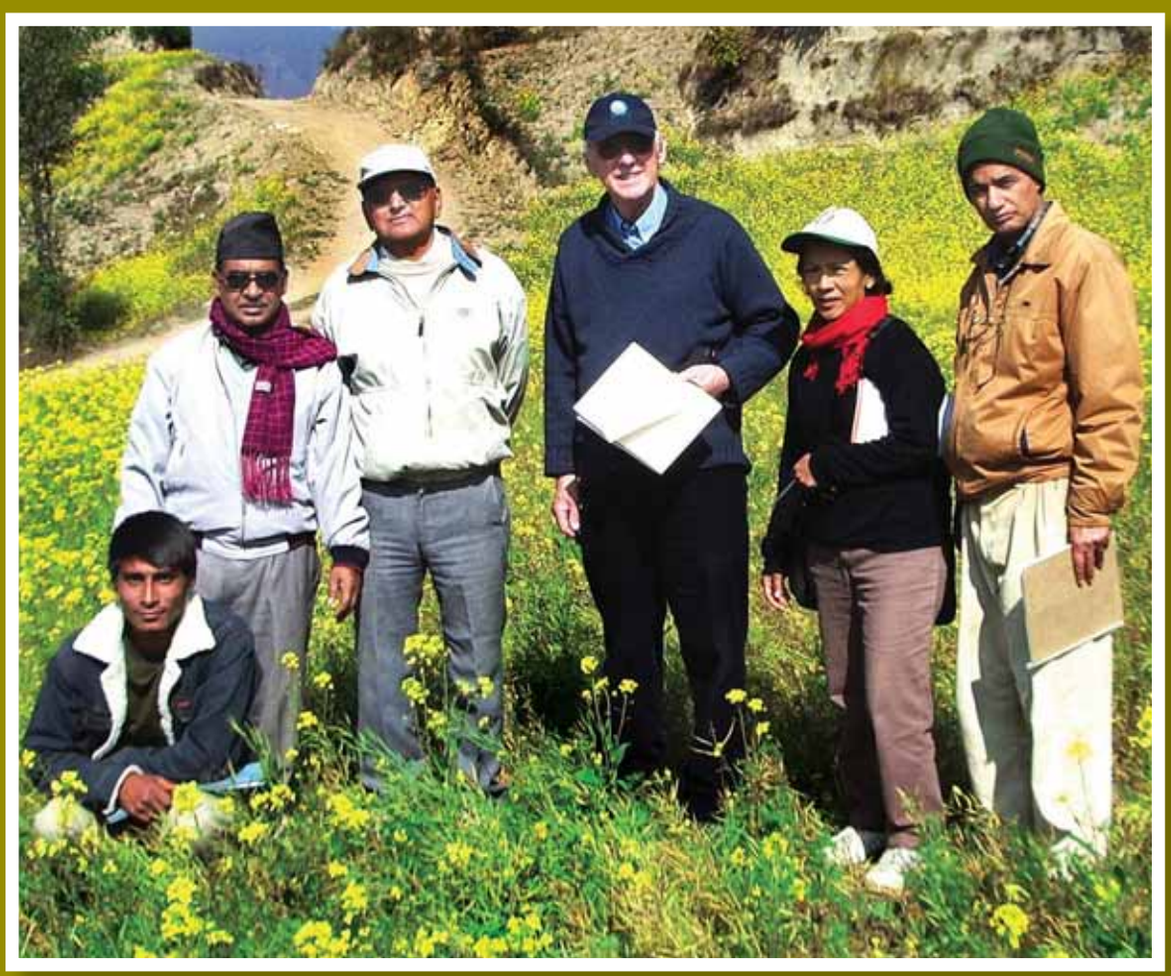
Technology needs and transfer issues in South Asia

in relation to climate change and food insecurity



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There is a substantial literature that recognizes the impacts of climate change on agriculture in South Asia suggesting that technology should be a key component of the response.[1] In terms of innovation and appropriateness of the required technologies, it is essential that they contribute to increased food production and sustainable development in agriculture while reducing emissions. This policy brief investigates the technology needs and transfer issues pertaining to agriculture in South Asia in the context of climate change and food insecurity, with a focus on the role of intellectual property.

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Agriculture technologies

Agriculture technologies in relation to climate change can be classified as technologies relevant to adaptation and those relevant to mitigation.[2] A survey of literature indicates that while many such technologies are already available or being used, there is a need to develop and use new technologies, including new seed varieties, with traits that are relevant to climate change.

From an intellectual property right (IPR) perspective, the relevant technologies can be classified as those which can be protected by intellectual property (IP), or IP-relevant, and those which cannot be protected by IP, or IP-irrelevant.[3] But as different countries have different norms to define invention and eligibility for patent or IP protection, these variations have to be taken into account in such a classification. For example, while in the United States (US) it is possible to get plant variety protection and patent protection for a new variety, in South Asia, only plant breeders' rights can be obtained for a new variety. Farm management practices, agriculture practices and many related practices such as rain water harvesting and integrated soil nutrient management *per se* cannot be patented, but equipment and software that can be used in them can be patented or copyrighted, respectively, if they fulfil the criteria for IP protection. On the other hand, given the tacit nature of many of the practices and the variations and adaptations necessary for local conditions, even if IP protection is available, deployment alone will not result in the best utilization of technologies.

Thus, while some of the relevant agriculture technologies will be protected by IP, many will not be protected. But mere availability of IP protection does not necessarily result in innovation or commercialization if the inventor does not see much scope for returns commensurate with investments in research and development (R&D), and in production and distribution. Moreover, private sector R&D in agriculture is limited to some activities and, in terms of both range and amount, the public sector is the major player in agriculture R&D.

Therefore, while there is an urgent need for both new and improved technologies, the private sector alone will not be able to undertake the required R&D, and the public sector will have to undertake a significant portion of it. The private sector, however, can still play an important role in diffusion and commercialization of technologies. Globally, during the past two decades, public sector R&D has not increased significantly while private sector R&D has increased, particularly in agriculture biotechnology.[4]

In the context of South Asia, studies show that although the region has fared better in some aspects, there are trends/factors that demand more attention. For example, while noting the positive aspects in India's post-Green Revolution agriculture, Sharma and Gulati (2012) point out: "The country faces a number of challenges to agricultural growth including technological fatigue, policy deficits, infrastructural, credit and marketing constraints and water, and soil health related ecological and environmental problems. Public sector agricultural R&D has not adequately addressed arid/dry land agriculture and the need to develop drought and pest resistant crop varieties."[5] Thus, a major obstacle to the transfer of technology could be the very non-availability of appropriate technologies to meet the challenges of climate change. Although governments in South Asia are aware of the negative impacts of climate change in agriculture and have taken some policy measures to minimize the impacts, it is necessary to look at the measures undertaken, particularly in the context of development and diffusion of technologies for adaptation and mitigation.

Mere availability of intellectual property protection does not necessarily result in innovation or commercialization.

The underinvestment in R&D, particularly public sector R&D, should not result in non-availability of relevant technologies, particularly for poor and marginal farmers. Although assessments of the impacts of climate change on the yield and productivity of different crops or in different regions may vary, this cannot be a reason for lack of preparedness in developing technologies and their diffusion. Hence, national agriculture R&D strategies should be assessed in terms of the capacity to undertake R&D for such technologies and to support their diffusion. It is also important to use both demand-pull and market-push mechanisms and their combinations, if necessary, for stimulating innovation, wherever appropriate.[6]

Initiatives in South Asia

Most South Asian countries have drawn up climate change action plans or strategies. Pakistan recently approved a National Climate Change Policy, which includes components for technology development and transfer. Sri Lanka's National Climate Change Policy lays emphasis on technological innovation and states: "Encourage climate resilient, environmental friendly and appropriate innovative

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technologies while recognizing and promoting the utilization of appropriate traditional knowledge and practices in food production". India has initiated an ambitious and comprehensive climate change action plan that includes action plan on climate change and agriculture. In 2011, Nepal unveiled its Climate Change Policy. In the case of Bangladesh, although there does not seem to be any comprehensive policy, a National Adaptation Programme of Action (NAPA) was prepared in 2005.

In the regional context, the South Asian Association for Regional Cooperation (SAARC) has been sensitive to the issue of climate change. Although the issue was first discussed in SAARC in 1987, after which many committees and working groups had been set up, progress was not exemplary.[7] The Thimphu Statement on Climate Change adopted in April 2010 aims to, among others, i) undertake advocacy and awareness programmes on climate change to promote the use of green technology and best practices to promote low-carbon sustainable and inclusive development of the region; and ii) commission a study to explore the feasibility of establishing a SAARC mechanism, which would provide capital for projects that promote low-carbon technology and renewable energy, and a Low Carbon Research and Development Institute in South Asian University.

Although the Thimphu Statement makes no specific reference to the agriculture sector, if the above plans are implemented, they will go a long way towards promoting relevant technologies in agriculture. The obstacles seem to be more institutional in nature, and unless something is done about these, technological issues will not get resolved. Hence, while there is ample potential for development and transfer of technology at both national and regional levels, realizing that potential calls for a focused action plan, given the urgency of the issue.

Role of intellectual property

The role of IP in technology transfer is controversial and a survey of literature shows that strong IPRs *per se* do not result in better or more transfer of technology. There are divergent views on the role of IPR, the relevance of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) of the World Trade Organization (WTO), and policy measures necessary to incentivize both development and transfer of technology.

The North-South divide on technology transfer is an old issue and it resonates in this debate as well.[8] But a nuanced position eschews extreme positions and underscores the fact that while there are issues with both IPR and TRIPS, solutions have to be found within the current IPR/TRIPS regime as well as beyond that. This means that while traditional issues like licensing have to be addressed, new options like open innovation and open source models can be explored in the development and transfer of technology.[9]

IP is an incentive, but as an incentive, its effect is not uniform in all technologies. In agriculture,

as discussed earlier, the requisite innovations can be classified as IP-relevant and IP-irrelevant. Thomson and Webster (2010) state that there is considerable potential of innovation in areas in which IP rights are unsuitable or not needed. They argue: "These include abatement achievable through new and improved agronomic practices relating to land management and animal husbandry. Developing best practice demands ongoing research to understand both the basic science and location specific aspects of agronomic systems. The global IP system is unlikely to affect investment in, or international transfer of, these innovations. Alternatively, there appears to be a strong case for public funding of research and extension services to facilitate deployment in cases where IP rights are unsuitable."[10]

But as the effects of IP are less direct in agriculture (except in the case of seeds and access to genetic resources) than in issues like health or access to knowledge, benign neglect cannot be the solution. Instead, the approach should be to find out whether the absence of IPR results in under-investment by the private sector and the public sector where innovations are required.

Access to seeds and genetic resources, and appropriation by IPR and the implications of this for food security are important issues. In the context of climate change and agriculture, this is all the more relevant as there is an urgent need for developing varieties with traits like flood resistance and drought tolerance, and varieties that could use nitrogenous fertilizer more efficiently, resulting in lesser emissions of nitrous oxide. The centres run by the Consultative Group on International Agricultural Research (CGIAR) and the Indian Council for Agricultural Research are among the institutions that are involved in developing such varieties. However, recent trends in patenting and patent applications on what is called "climate ready genes" have been of concern.[11] Similarly, attempts to patent essential biological processes, plant breeding methods (which can restrict or block access to research tools), genetic materials, etc., have been criticized and their potential negative impacts highlighted.[12] Access to germplasm and Freedom to Operate (FTO) are important from a plant breeding perspective, but broad patents can constrain the options available to plant breeders in developing varieties and hence a balance between patenting and FTO is necessary.[13]

Agriculture biotechnology is expected to play an important role in developing necessary plant varieties. It has to be understood in the context of developments in IPRs on plants and agriculture biotechnology.[14] South Asian countries have not opted for providing patent protection for plant varieties. However, this is not a sufficient basis to conclude that IP is not an issue unless a patent landscaping of agriculture biotechnology patents applied for and granted in the countries in the region is done, and the claims and scope of claims are identified. Similarly, a comprehensive analysis of the seed sector in the region and the trends in seed production, seed replacement ratio, and public/private ownership in seed development has to be done. In the case of India, a recent study indicates that "…the public sector's current contribution to India's seed and agbiotech industries, GM technology pipeline, and wider innovation market is insufficient. National and international research organizations play an important role in varietal rice and wheat improvement and hybrid parent line development, but their contributions are limited by a range of factors".[15]

The private sector alone cannot meet the need for varieties with different traits.

But there is no guarantee that the private sector alone can meet the need for varieties with different traits. Both the public sector and the private sector have an important role to play. Relying on market forces alone is not the right approach. Underscoring the need for more support to agriculture R&D in the Asia-Pacific region, the Tsukuba Declaration on Adapting Agriculture to Climate Change (2008) pointed out that CGIAR Centres and National Agriculture Research Systems have a major role in developing new genotypes and applying plant breeding and biotechnology to develop them.

There is a need to take into account farmers' needs and encourage initiatives like participatory plant breeding in developing varieties that are more suited to meet farmers' needs. Such exercises can also draw upon traditional varieties and traditional farming knowledge. Alternative approaches like using Open Innovation Models to develop new varieties can be used to overcome some of the constraints imposed by the global IP regime. The services of not-for-profit organizations like PIPRA and CAMBIA can be used to access technologies, and in areas like patent landscaping, licensing and entering into material transfer agreements.[16] Although not much work has been done on ownership and scope of claims in patents on or patent applications for varieties with traits relevant to adaptation or mitigation, a recent study for the Organisation for Economic Co-operation and Development (OECD) indicates that OECD countries and the private sector are the dominant players in this.[17]

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The potential of South-South technology transfer to tackle climate change is yet to be fully explored.

From the above discussion, it is obvious that IP will be an important and contentious issue in agriculture. South Asian countries should take appropriate steps so that IP does not become a barrier in meeting the challenge of climate change. For example, they should explore options like competition law and policy to enhance access to and transfer of technologies.

South-South transfer of technologies is an important option in climate change, and its potential is yet to be fully explored.[18] SAARC can act as a catalyst for South-South technology transfer in the region. With technologies available within the region, by developing mechanisms to encourage intra-regional technology transfer, SAARC can help meet the technology needs identified by the United Nations Framework Convention on Climate Change. Such efforts should be supported with financial and non-financial incentives and measures, including tariff concessions, capacity building in technology absorption and joint undertaking of R&D.

TRIPS and technology transfer

One of the objectives of the TRIPS Agreement is to facilitate transfer of technology. At the same time, the need to strike a balance between the rights of IP holders and socio-economic policies is specified in Articles 7 and 8 of the Agreement. Article 7 specifies the objective to "provide protection and enforcement of intellectual property rights which should contribute to the promotion of technological innovation and to the transfer of technology to the mutual advantage of producers and users of technological knowledge".

The objective of Article 66.2 of the TRIPS Agreement is to encourage technology transfer to the least-developed countries (LDCs) from developed countries. It states: "Developed country members shall provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least developed country members in order to enable them to create a sound and viable technological base". But the Article has not been implemented as per the expectations of the LDCs. The major reason behind this is the North-South divide.

Suggestions have been made to make the implementation of the Article effective.[19] But given the deadlock at the TRIPS Council and the lack of progress in the WTO Doha Round, nothing extraordinary is likely to happen in this area. Hence, it is better to presume that Article 66.2 will not result in the much-needed transfer of technology. Instead, it is better to focus on regional cooperation and South-South cooperation in technology development and transfer.

Conclusion

It is obvious that IP will be an important issue in technology transfer in agriculture in the context of climate change. As relying on market forces may not result in the development and transfer of technologies, public sector investment in R&D is crucial. It is even more important in the case of public goods and innovations, where due to the absence of IP protection, limited market size and other factors, the private sector is not investing sufficiently in R&D. Within the agriculture sector, the impact of IPR is likely to be felt more prominently in seeds and access to germplasm. Global trends indicate that IP may become a barrier on account of various factors.

Therefore, countries in the region have to understand the implications of such trends. They need not have high hopes of Article 66.2 of TRIPS. The potential of regional cooperation and South-South cooperation has to be realized and the countries should implement the Thimphu Statement on Climate Change in letter and spirit. ■

Notes

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