participatory technology development (PTD) activities in Nepal and some PTD work taking place now. There is a paradox here. While the PPB debates appear to be narrow, there is plenty of historical evidence to show that there has been, and there continues to be, a wide range of PTD activities taking place in Nepal. In many ways Nepal is an international leader in the PTD field, as evidenced, for example, by its being the first country to formally release a variety from a PPB program, as well as the fact that it is the home of the *samuhik bhraman*, the traveling PRA technique used by senior researchers to interact with farmers.

The historical record

There is a long history of PTD in Nepal. Some of the earliest work in low-income public-sector agricultural research organizations took place here (Gauchan and Yokoyama 1999; Kayastha, Mathema, and Rood 1989). This started in the 1970s with the cropping-system project based in the agronomy division of the national agricultural research system in Khumaltar. This grew to its height in the mid-1980s when there was a large, fully functioning multidisciplinary farming systems division with farming systems research (FSR) sites in many locations. In addition to this, there were two well-funded autonomous agricultural research stations in the hills supported by the British government that had active PTD programs. One of these stations had a PPB program. While the outcomes of these programs were sometimes mixed as regards the involvement of poorer farmers, effective feedback to researchers, etc.,[14] the point is that many of the principles being suggested in these early PPT programs are common to the "new" PPB/PCI approaches. It would appear that some of the institutional lessons from this historical experience are not being taken up in the current debates on PPB.

For those interested in the "institutionalization" of participatory approaches, the establishment and then total decline of the farming systems division in NARC, and its replacement by a traditional technology-transfer outreach unit (mainly concerned with varietal testing) must be a salutary lesson. During the same time, NARC's social science capacity to support PTD and conduct research policy analysis also declined drastically. Whether institutional capacity is developed and is sustained depends on the social context of science. There is nothing linear or straightforward in capacity development. Not only is there this long history of agricultural PTD in Nepal, but there is also a long tradition of PTD in a wide range of other technology sectors. Many of the publications of the Intermediate Technology Development Group (ITDG) give evidence to this long history. In the irrigation sector, Nepal's research work on participatory irrigation management has made major contributions to the applied and theoretical literature on institutions and common property management.[15]

It is interesting to read some of the chapters in the proceedings of the third and fourth NARC outreach workshops (Acharya, Lang, and Karki 1996; Acharya 1998) to see that a great deal had been learned about strengthening PTD approaches and the problems that might be expected. Some of this experience was with PPB taking place in the two relatively autonomous British-funded hill stations at Lumle and Pakhribas.[16] Chapters in those proceedings also covered such issues as the potential role of NGOs and institutional linkages in the overall R&D system. This type of institutional issue is important. What can or cannot be done to implement different ideas, methods, techniques of PPB depends very much on the institutional context in which scientists work. Some of the current

14. See Kayastha, Mathema, and Rood (1989).
15. For example, see Martin and Yoder (1988).
16. See Sthapit, Gauchan, and Rana (1996), Gurung et al. (1996), and Dhital, Subedi, and Shrestha (1996).

actors in the PPB debate are the same ones who were involved in earlier years. What is puzzling to observe, is that it is as if these earlier, broader-based and more institutionally aware pieces of analysis did not exist. Certainly, with the current emphasis on a "new" approach and "new" manuals, the reader is encouraged to think that some of the issues are new, while in fact they are well known in Nepal.

The current range of PTD activities by many different actors

Not only does Nepal have this rich historical background of participatory approaches to research in topics far wider than plant breeding, but there is a great deal of PTD now taking place inside and outside of the public-sector research system, which could inform the debates in plant breeding (Gauchan, Joshi, and Biggs 2000). This includes a participatory varietal selection (PVS) program for fodder, involving 3500 farmers in 10 districts in Nepal and farmers asking researchers in NARC for specific varieties of exotic goats to cross with their own local breeds. Many of these programs do not think that what they are doing is extraordinary, or needs a special project, let alone that it should be the subject of much-heated debate to show that what they are doing is different from other parts of their R&D activities.[17]

In addition to these activities, there is the continuing and very extensive PPB practice of farmers going to India to select and being back a whole range of cereal, horticultural, and other varieties. This activity includes not only farmers, but also a range of other actors such as agricultural veterinarians and other rural entrepreneurs who seek out new pesticides, fertilizers, and other agricultural inputs. A serious challenge for Nepali and Indian researchers and policymakers is how to keep up with this two-way flow of technology, how to learn lessons for science, and if necessary and feasible, how to regulate it.

Ways forward

We have argued that from our perspective, some of the PPB debates in the international and local literature appear rather narrow and are not addressing broader R&D policy issues.[18] From a Nepal perspective, it would also appear that some of the debates have not taken adequate account of the great wealth of past knowledge (published and unpublished) on PPB/PTD in Nepal, nor does it appear to reflect an awareness of the large amount of PPB/PTD research being conducted by a range of different R&D actors at the present time. In the light of this, we suggest a number of ways forward in the Nepal context. These are ways forward that place emphasis on the institutional issues of how the national system can integrate and use the R&D capacity of many diverse actors.

New forums for research policy debates

The agricultural and natural resource R&D system in Nepal is rapidly changing. There are new research and extension providers emerging and old actors are changing their roles. The sources and conditions of research funding are also changing, with an emphasis more on transparency and the

17. It is interesting to note that there are important areas of breeding (for example, in the fisheries sector) where there is very little systematic research, the term breeding being used to denote the multiplication of fingerlings. It is possible that some of the knowledge and experience of those engaged in the PPB/CPB debates could be better redirected towards strengthening fisheries breeding.

18. A very notable exception to this is the PPB code of practice guidelines being developed by the CGIAR Systemwide Participatory Research and Gender Analysis Program (Weltzien/Smith, Meitzner, and Sperling 2000). There are many ethical and legal issues concerning access to information, patents, etc., that have been neglected in the past and need serious policy analysis.

efficiency of the overall R&D system. In the light of these changes, it would appear that one of the new types of institutions needed in the PPB area are *national* forums where issues of importance to national policy can be discussed.[19] Participants need to include knowledgeable researchers, not only from the public sector but also now from the private/NGO and university sectors. Research funders will also need to be involved, as funders increasingly need to be recognized as one of the stakeholders in a particular research endeavor. In the particular area of plant breeding, seed-release legislation, and regulatory systems, the national forum will have to include the major NGOs working in this area and in the growing private sector. The knowledge and capacity of these sectors has to be used for policy purposes. At the regional level and for specific technologies (e.g., a regional research station or a rice commodity-improvement program), forums will also have to be established. The legitimate concerns of different actors can then be discussed. The strengthening of such forums would also help to reduce the chances that the competition for funds (and the demands of the project cycle) becomes the major determinant for directing research activities.

New institutional partnerships and coalitions

A second and related new direction concerns the formation of new institutional partnerships, alliances, and coalitions. In the past such projects as the in situ agrobiodiversity project involving a formal agreement between NARC, Local Initiatives for Biodiversity Research and Development (LI-BIRD, a large local research-based NGO), and IPGRI were an exception.[20] However, it is now being recognized that such partnerships are the best way forward in using scarce national and international research resources. At the national level, it is clear that public-sector R&D agencies are changing policies to encourage their staff to work collaboratively with the NGO/private/university sectors and also to enhance linkages among public-sector institutions.[21] The challenge in this is how to develop and implement genuine partnerships. At one level, this will involve learning new management skills, but at another level, it will also involve a respect for the knowledge, skills, and roles of a wide range of multiple actors in the R&D system. Many of the institutional innovations needed for going forward are already being developed "informally" and sometimes formally in multiple locations in Nepal. Some of these innovations might be useful to other countries and international agencies.

Conclusions

For years researchers in Nepal (whether with or without formal training in science) have been developing technology relevant for different niches in the country. In recent years the achievements of formal science have been recorded in various ways. However, the informal activities of research-minded farmers have continued to play a major role in R&D processes (as evident in the spread of improved varieties selected by farmers), but these informal activities have not had the support of the formal research process for technology generation and promotion. By the same token, there are innovative researchers in the formal system who are developing new plant-breeding procedures and new institutional structures for the practice of science. Some of these innovations involve new types of partnerships with many local and international actors. This type of innovative practice is

19. See Roling (1990) for the importance of platforms, forums, and other similar institutional mechanisms for discourse in agricultural R&D. For similar discussions on development nodes and networks in rural-development projects, see Alsop and Farrington (1998).
20. Interestingly, this included a PPB component, participation of "conventional" plant breeders and concerns with gender analysis.
21. See Gauchan, Joshi, and Biggs (2000), the proceedings of the 5th National Outreach Workshop and the report of the Committee on Research and Development Linkages prepared for the July meeting of the NARC Board.

not new to science. The practice of science always involves the flow of information between different groups of people. However, because science is a social process, there are always people and interest groups who, for one reason or another, want to control the flow of information in different ways. Some of the reasons for this have been discussed in this paper.

One of the biggest challenges for researchers and research funders at present is to find ways of strengthening the overall R&D system in Nepal. In this process, international actors can play a role. However, the involvement of international actors should be questioned if (1) they encourage the creation and use of unhelpful dichotomies, where a more careful analysis is needed and (2) Nepal is seen as a location for experiments or international research programs that are owned in any meaningful sense by others—and Nepal is seen as being at the end of a "top-down" R&D system.

Bibliography

Acharya, B. K. 1998. *Proceedings of the Fourth Outreach Research Workshop, Khumultar, 27–29 April, 1998.* Khumaltar, Nepal: Nepal Agricultural Research Council.

Acharya, B.K., L.A. Lang, and T.S. Karki (Eds).1996. *Proceedings of the Third National Workshop on Outreach Research, Pakhribus, May 21–23, 1996.* Khumaltar, Nepal: Outreach Research Division, Nepal Agricultural Research Council.

Alsop, R. and J. Farrington. 1998. Nests, nodes and niches: A system for process monitoring, information exchange and decision making for multiple stakeholders. *World Development* Vol.26(2):249–260.

Apthorpe, R. and D. Gasper (Eds). 1996. Arguing development policy: Frames and discourse. *European Journal of Development Research* 8(1).

Biggs, S.D. 1980. Informal R & D: The failure of farmers to adopt new technological packages entirely may be a sign of creativity rather than backwardness. *Ceres* 13(4), July-Aug:23–26.

Biggs, S.D. 1990. A multiple source of innovation model of agricultural research and technology promotion. *World Development* 18(11):1481–1499.

Biggs, S. 1997. Livelihood, coping and influencing strategies of rural development personnel. *Project Appraisal* 12(2):101–106.

Biggs, S. and H. Matsaert. 1999. An actor oriented approach for strengthening research and development capabilities in natural resources systems. *Public Administration and Development* 19:231–262.

Biggs, S. and G. Smith. 1998. Beyond methodologies: Coalition-building for participatory technology development. *World Development* 26(2):239–248.

Bista, D.B. 1991. *Fatalism and development: Nepal's struggle for modernization.* Calcutta: Orient Longman Ltd.

Burghart, R. 1994. His lordship at the cobblers' well. In *An anthropological critique of development: The growth of ignorance,* edited by M. Hobart. London: Routledge.

Byerlee, D. 1998. The search for a new paradigm for the development of national agricultural research systems. *World Development* 26(6):1049–1055.

CARE. 1998. *An assessment of participatory crop variety selection program in Syangja and Mahottari districts, Nepal.* Lalitpur, Nepal: Care Nepal.

Chambers R. and M. Howes. 1979. Rural development: Whose knowledge counts? *IDS Bulletin* 10(2).

Clay, E.J. and B.B. Schaffer (Eds). 1984. *Room for manoeuvre: An exploration of public policy in agricultural and rural development.* London: Heinemann.

Dhital, B.K., M. Subedi, and P.K. Shrestha. 1996. Farmers' research in generating sustainable technologies: Observations and experiences from Lumle Agricultural Research Centre. In *Proceedings of the Third National Workshop on Outreach Research.* Khumaltar, Nepal: Outreach Research Division, Nepal Agricultural Research Council.