education are not widely used yet in Bangladesh and Nepal. These have the potential to improve access and participation, particularly in rural areas. Difficulties in using these technologies are exacerbated by the lack of mobile network coverage in some remote areas. But there are signs in Bangladesh that the internet is no longer just being used for entertainment and there are reports that there has been a sharp growth

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[13] Bangladesh Jute Research Institute (BJRI). See: http://www.bjri.gov.bd/bjri_english
[14] FAOSTAT (2012). See: http://faostat3.fao.org/home/E

in traffic to business and fashion Facebook pages, e-commerce sites, and job search platforms. It might be reasonable to expect that in the near future people will also use the internet to further their education.

Bangladeshi participants reported that there is not enough adoption of scientific agricultural innovation as farmers are unaware of new techniques and do not have access to capacity development that would enable them to use such innovation.

For S&T innovations that rely on data, participants said there is a need to ensure the quality and reliability of data, and that data need to be simplified and made understandable to non-specialists.

Education interests by sector/country are set out in the table.

Table 4: Education-specific interests per sector/country

Sector	Bangladesh	Nepal
Policy	*(None given)*	• Creation of science centres in schools to ensure practical learning • Support for physics Olympiads
Academic and research	*(None given)*	*(None given)*
NGO	• Capacity building for new technology • General education	• Primary education • Adult education • Vocational education • Financial literacy • Governance • Gender equality
Media	• Violence in schools and concern over educational quality	• New policies and big projects for education
Private	*(None given)*	• Technology education

Technology and innovation

Participants prioritise low-cost solutions and products that are adapted to context and ease of use.

In both countries we heard about advances in ICT. Its use in education is seen as a way of increasing educational impact. Other areas of importance for development include agriculture, health and banking. New technologies can also increase transparency when used by locals to access relevant data and for holding decision-makers accountable.

Participants were concerned about the digital divide, not just between developed and developing worlds but also between rich and poor. This can take the form of limited or no access to the internet by the poor, which limits their ability to engage with microfinance and other new services. Nepalese participants reported that access to ICT, particularly mobile technology, is increasing in rural areas but coverage is still limited. Lack of coverage has affected the rollout of development programmes. For example, the Ministry of Agriculture wanted to collect information and serve rural areas via a text messaging system but this could not be implemented as it could not find a service provider and the appropriate technology.

The problem in Bangladesh has moved from ensuring people have connections to the internet to price and bandwidth. This is exemplified by the huge expansion in the services sector reported by participants. There are about 4,500 government-owned and 5,000 privately owned telecentres in Bangladesh and an estimated 12,000 internet cafes. There has been a shift to smartphones, even in rural regions, and there are about 40 million users. There are high levels of adoption in all sections of society. Some participants argued that prices in the country are too high while others said that prices are actually cheap compared with the region as a whole and that the focus should be on increasing bandwidth while keeping prices stable. There were comparisons with Malaysia where internet consumption (volume of bytes) is 60 times that of Bangladesh yet its population is one sixth of Bangladesh's. A2I (Access to Information), a government programme, plans to install a fibre optic cable system in the country that may support greater access.

Examples of development activities that rely mobile phones in Bangladesh include:

- o A2I[15] is planning to use mobiles to reach rural populations in an effort to reduce its travel costs and increase access to government services. Participants expressed concerns that this service is being rolled out in English, which might make it inaccessible to some of the people it is targeting

- o The Economic Empowerment of the Poorest (EEP)/Shiree programme (funded by the UK Department for International Development) is focused on rural livelihood development and uses mobile devices, GPS tracking and other ICT approaches for data collection[16]

- o ICT is also used in mTikka, a vaccination project that aims to register births, schedule health visits, update immunisation histories and send immunisation reminders to parents[17]. It is run by an NGO called m-power[18]

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[15] An Access to information (A2I) representative added that there are also plans to create e-government services via a government portal consolidating some 25,000 government websites and via Union Information and Service Centres (UISCs), which are built at district levels and intended to enable local people to log queries and requests and help raise awareness of S&T in rural areas, particularly among young people.
[16] http://www.shiree.org
[17] http://www.jhumhealth.org/projects/mtikka
[18] http://www.mpower-social.com

o Micro-business ventures are being automated using ICT (e.g. text message business report software) but this is technology adoption instead of innovation, participants said.

Overall, participants in both countries said there is more adoption of technology than genuine innovation, more software than hardware development (e.g. chips, devices) and that research reports are produced but not digitised, which in the opinion of some demonstrates a lack of IT industrialisation in Bangladesh. However the Bangladeshi government is trying to encourage innovation through A2I. It aims to identify promising initiatives with the potential for replication nationwide. One of its representatives present at our group told us that it has been running since 2013 and that there have already been three selection rounds with a total of 17 projects meeting the criteria, which includes being multi-sectorial.

Participants felt that Nepal does not need big and complicated innovations but rather practical solutions such as technologies for harvesting rice.

The table below sets out interests by sector/country.

Table 5: Technology and innovation-specific interests per sector/country

Sector	Bangladesh	Nepal
Policy	• Digitisation of government services: mobile apps and digital centres • IT: internet access and access to information	• Follow IT trends and implement where appropriate • Biotechnology • Central health database
Academic and research	• ICT for development: focus on mobile apps • Jute diversification products • Hardware and robotic systems • Geographic information systems (GIS) and GPS	• Robots and automation • Open source software development • ICT: focus on mobile technology • Biotechnology
NGO	• Access to information via internet and mobile • ICT centres • Focus on rural areas for subjects above	*(None given)*
Media	• Applied instead of pure science • Upcoming technology (price, bands, features)	• ICT
Private	• ICT products and services: financial services via mobiles • Biotechnology	• Wiki and web-based sharing knowledge • ICT • Cyber-security

Energy

Participants focused on renewable sources and access by rural populations and women. In Nepal we heard about successful production of biogas from forestry products. In both countries the focus is on access to electricity or alternatives.

Most interest in energy came from Nepal, as in the table.

Table 6: Energy-specific interests per sector/country

Sector	Bangladesh	Nepal
Policy	*(None given)*	• Biodiesel
Academic and research	*(None given)*	*(None given)*
NGO	*(None given)*	• Alternative energy
Media	*(None given)*	• Renewable energy: biogas, solar lamps/panels, briquettes, micro-hydro, wind • Improved cooking stoves
Private	• Light engineering • Green energy services	*(None given)*

Infrastructure

Participants focused on the role of better transport in increasing access to health and education services and increasing market opportunities, particularly for rural populations.

There was a lack of consensus about research-related infrastructure such as laboratories. Some argued that the problem is not a lack of infrastructure but the failure to make the best use of it as government can exert too much control. Others believe that infrastructure is indeed scarce and can discourage students from going to remote areas to conduct research. Decentralisation and increased use, not just more infrastructure, seem to be important. Unplanned urbanisation is an area of concern in both countries.

The table shows topics reported by each sector.

Table 7: Infrastructure-specific interests per sector/country

Sector	Bangladesh	Nepal
Policy	*(None given)*	• Update health infrastructure, particularly nuclear and radio-based equipment
Academic and research	• Mass transportation	• Traffic • Road safety
NGO	*(None given)*	*(None given)*
Media	*(None given)*	*(None given)*
Private	*(None given)*	• New equipment • Technology • Quality of laboratories

Chapter 4: Channels for S&T evidence; capacity building needs

This chapter provides insights on preferred channels for disseminating S&T information. Participants were also asked about their capacity building needs. What came through from the discussions is that jargon is a barrier that enforces silos between different stakeholders.

How people access S&T information

a) Policymakers said they prefer face-to-face meetings with researchers or consultants. They also rely on government data to find S&T information.

b) NGO participants said they mainly used the internet to source information, particularly information from trusted networks and donor reports, and from social media posts highlighting research and policy outputs that have proven to work. Other sources include printed publications, local media, conferences and seminars.

c) Private sector participants tend to use dedicated websites and social media to find S&T information. Other sources include research papers, text message alerts, traditional media, IT centres, professional networks and conferences.

d) Academics and researchers rely on the internet, scientific papers in journals and on conferences to find S&T information. Other sources include traditional and social media.

e) Media participants reported using the internet, social media, and press releases to find S&T information. Other sources include traditional media outlets.

Dissemination channels for S&T information

a) Policymakers told us they tend to use traditional media, press releases and social mobilisers to disseminate S&T information.

b) NGOs employ a range of approaches including print publications and other traditional media, conferences, text messaging, internet cafés, their own websites, call centres, arts (drama, song, video), challenging activities (such as marathons), and social mobilisers and volunteers.

c) Private sector participants disseminate S&T information via websites, social media, email, printed materials, multimedia and conferences and exhibitions.

d) Academics and researchers rely on scientific papers in journals, conferences and the internet to disseminate S&T information. Other routes include Olympiads,[19] and traditional and social media.

e) Media participants report using science magazines, Olympiads, science popularisation campaigns, and conferences.

Policymakers: capacity building needs

Policymakers in the focus groups outlined a range of capacity building needs to strengthen the use of S&T information. They said that awareness-raising about ongoing research and new developments is needed; that policymakers need to be better able to coordinate projects that involve multiple agencies; and policymakers also need the capacity to understand and apply evidence. Hiring people with scientific qualifications for S&T government roles and the creation of research advisory councils might help build capacity. Some felt that a more structured policymaking process might facilitate the use of S&T information as well as helping to build objective, effective and sustainable policies. A barrier to this is the high staff turnover in policymaking institutions. When policies are in place, policymakers

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[19] These are science-related competitions for students. For more information see:
http://scienceolympiadsbd.blogspot.co.uk

face difficulties in communicating them, particularly at village level, so that they reach all the population.

NGO/civil society sector: capacity building needs

The focus groups highlighted some capacity gaps among these participants. Poor IT skills should be improved so that ICT could be more widely used in data collection and service delivery and, overall, participants felt that the sector could do with better knowledge management: documentation, monitoring and evaluation, analysis, writing skills, communication and research. More could be done to highlight best practice and increasing awareness about S&T, particularly on technology transfer and adaptation. Ensuring that indigenous knowledge is incorporated into innovations is considered to be important and a current gap.

Private sector: capacity building needs

Those from the private sector said they require support to forge partnerships with academic and government organisations and foster new and innovative approaches that are adapted to context. This requires finance, infrastructure, access to information and English language skills.

Academics and researchers: capacity building needs

Researchers and academics in our focus groups said support is needed to collaborate with the public and private sectors and also with other academic and research institutions. They also need to be better informed of local needs, important policy and commercial viability. The capacity gap could be partly filled by more practical orientation during education. They also highlighted gaps in their ability to communicate S&T to non-specialist audiences, to write for publication, and how to brand their work. Again, better English language skills are important.

Media: capacity building needs

Media participants said there is a need for more science journalists, particularly those who can respond to rural populations. The media needs to give greater space to science reporting and to tackle competitiveness among professionals that can leave science journalists feeling isolated. Plagiarism was raised as a concern. Media participants also felt their skills in communicating and popularising science could be improved through better data analysis, interviewing, writing and editing skills. Participants in Bangladesh suggested science could be popularised via drama and music. Participants would like to foster stronger skills in investigative journalism. They were interested in how to use ICT for science journalism, highlighting blogging and social media as particularly important.

Chapter 5: Recommendations

Create an enabling political environment

Governments are pivotal to providing leadership and ensuring that an enabling environment exists for research and its uptake. Participants from Bangladesh and Nepal felt that their governments could do more to coordinate national efforts, mobilise resources and people, and provide overall direction. But for this to occur it will be necessary to raise government awareness of the importance of S&T.

Even when there are relevant S&T policies in place they are not always implemented. Bangladeshi stakeholders suggested that this is due to a lack of trust and slow uptake of new technology.

Strengthen multi-sectorial action on S&T

It is the job of governments to create an enabling political environment for S&T. But progress will only be possible when there are strong partnerships between government and the academic and private sectors that are driven by local need rather than imported solutions. Support should be provided to build innovative partnerships that tackle complex issues, with a focus on regional cooperation. These partnerships should be multidisciplinary.

Build capacity for change

Participants identified a range of skills that need to be built among individuals in government, civil society and the media. Government structures should support policymakers in accessing, understanding and applying new S&T knowledge. NGOs/the civil society sector want support to integrate new technologies into the way that they deliver and communicate their work. Meanwhile, the media would like to remove barriers to high-quality science reporting. Academics want support in communicating science, and an education system that supports applicability to industry and benefits to society.

The role of international stakeholders

Chapter 2: limited financial resources and donor-driven research noted that S&T is not seen as a funding priority, resulting in a S&T agenda that is largely driven by foreign funders. These funders, generally from high-income countries, direct resources to areas they believe to be most relevant but they do not always tackle the most pressing local concerns. Participants acknowledge that collaborative projects (between global and local organisations) are needed but are not always unproblematic. More transparency and awareness-raising in countries that receive funds could help international donors demonstrate how their funds are being used to the advantage of local people.

Developing capable future generations

Participants discussed the knowledge and skills divide (chapter 2) and recommendations were put forward in Chapter 3: education. A strong recommendation was educational reform, focusing on better training for teachers and adequate infrastructure to increase access to and quality of education to improve science literacy across the population, promoting public understanding and attracting more young people to science. Projects that develop students with talent who did not receive proper schooling were suggested.

Role models can help young people visualise the types of careers they could have by studying sciences, so counteracting negative stereotypes. Both the media and the private sector have a role here — the former in promotion, the latter in funding. Governments should also of course support better education and fund research and innovation to attract the next generation of scientists.

In addition, participants recommended that ICT be used more in education. This might help integrate knowledge into academic curriculums as the speed of scientific advances continues to increase, although marginalised communities still depend heavily on printed materials.

Science communication – increasing uptake and closing the informational gap

Science journalists, think tanks, knowledge brokers and intermediaries can all play a role in making evidence more accessible. The goal of science communication is to translate complex information into messages that are easier to understand by non-specialist audiences in the hope that this will increase interest and uptake. But good data alone is not enough — apart from being easy to understand, information needs to be engaging to attract interest and motivate action. Findings that have local relevance can be particularly valuable alongside analysis of the socioeconomic implications of research.

Participants see the media as a knowledge broker that helps bridge the gap between research and policy and between research and the public. In the global review SciDev.Net undertook in 2012, we found that the media is one of the main sources of information for policymakers and there is agreement that the media can influence the policy agenda.[20]

Academics and researchers need to work closely with the media to resolve misunderstandings and correct inaccurate information.

Research that addresses real-world problems

Research should try to address development issues, generating low-cost S&T solutions that are adapted to local context, adding value and economic opportunities, while taking into account the long-term needs and concerns of marginalised and vulnerable groups.

Publishing in international peer-review journals does not contribute greatly to the local body of knowledge and practice — these journals tend to favour global issues with limited local impact and in any case are less accessible to the local S&T community. Reform in human resources management at academic and research institutions might be effective at changing focus. Career progression could be linked to indicators that relate more to local impact, gearing researchers towards development issues and encouraging them to also consider science communication and innovative partnerships for increased S&T uptake.

Research should be planned with development goals and possible commercialisation in mind. From the start, this may require multidisciplinary research and direct engagement with those ultimately affected as well as the private sector or non-governmental organisations interested in rolling out local technology. This would ensure that stakeholders' views are taken into consideration, particularly those concerning gender and indigenous knowledge, and will increase local relevance and uptake.

Researchers should engage with other knowledge creators such as indigenous groups in ways that do not only extract knowledge but also ensure credit and benefits are distributed accordingly.

Young people, rural populations and gender relations

Young people

Future generations are key to ensuring S&T makes a positive contribution to development. In this report we have touched on issues that affect young people directly, mainly the quality of education, and the lack of a vibrant labour market that encourages the development of S&T professionals. The private sector can be an important player here, particularly for training and jobs, although NGOs can

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[20] See Romo J. (2012). *SciDev.Net Global Review*. SciDev.Net. Available here:
http://www.scidev.net/global/evaluation/learning-series/scidev-net-global-review-2012.html

also offer employment opportunities and should not be forgotten in strategies to employ the next generation of graduates.

Young people also need entrepreneurial skills so they can contribute to building the economy by developing locally needed solutions.

Rural populations

This report finds that participants in Bangladesh and Nepal see an overall divide in technology, infrastructure and access to information, knowledge and finance compared with the developed world. But there is also a divide within these countries as the disadvantages affect rural populations more. They are also more vulnerable to climate change and loss from natural disasters. Inadequate transport to rural areas reinforces their marginalisation as does an absence from media reporting and general policymaking. A participant in Nepal suggested that the rural divide is maintained in the interest of keeping labour and outputs cheap to boost profits.

There are many NGOs that engage with rural groups, and also many gender-related projects, yet most science researchers and organisations tend not to engage with NGOs, although they can help identify needs and help with uptake.

Gender relations

Gender issues start from birth, participants said. Many families still prefer to have a boy, although this is slowly changing, particularly in urban areas and within educated groups. Participants identified S&T as being instrumental in improving the quality of life of women and lessening their reproductive and work burdens. This is particularly important as the majority of women in both Bangladesh and Nepal practise subsistence farming. Therefore gender priorities for S&T could involve increasing access to improved processing and harvesting methods (so as to increase economic opportunities and food security), tools for harvesting rainwater, better irrigation techniques and cost-effective energy solutions.

Access to work and health services is another key area for gender equality, particularly for women in rural and slum areas, and for maternal health. Lower wages paid to women than men in the same posts will continue to be a challenge, and participants also said there are high rates of violence against women. In addition we heard that broader social and religious norms still prevent women from participating more widely in education and work: women can have restrictions on mobility, encouraging them to stay at home. Such norms are most stringent in rural areas, according to our participants. There are signs of progress in the educated urban classes. We heard about women being allowed to study abroad or work outside the household.

Age, geographical location and socioeconomic position greatly influence gender issues, and there is a need to focus more on gender relations, participants said. They added that not involving women more broadly is wasting half of the population's capabilities. Focusing on gender relations in both countries could help improve the limited success of statutory measures. For example, Nepal has scrapped forms of legal gender discrimination such as a lack of inheritance rights for women, yet social practice is still a barrier.

A big challenge is increasing the number of women who go on to higher levels of education, as participants mentioned that social, religious and reproductive demands are a barrier. These include a perception that a demanding career might distract from conjugal life and household responsibilities — this perception seems to increase when considering S&T careers, with women opting for more socially acceptable human and art subjects instead. Despite this, in Bangladesh participants report that there are more cases of women enrolling in higher education (partly as women are getting married later),

with some opting for S&T-related subjects. Participants noted that women tend to opt for medicine, computing and engineering and avoid physics and mathematics.

Some gender initiatives were discussed in detail in the focus groups. In Nepal these were about providing role models and organising S&T groups for women; and in Bangladesh about lessening the financial pressure on families to marry off young women, allowing them to study instead or to help create income. Participants added that in Bangladesh the steep increase in living costs and micro-financing opportunities targeting women have changed the gender landscape, encouraging women to work outside their homes (about eight million women also work in the garment industry in Bangladesh).

ICT is also important as it helps women who cannot easily work out of the home to do so, such as by managing a small business via the internet and mobile phones, according to our participants. But women tend to be less aware of technology than men. The Centre for Mass Education in Science in Bangladesh has a programme to introduce adolescent girls to technology, it was noted.

Participants also called for development interventions by foreign stakeholders to bear gender relations in mind, as there are cases where involving women has made things worse. For example by teaching women how to do tasks that are physically demanding and more suited to men.

The next section is a case study from a development project that reflects the discussion in this chapter. Please note that SciDev.Net has not evaluated this project and our purpose is not necessarily to endorse it but rather to share an example of a strategic response to issues identified in this report.

The project aims to increase S&T access for rural people, particularly women, via an NGO partnership that also has the goals of self-sufficiency and sustainability. The project exemplifies some of the challenges faced, particularly on funding and government leadership.

Case study: Practical Action and READ Nepal

One of the main challenges to increasing use of technological and scientific innovations in Nepal, particularly in rural and remote areas, is to raise awareness of what is available and enable people to access and use new tools to solve local problems.

The NGO Practical Answers Service Programme (Practical Action in Nepal)[21] and its implementing partner, READ Nepal,[22] are working with communities around the country to help them organise themselves and learn from practical and technical advice. Practical Action works with a demand-driven model that typically uses email, phone and/or social mobilisers to collect technical questions and enquiries from locals, mainly women practising subsistence or small-scale farming. It then finds the most appropriate knowledge for locals and uses print, video, radio, text messaging[23] or face-to-face delivery for science communication and training. It is also looking at voice commands via mobiles to enable people to access knowledge.

Practical Action partnered with READ-Nepal three years ago, an organisation that encourages communities to open libraries to increase literacy, and now the libraries also host Practical Action knowledge facilitators. Local people visit the library and have their questions logged — these are then rolled up on a monthly basis and shared with Practical Action for follow-up. In 2013, Practical Action collected about 60,000 queries from some 11,000 people in Nepal — it told us that the questions were mainly about agriculture, livestock management (diseases and production) and disaster risk

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[21] http://practicalaction.org/answers-nepal

[22] http://www.readglobal.org/our-work/read-nepal

[23] Using text messaging in Nepal had limitations as Nepali language characters are supported only on smartphones.

reduction, with climate change questions on the rise. Providing answers has helped reduce the burden of daily activities, increase production, and meet a general demand for knowledge.

With the help of Bhuwan Adhikari, programme officer at Practical Answers, this author organised a field visit to the municipality of Panauti in Kavre district, and heard how this community has raised funds to open a new library, Gyan Bikas Community Library and Resource Centre, where people can log questions for experts. Practical Action then responds with print or video materials as soon as possible.

The library also caters for children. There is a room with musical instruments, a reading room and an IT centre equipped with laptops where children can learn IT skills and use their time productively when not at school.

Panauti also has a sustainability plan. It opened a souvenir shop for local handcrafted items with revenue going to the library. Plans include making one of the library's floors available to rent for events, and opening a coffee shop on the terrace. Villagers believe that small improvements will in the long term contribute substantially to the library's financial stability and to the many services it offers to locals.

A key component of this model is that Practical Answers and READ do not only promote access to S&T, and help empower the community and women, but also make sure that appropriate government departments are aware of the information needs of the municipality and villages via reports and regular meetings. This fosters contacts with government advisors and encourages allocation of resources and policy responses to cater for the community's needs in the future. But a lack of government funding means that NGOs will need to continue to help meet the high demand for such services.

Final remarks

If S&T is to drive equitable and sustainable development, policies and research should attend to basic needs (such as health and food security) to provide a long-term advantage, with a focus on young people, rural populations and balanced gender relations.

Strategies aimed at joining up silos and generating multidisciplinary and multisectorial partnerships might be effective when aiming to increase use of S&T for development. In addition, high-quality science communication and knowledge management are key to increasing availability and use of evidence, and so capacity for these activities should be increased.

Annex 1: Participants

Bangladesh

Name	Gender	Job title	Organisation
Bijon Islam	M	Co-founder and Chief executive officer	LightCastle Partners Ltd
Manjur Mahmud	M	Chief operating officer	DataSoft Systems Bangladesh
Mubir M. Chowdhury	M	Chief operating officer	Humac Lab Ltd.
Benedict D'Rozario, represented by Shaheen Kamruzzaman (see below)	M	Executive Director	Caritas Bangladesh
Shaheen Kamruzzaman	M	ICT officer	Caritas Bangladesh
Nasim Ahmed	M	ICT officer	Counterpart International
Nazrul Islam	M	IT systems manager	USAID
Shahid Uddin Akbar	M	Chief executive officer	Bangladesh Institute of ICT in Development (BIID)
Khalilur Rahman	M	Associate professor	BRAC University
Adeeba Raihan	F	Business Information Analyst	Advanced Seed Research and Biotech Centre, ACI Agribusinesses
Shahidul Islam Chowdhury	M	1) Special affairs editor 2) Planning editor	1) Dhaka Tribune 2) Bangla Tribune
Abdullah Hasan	M	Convener	Youth Journalists Forum Bangladesh (YJFB)
Ariful Hasan Opu	M	Director	Bangladesh Association of Software and Information Services (BASIS)

Name	Gender	Job title	Organisation
Sharful Alam	M	Chief operating officer	Aamra Technologies
Fahim Mashroor	M	Chief executive officer	Bdjobs.com
Solaiman Shukhon	M	Head of marketing	Elite Technologies
Mashuda Khatun Shefali, represented by Tahnee Yeasmin (see below)	F	Executive director	Nari Uddug Kendra (Centre for Women's Initiatives)
Tahnee Yeasmin	F	Personnel	Nari Uddug Kendra (Centre for Women's Initiatives)
Muhammad Ibrahim	M	Executive director	Centre for Mass Education in Science (CMES)
Rubaiyath Sarwar	M	Co-founder and managing director	Innovision Consulting
Riasat Alam	M	Project coordinator	Market Development through ICT Initiatives/Innovision Consulting
Mridul Chowdhury, represented by Muntasir Saqib Khan (see below)	M	Founder and CEO	mPower Social Enterprises
Muntasir Saqib Khan	M	Partnership development manager	mPower Social Enterprises
Munir Hasan, represented by Nurunnaby Hasive (see below)	M	Youth coordinator	Prothom Alo [news site]
Nurunnaby Hasive	M	Journalist	Prothom Alo [news site]

Name	Gender	Job title	Organisation
Abdullah Al Mahmud	M	Editor	Zero to Infinity [science magazine]
Mohammad Asaduzzaman	M	Technical director	Bangladesh Jute Research Institute (BJRI)
Rafiqul Islam Mondal	M	Director-general	Bangladesh Agricultural Research Institute (BARI)
Shamsun Nur	F	Director – Oilseed Research Centre	Bangladesh Agricultural Research Institute (BARI)
Sazedul Karim Sarker	M	Head of poultry production research division	Bangladesh Livestock Research Institute (BLRI)
Mohammed Eunus Ali	M	Professor, department of computer science and engineering	Bangladesh University of Engineering and Technology
Faruq Ahmed Jewel	M	National consultant	Access to Information (A2I) project, Prime Minister's Office/UN Development Programme in Bangladesh/USAID

Nepal

Name	Gender	Job title	Organisation
Ambika Osti	F	Office manager	GalliGalli [information on accessing government services]
Mahesh Puri	M	Associate director	Center for Research on Environment, Health and Population Activities (CREHPA)
Balaram Shrestha	M	Executive director	Biogas Sector Partnership Nepal
Ram P. Chaudhary	M	Professor and executive director	Research Centre for Applied Science and Technology (RECAST), Tribhuvan University
Bigyan Rimal	M	Programme coordinator	Biotechnology Society of Nepal
Shanker Ghimire	M	Executive director	Asian Pharmaceuticals
Sameer Dixit	M	Country director	Center for Molecular Dynamics – Nepal
Bisheshwar Bhandari	M	Managing director	Nepal Consulting Lawyers
Khem Bahadur Karki	M	1) Principal investigator 2) Executive director	1) Nepal Health Research Council 2) Society for Local Integrated Development Nepal
Purushottam Dhakal	M	Research officer	Nepal Health Research Council

Name	Gender	Job title	Organisation
Naya Sharma Paudel, represented by Rahul Karki (see below)	M	Environmental governance specialist	ForestAction Nepal
Rahul Karki	M	Researcher	ForestAction Nepal
Ganesh Gurung	M	Founding chair	Nepal Institute of Development Studies (NIDS)
Naresh Newar	M	Correspondent	Inter Press Service (IPS)
Niranjan Khakurel	M	Principal	Nepal College of Information Technology
Damakant Jayshi	M	Executive director	Panos South Asia
Jorge Esteban	M	Managing director	Edushala [education company]
Shahani Singh	F	Freelance journalist	SciDev.Net and others
Sunoj Shrestha	M	Co-founder	Karkhana [education company]
Arya Gautam	F	Programme officer	Foundation for Development Management
Chet Raj Pant	M	Ex-National Planning Commission member	–
Ranjit Acharya	M	Chief executive	Prisma Advertising

Nepal – other interviews and field visits

Name	Gender	Job title	Organisation
Chin Kaji Shrestha	M	Programme officer	READ Nepal
Durgesh Kumar Yogi	M	Monitoring and evaluation officer	
Parbha Wagle	F	Field supervisor	
Om Krishna Shrestha	M	Coordinator	Practical Answers service programme for Gyan Bikas Community Library and Resource Centre, Panauti
Soniya Tamrakar	F	Social mobiliser	
Bhuwan Adhikari	M	Senior programme officer	Practical Answers, Practical Action South Asia Regional Office
Achyut Luitel	M	Country director	
Sanjib Chaudhary	M	Communication coordinator	
Ganesh Sinkemana	M	Gravity goods ropeway expert	

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The publications in the SciDev.Net Learning Series derive insights from research projects and analysis regarding science communication. The series is part of SciDev.Net's monitoring and evaluation programme and provides valuable knowledge and lessons regarding the mainstreaming of evidence for policymaking, development programmes and when building a culture of science.

The publications should appeal to anyone with an interest in the use of science and technology in development and poverty reduction.