AgBioForum, 8(1): 7-17. ©2005 AgBioForum.

Evolution of Capacity for Institutionalized Management of Intellectual Property at International Agricultural Research Centers: A Strategic Case Study

Henrik Egelyng
Danish Institute for International Studies, Copenhagen

Intellectual property rights long remained a matter dealt with in vague terms of general policy at international agricultural research centers (IARCs). This situation changed at the turn of the century, when intellectual property (IP) became an object of a major institution-building process at three centers of the Consultative Group on International Agricultural Research (CGIAR). This article analyzes why and how policies were grounded and made operational in terms of new intellectual property structures and procedures. Focusing on initial developments at the International Rice Research Institute (IRRI), this analysis aims to make a strategic case and contribute towards an analytic framework for investigating institutional capacity for IP rights management by international organizations pursuing public missions.

Key words: capacity building, CGIAR, institutional development, intellectual property, international agricultural research, IRRI

Introduction

Technological and social forces demanding institutional change in the way international agricultural research centers (IARCs) do their business have been analyzed throughout the 1990s (e.g., Herdt, 1999). These forces were the result of five revolutions that transformed the strategic environment of the Consultative Group on International Agricultural Research (CGIAR) and left it facing "a series of difficult IP-related choices" (Binenbaum, 2004). They may also be summarized as an institutional challenge (Egelyng, 2000c) or simply as globalization. By 1998, the institutional challenge led to thorough policy discussions at the Consultative Group on International Agricultural Research (CGIAR) system level, based on work by the CGIAR Panel on Proprietary Science and Technology and on a survey by the International Service for National Agricultural Research (ISNAR) of seven center experiences with proprietary technology. These surveys and discussions revealed that several IARCs using proprietary technology had limited institutional capacity and understanding of IP issues. For instance, centers were uncertain whether particular research results could be applied freely—or at all. One result of these discussions was recommendations to create a central advisory capacity on proprietary science and to conduct a comprehensive IP audit to clear titles and eliminate potential risks to centers and their partners. In addition to these institutional challenges and forces, developments in the public relations arena added momentum to demands for action at IARCs. By 1997–1999, the International Rice Research Institute (IRRI), along with other CGIAR centers, experienced increasing exposure to controversies relating to intellectual property and genetic resources.[1] At the same time, developments within the biological sciences—allowing (for instance) bioindustrial use of rice (genome) as a model crop—only added to the urgency for IARCs (including IRRI) to strengthen their capacity to deal with IP rights. Overall, these developments resulted in the launch in 1999 of a formal institution-building exercise at IRRI, which resulted in the creation of a formal IP management unit (and subsequent IP office) within the institute.

The State of the Art and the State of Practice

Despite the gathering momentum in meeting the challenges above, the state of art in the IP challenges con-

1. *In IRRI's case, such controversies included the so-called basmati and jasmine cases and the Xa21 case. The basmati controversy arose in 1997, when RiceTec, Inc. of Alvin, Texas was given US Patent #5,663,484 on basmati rice lines and grains. In Thailand, the same US company was held to have patented and trademarked a jasmine rice ("Jasmati"). By 1999, the University of California received US Patent 5,859,339, covering an invention involving the Xa21 gene and a research history also involving IRRI and some of its research products—so-called Near Isogenic Lines. Common to these three cases were that the controversies died hard, despite their lack of real or de jure substance.The materials in question originated from other sources than IRRI, before the 1992 CBD and before the 1994 CGIAR agreement which placed IRRI's rice germplasm collection under the plant genetic resources regime of the FAO.*

fronting nonprofit agricultural R&D is one in which a collection of recent papers convey "many interesting insights," but remain "essentially collections of ad-hoc observations without a clear analytical framework" or "explicitly systemic perspective" (Binenbaum, 2004).

With regard to nonprofit agricultural R&D, capacity-building training in the science and management of biotechnology, IPR, biosafety, and international negotiations is generally perceived as an overwhelming need for public-sector institutions in developing countries (Herdt, 1999, p. 18). Moreover, as far as the international agricultural research system is concerned, a recent evaluation concluded that the CGIAR (sub)system has remained "equivocal" regarding the use and roles of intellectual property (Lesser, 2003).

Both the theoretical state of the art and this author's examination of the documentation provided for the evaluators suggests a need for providing more detailed information on what has happened inside individual CGIAR centers, in terms of strengthening capacity to deal with intellectual property as part of the institutional environment in which these centers conduct research. In providing a case study focusing on the IRRI (1999–2001) experience in this matter, this article aims to provide such information and add insights to the state of the art. Eventually, such state-of-art studies may enable subsequent steps towards an analytical framework for investigating institutional capacity for IPR management at international organizations pursuing public missions. Therefore, the first part of this article presents an analysis of the evolution of IRRI IP management capacity between 1999 and 2001, with a view to producing indicators for institutionalized handling of intellectual property. The second part presents a typology of IP and IP users, with a view to moving closer towards a framework for cross-cultural and transdisciplinary communication on intellectual property and development

Institution Building at IRRI

The preceding observations raise questions of whether, how, and why management of IP rights has been institutionalized by the International Rice Research Institute (IRRI) at the turn of the century and how policies were grounded and made operational in terms of new structures, procedures, and routines.

The institutional challenges facing IRRI and CGIAR are complex and diverse indeed. As cross-national flows of capital, information, goods, and people reach massive proportions, national institutional frameworks become inadequate (Herdt, 1999). Yet, "each nation has its own form of intellectual property protection, and despite common perceptions to the contrary, IP protection granted in one country is not generally valid in another. That is, a patent granted in the US has no force outside of it" (Herdt, 2001, p. 10).

The issues, conflicts, and reasons for the institutional changes described below are all rooted in the following facts: By the early to late 1990s, the IARCs (and certainly IRRI) saw many different categories of agencies—northern universities, transnational bioindustries, small national bioindustries, national agricultural research systems, donor agencies, and so forth—all interacting by internet, across borders, to help exchange or transfer technologies. Confusion often arose about the very basics of IP, as noted by Herdt (2001) above. Contracts were sometimes drafted or initially negotiated as though the IP rules of individual countries applied worldwide. In addition to the challenge of institution building in IP management, therefore, a second challenge of simply promoting some common understanding and common language presented itself.

A Globalizing Institutional Environment

The IRRI operates in an institutional environment of intellectual property rights (IPR) regimes that are strengthened and promoted worldwide by globalization, which includes technological developments and harmonization of laws and regulations under international agreements. Such agreements include the International Undertaking on Crop Genetic Resources (IU), the Convention on Biodiversity (CBD), and the Trade Related Intellectual Property Rights (TRIPS) provision under the World Trade Organization. These IPR regime changes affect how agricultural scientists exchange materials and ideas and what research objectives they can pursue (Egelyng, 2000c). Initially, the IRRI dealt with IPR issues through an ad hoc committee. By 1999, IRRI established what is now the office of the deputy director general for partnerships (DDG-P) with an in-house IPR facility. Building capacity to act in the area of intellectual property had become imperative for the IRRI.

Byerlee and Fischer (2001) report how many public biotechnology programs have been "tool driven" and lacked a clear strategy and set of priorities. In the absence of well-defined development goals and without clear strategic direction, any IP capacity-building program left to IP experts might end with technical capacity building becoming a goal per se, rather than a means to pursue development. During a visit to IRRI on April 30,

1999, Nobel Laureate Dr. Norman Borlaug was asked what he perceived as the major challenge for IARCs in the context of biotechnology. Dr. Borlaug—stressing that he had nothing against any individual lawyers or the legal profession per se—answered: "How will you keep out the lawyers? How will you keep the tail from wagging the dog?" Dr. Borlaug saw a strategic challenge in making sure that future interaction with IP professionals serves poor farmers rather than other industry actors and interests.

The office of the DDG-P built and strengthened IP structures and procedures and planned and implemented institutional strategies in the IP field in pursuance of the same strategic challenge. Between 1999 and 2001, the DDG-P office prepared IP handbooks and guidelines and introduced and revised material transfer agreements, pro formas for memoranda of agreements, clearance sheets, IP decision-making flowcharts, databases, confidentiality agreements, and many other requirements for institutionalized handling of intellectual property.

It is often implied that building and strengthening IP administration at an international agricultural research institute are mainly about patents and biotechnology. Administrative IP procedures at IRRI, however, were designed with a view to manage IP associated not only with germplasm and biological tools, but also with agricultural machinery, confidential information, software, and trademarks. It has been a major effort for IRRI to regularize copyright management for publications, videos, web sites, software, CD-ROMs, and databases. Furthermore, although one objective of IP institution building has been to secure IRRI some rights, another objective was to ensure that the institute does not infringe third-party intellectual property. Equally important, new potentials were discovered for economies of scale in negotiating licenses on a CGIAR system-wide basis (instead of by center).

Most IP instruments are applied routinely and without much debate. This is often true for copyrights and patents for mechanical inventions. However, application of IP to life-science products remains controversial, and the life-science IP regime is still evolving rapidly; biotechnology is one technology often racing ahead of—or challenging—policies and regulations. IRRI therefore has to play by the various and often conflicting rules of both the international community and the various countries in which it operates.

Grounding Policy

At IRRI, a DDG-P extension office (IP desk) created a range of in-house IP facilities and institutional tools, such as intellectual property management review (IPMR), IP audit reports, a handbook of IP administration, an IP primer and awareness program, an IP library facility, and an IRRI-CORRA (Council for Partnership on Rice Research in Asia) workshop on plant variety protection.

The IPMR was undertaken as an external review that focused on three main fields: ownership and control of IP, an IP audit, and management of IP at IRRI. Parallel reviews were undertaken at other centers, including the International Maize and Wheat Improvement Center (CIMMYT), the International Livestock Research Institute (ILRI), the Center for International Forestry Research, and the International Plant Genetic Resources Institute. The handbook of IP administration was drafted in-house and included references and briefs of policies, structures, and procedures of IP administration. It included online IP forms and templates, including standard material transfer agreements (MTAs), confidentiality agreements (CAs), and international agreements that affect IRRI IP administration. The handbook also included clearing sheets and flowcharts that illustrate IP procedures and explanations on the establishment of IRRI IP databases on third-party research products. The rationale for these flowcharts is to inform scientists on how to initiate and follow the procedures for import and export of materials covered or potentially covered by IP. The rationale of the databases were to enable scientists easy access to information on whether a particular material destined for export out of IRRI would be covered by any agreement between IRRI and any third-party IP holder. The handbook was prepared with a view to be put on the IRRI intranet as the primary internal source of information and guidance on IRRI IP procedures. Having this resource published electronically as an evolving instrument is ideal for a field as dynamic and rapidly moving as IP. Scientists can download, complete, and submit the forms required for the transfer of biological materials directly from their computers.

The International Potato Center (CIP) also published its second-edition IP handbook as an internal document. In contrast, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has placed not only its general IPR policy but also its standard MTAs and innovation/intellectual asset disclosure forms on the internet in a special IP office website. A system-level booklet of CGIAR center policy instruments was pub-

lished by the System-wide Genetic Resources Programme (SGRP) in a version available to outside parties upon request. In contrast to the in-house versions, the SGRP versions include only policy instruments and guidelines common to all centers. Consequently, the majority of forms, guidelines, and statements in this booklet concern in-trust plant genetic resources and broad system policies and principles (SGRP, 2003).

The IRRI IP primer was drafted in-house as an IP dictionary and included a list of IP literature available at IRRI, a list of web IP facilities, and other information. The International Food Policy Research Institute presented a two-page primer on IPR and agricultural biotechnology on the internet.

The IRRI IP awareness program began with seminars featuring international experts on IP administration. The objective of this program was to encourage all staff to be well acquainted with the policies and procedures governing IP at IRRI. The IP library facility was established at the IRRI library in the form of new and relevant IP literature and material identified and acquired.

The IRRI-CORRA workshop on plant variety protection (PVP) focused on the needs for institution building, strengthening, and capacity building, in the light of the new PVP regulations in the individual countries and the region. The workshop included a major case study focusing on the International Network for Genetic Evaluation of Rice (INGER), and examined the question of how PVP and related IP legislation will affect the free flow of germplasm and access to materials and information (Egelyng, 2002). The workshop was followed up in the form of an IRRI-national agricultural research and extension systems (NARES) institution-building exercise that aimed to adapt INGER to the sui generis PVP regimes.

IRRI IP institution building thus included efforts in concert with other centers (IPMR and audit and input to the work plan of the Central Advisory Service on Proprietary Science (CAS) as well as in-house activities. Within the CGIAR, three centers (IRRI, CIMMYT, and ILRI) subsequently formed a group, jointly accessing funds to consolidate and formalize this work beyond the early phase (1999–2001). At IRRI, however, most of the tools above remain in-house tools.

Another major activity evolving at IRRI was to explore and review possible and existing partnerships between IRRI and other parties from an IP perspective. This included agreements with private companies, NARES, international organizations, donor-investors, and advanced research institutions around the world. Reviewing and commenting IP-related draft reports and papers, presented to IRRI by the World Bank, the Convention on Biological Diversity, Technical Advisory Committee of the CGIAR, and other international institutions, has become part of the responsibilities of the IRRI IP desk. Although detailed evidence on IRRI IPR agreements with private companies are not publicized, general lists of all partner institutions with which IRRI has agreements are published annually (e.g., IRRI, 2005).

IRRI IP Activities

Between 1999 and 2001, the IRRI IP desk initiated a range of institution-building objectives and activities, such as freedom-to-operate studies, a case study on IP aspects of functional genomics and the new plant type, a trademark-management strategy, and consolidating the "single-door" principle.

Freedom to operate is the ability to undertake research, development, and sales involving a particular technology while minimizing risk of infringing unlicensed property of others. Freedom-to-operate assessment needs were identified and included particular cases of genetic constructs obtained from third parties under MTAs and subsequently distributed to NARES under the Asian Rice Biotechnology Network (ARBN), the INGER network, and other programs of collaboration. Constructs identified for subsequent investigation included the *Xa7*, *Xa21*, *Pi-9*, *Gm1* (gall midge resistance), *Gna* (snowdrop lectin), and *Bacillus thuringiensis* (Bt) genes transferred to Bt rice varieties by IRRI. Freedom to operate had become a major strategic objective for IRRI, as some of the materials, tools, and technologies IRRI scientists work with (or plan to work with) are increasingly becoming proprietary materials. IRRI is under pressure to identify areas perceived to be at risk for patenting by third parties, potentially resulting in the perceived loss of IRRI freedom to operate.

For functional genomics and the new plant type (NPT), one question evaluated was whether IRRI might need to focus on selected aspects of its functional genomics activities and perhaps the NPT technology with a view to IP protection. IRRI also established mechanisms to provide overview and decision-making for areas in which IRRI might wish to proactively seek protection by defensive publishing and/or defensive patenting intended to destroy the novelty (and therefore patentability) of rice-related innovations that benefit developing countries. IRRI may also wish to create mechanisms to ensure that it is alerted to potential infringement of third-party IP.

Strengthening and widening the protection of the IRRI logo and establishing protection of the IR designation as a trademark were included as strategic objectives for IRRI to pursue. A trademark-management strategy was devised to identify filing priorities, enforcement priorities, licensing, and exploitation, as well as maintenance issues.

To consolidate a single-door principle, the DDG-P became the focal point for IP administration at IRRI. This step had significant implications for the procedures by which IP-related cases are considered at IRRI and the way these are processed, filed, communicated, and stored. Before the establishment of the DDG-P, it was common for material transfer agreements, confidentiality agreements, technology licenses, and other IP-related agreements to be filed and stored only by the scientists carrying out the research in question. The IP-related documents that IRRI signs, however, often cover a long time span and imply an obligation by IRRI to monitor the subsequent movement of materials. The IPMR therefore identified a need to consolidate the office of the DDG-P as one in-house "single-door" IP unit in charge of handling IP issues and acting as a depository of IP documents. The office of the DDG-P and its site on the intranet became a working depository for a range of documents related to IP administration. A central repository of IP records is now an important aspect of IRRI's IP administration.

Institutional Objectives

With regard to IP administration, the DDG-P was made responsible for the following institutional objectives:

- staff and visitors signing and adhering to an agreement on intellectual property;
- clarifying copyrights for various publications;
- filing originals of all IP agreements centrally and providing copies to relevant staff;
- filing and maintaining proper research records;
- coordinating the MTA granting procedure;
- monitoring and supervising IP provisions of all other agreements;
- coordinating all IP matters with IRRI's internal/external legal advisors; and
- ensuring that any third-party IP used by IRRI is registered and administered according to the provisions of the agreements by which it was accessed.

In contrast to the IP offices of private companies and semipublic entities, the objective of IRRI's IP administration was not to preserve the legal identity of innovations as intellectual property. On the contrary, for IRRI-generated innovations, the objective was to ensure that these innovations were put into the public domain. IRRI's policy on intellectual property combines IP provisions with provisions dealing with access to germplasm. Emphasizing free availability of germplasm and information, inventions, and biological material developed at IRRI, the policy provides for any necessity to seek IP protection in order to secure the availability of advanced biological technologies or materials to developing countries. The priorities of IRRI's IP administration are therefore to ensure that all materials leaving IRRI are accompanied by material transfer agreements featuring provisions to protect the interests of IRRI and the clients it has been mandated to serve.

New Responsibilities for Scientists

IRRI scientists are involved in biological materials transfers in two directions: outbound (IRRI) materials that they send to external collaborators and incoming materials that they receive from institutions and companies overseas. Until quite recently, the majority of IRRI scientists would have to worry only (or mainly) about the scientific rationales of these transfers. Today, scientists exporting any new biological material out of IRRI need to make sure of IRRI's obligations are for that particular material. For example, such material may contain genes that IRRI received under an MTA with a particular bioindustry. Some biological materials ready for transfer out of IRRI may be based on material originating from the Philippines and therefore require clearance under Philippine bioprospecting rules. The IP handbook and IP databases alert scientists to the conditions under which IRRI is (or is not) allowed to export or share these particular materials.

To guide IRRI scientists with these new responsibilities, the office of the DDG-P developed a set of intranet tools and administrative guidelines describing the procedures and instruments by which IP policies are carried out. Guidelines were developed for publishing, implementing partnerships with the private sector, submitting material transfer agreements, and drafting confidentiality agreements. A pro forma has also been drafted for scientists preparing or negotiating collaborative research with IP implications.

IP and International Flows of Improved Rice Germplasm

As an international center for the conservation and improvement of rice materials, IRRI operates at both the receiving and supplying end of international germplasm

flows. One basic distinction in dealing with material transfers is therefore that between outbound and inbound materials. Another important distinction is between different categories of material. IRRI refers to materials received at its Genebank and redistributed in their original form as *trust material germplasm*—held in trust by IRRI on behalf of the international community. This in-trust material is also often referred to as *designated germplasm* because it is designated to IRRI by the Food and Agriculture Organization (FAO) of the United Nations. The IRRI Rice Genebank (IRG) has long used a so-called "shrink-wrap" MTA when sending samples of FAO-designated rice germplasm out of IRRI. In contrast, materials that have been changed or developed by IRRI are referred to as *IRRI research products*. IRRI research products are sometimes also referred to as *IRRI-improved materials*, *IRRI-developed materials*, or *IRRI biological assets*.

The procedures and institution building reported in this article mainly apply to the latter category of materials—IRRI research products. These are defined here as biological materials that are nondesignated and to which IRRI has added value. In concrete terms, these include advanced lines, inbred lines, (hybrid) restorer lines, the new plant type, IRRI varieties, transgenic lines, gene pyramid series, fungal proteins, new mapping populations, characterized mutants, near-isogenic lines, introgression lines, bacterial artificial chromosome (BAC) libraries, and other biological tools for gene discovery. IRRI frequently shares all of these kinds of materials with third parties. Such sharing has become formalized, with each material shipped from IRRI (and sometimes even within IRRI) being accompanied by a standard MTA for the recipient to sign. In concert with the other instruments described above, IRRI established a standard agreement governing IP generated by its own staff and the relationship between IRRI and its employees in that respect.

Material Transfer Agreements—IRRI IP Instrument Number One

By 2000, the use of MTAs had become institutionalized among most CGIAR centers and certainly at IRRI. As ordinary contracts enjoying the protection of law in most countries, MTAs are perceived as particularly useful in the context of biotechnology. However, as instruments to facilitate the transfer of biological materials with potential commercial value, MTAs are still a relatively recent institutional innovation. MTAs can be designed to avoid patent rights on the transferred material or its components or to encourage patenting and govern the division of theoretical benefits. In some cases, MTAs offer protection beyond what a patent could do, but MTAs lose their legal force once the material involved becomes significantly disseminated (Barton & Siebeck, 1994). In the context of international agricultural research for the common good of poor farmers, dissemination is a must. For IRRI, any arrangement requiring control of material flowing in and out of its collections diverts resources from agricultural research into administrative tasks. As pointed out by Barton and Siebeck (1994), the transaction costs that centers may incur on themselves by implementing IPR regimes can be huge. A minimum of bureaucratic procedure, therefore, is in the policy interests of IRRI. In the past, this was achieved with a minimum of formality.

Today, formalities are not completely avoidable. A master MTA now applies to all materials leaving IRRI as research products. The master MTA stipulates the conditions under which the recipient can use biological research products supplied by IRRI. The reasons for using a master MTA are partly to minimize and streamline administrative costs and other transaction costs related to the sharing of biological materials. It is further intended to ensure that recipients obtain materials under equal terms and that the principles by which IRRI shares its research products are clear to the world. Therefore, it has become the responsibility of the individual scientist to initiate an MTA clearance procedure (through the office of the DDG-P) prior to exporting any scientific material from IRRI. Scientists can find a standard MTA text in the handbook of IP administration. However, in each particular case, scientists need to describe the particular material in question and the parties to the transfer. Overcoming the problem of skyrocketing transaction costs will therefore depend on IRRI developing institutional capacities to efficiently administer and implement whatever formal procedures are required. In other words, the task becomes one of limiting legal formalities and IP-related costs.

Based on the analyses above, Table 1 summarizes and presents a set of criteria by which different kinds of research organizations may be classified as belonging to a particular type of IP producer or user.

A Master MTA for IRRI Research Products

An IRRI master MTA for nondesignated material was drafted, requiring recipients of IRRI research products to grant IRRI a sublicensable, nonexclusive, and royalty-free license for any IP rights resulting from or

Table 1. Towards a set of indicators for institutionalized handling of intellectual property.

• Institutional strategies in the field of intellectual property implemented
• IP handbooks, primers, and/or IP guidelines issued
• Material transfer agreement (MTA) sheets standardized
• Pro formas for memoranda of agreements introduced
• Confidentiality Agreement Templates available
• IP audited recently
• IP awareness program in operation
• IP library facilities exist
• IP decision-making flowcharts available
• Databases protected
• Copyright clarified and management regularized for publications, videos, web sites, software, CD-ROMs, and databases
• IP forms and IP templates online
• IP instruments applied routinely for exchange of mechanical inventions, life-science products, and biological and other out-bound and in-bound materials
• What instruments of IP are applied
• Mechanism allowing the institution to monitor and observe international agreements with IP implications
• Staff and visitors signing and adhering to an agreement on intellectual property
• Originals of all IP agreements filed centrally and copies provided to appropriate staff members
• Proper research records made, maintained, and filed
• MTA granting procedure coordinated
• IP provisions of all other agreements monitored and supervised
• IP matters coordinated with the IARCs internal/external legal advisors
• Third-party IP registered and administered according to the provisions of the agreements by which the IP was accessed
• Policies, structures, and procedures of IP administration operational
• Internal information about and guidance on IP procedures available
• Administrative guidelines may exist for publication and for implementing partnerships with the private sector
• Guidelines exist for submitting material transfer agreements and for drafting confidentiality agreements
• A pro forma exists for scientists preparing or negotiating collaborative research with IP implications

derived from IRRI materials. The objective was to ensure that IRRI would retain freedom to operate (FTO) for IRRI materials and derivatives of IRRI materials and to avoid a situation of any party monopolizing technologies based on materials supplied and developed by IRRI. No broader consensus, however, was achieved on to what extent the said license was (a) for research only, (b) for both research and commercialization, (c) for research and dissemination to subsistence farmers through nonprofit channels (parastatals and NGOs), or (d) covering a particular territory only. Explicit decisions on to what extent or in what circumstances the licenses are for research or for different kinds of use were left for the future. Review of IP policies and MTAs from other centers, including ICRISAT, CIP, and the International Institute for Tropical Agriculture suggest that as far as MTAs for research products are concerned, the situation is similar at other centers. Future decisions on the points above are important, as centers may not be able to justify investing their resources in technological trajectories based on proprietary technologies that cannot be freely distributed for use by their clients. For IRRI, important questions to address include the following:

- Besides continuing to freely provide the private sector with access to designated and improved rice germplasm, should IRRI allow the private sector to establish IP over innovations made by private research based on derivatives of such material? Would IRRI, for instance, allow a private bioindustry to add value to the IRRI material by inserting a proprietary gene in rice seed?
- Should IRRI use resources to do research using third-party IP, the supplier of which requires a license in case of any commercialization or dissemination by developing-country NARES?
- Should it be left to the NARES to negotiate IP issues with the private sector? Would IRRI, in subsequent distribution of such material to NARES, enclose a letter reminding NARES that the material contains a privately owned gene that NARES should ask for and negotiate a permission to use with the said bioindustry?

If a CGIAR center cannot ensure that the fruits of its research using third-party IP will be subsequently freely and equally available to developing countries, justifying this research would be difficult. IRRI always needs to demonstrate the likelihood of the eventual technology to be applied by poor rice farmers. Although suppliers are not likely to share any materials with IRRI on terms destroying supplier rights vis-à-vis the industrialized world, the majority of material suppliers have in fact proved willing to waive their rights over the materials as far as the poorest developing countries are concerned.

If IRRI were to adopt a market segmentation principle as part of its IPR policy, this would not mean, of course, that IRRI cannot or would not distribute a particular IRRI research product containing third-party IP to recipients from industrialized countries. What it does mean is that IRRI would do so with a legal message enclosed, advising the industrialized-country recipient that the material does or may contain IP owned by a third party and that it is therefore the responsibility of

Table 2. Typology of intellectual property and users.

	Private semipublic	National public	International public
Type	Private goods providers	Public goods providers (national level)	Public goods providers (international level)
IP policy objective	Appropriation; preserve status of any invention as IP	Put basically any invention into public domain by publication	Secure innovations for international public domain
IP instruments	Patents, trade secret, plant patent, plant variety protection, copyright, trademarks, confidentiality agreements, material transfer agreements	None, except copyright and perhaps MTAs; academic publishing (scientific criteria only)	Publishing (scientific criteria); defensive (enabling) publication; copyright; material transfer agreements; confidentiality agreements; employee contracts
Nature of in-house IP facility	IP clearinghouse, IP office or technology transfer office	None	IP administration unit

the recipient to clear any commercial use with such parties.

Towards a Framework for Cross-Cultural and Transdisciplinary Communication on IP and Development: Protection or "Protection"

The ambiguity surrounding the term *IP protection* is perhaps the single most confusing element in international analyses of IPR activities. In the context of international agricultural research, the root cause behind this confusion is that discussants and practitioners alike often forget to distinguish explicitly the various perspectives from which IP is discussed or applied and the specific geography of the IP. To avoid such confusion, it is advisable to be very clear about who is to protect what from whom, how, and why (Egelyng, 2000a, 2000b). Based on the author's analysis of letters and draft contracts in correspondence between public-private and national-international actors, a typology was developed with a view to conceptualize or understand the motives, behavior, and perceptions of IP by such different organizations.

Protection as Perceived by the Private Sector

To the private sector, IP protection is a means to acquire ownership rights to an innovation, with a view to maximizing the firm's profit from that innovation (Table 2, column 2). All instruments of IP protection are relevant from the private-sector perspective. In the case of private-sector research organizations, the in-house IP facility governing and implementing their IP strategy may include an IP clearinghouse. The rationale for such a clearinghouse is to ensure that the scientific manuscripts leaving the private organization are drained of patentable subject matter and any other information giving premature clues toward an innovative or productive potential that can be exploited commercially. Whether and to what extent this distorts the trajectory of scientific discovery is not discussed here. What is emphasized is that the science conducted in the private sector in general, and the reporting on such science in particular, follows rules different from those governing research at not-for-profit institutions working in the public domain. The bottom-line objective of IP administrations working in this structural environment is to preserve the legal identity of innovations made as intellectual property.

At least two distinct traits characterize a research organization engaged in IP protection. One is that research reporting is organized in a manner conforming to the requirement of the patent system. This is reflected in a range of measures such as special procedures for keeping laboratory notebooks and strict policing and control of the movement of materials and information. (A classical text prescribing such measures is Saliwanchik, 1988.) The other trait is that mechanisms are in place to guard secrecy and confidentiality. The reason for the latter is that courts will only enforce trade secrecy laws if the owner of a trade secret can demonstrate that proper steps were taken to preserve the secret. This goes beyond marking relevant documents "confidential." It involves scientific information shared under confidentiality arrangements only and procedures to minimize the number of people knowing about the research. Confidentiality agreements (CAs) are written agreements describing in significant detail the terms and conditions under which a piece of information is shared and what the disclosee (person receiving information) can and cannot do with the information he or she rightfully receives. A CA may state, for instance, that the disclosee may only use the information to determine whether he or she can manufacture a particular product at a given price per unit. Historically, in the process of

becoming quasiprivate research organizations, some industrialized-country universities have established clearinghouses, letting experts ensure that the scientific manuscripts leaving the university are systematically drained of potentially patentable subject matter or information giving clues toward the same.

Protection as Perceived by the Classical Public University

Some universities around the developing world remain strictly public-sector institutions, providing public goods in the classical sense of the word and bringing their science to the public domain. To such a university (Table 2, column 3), the term *protection* would mean to protect an innovation from being appropriated by any single private-sector or semipublic interest wishing to patent it. Universities in this category are found all over the world. However, there are probably far fewer such universities in this category today than just five years ago. The objective of any IP administration in this structural setting is not primarily a defensive one, with a view to destroy the novelty of innovations. Instead, the overriding objective is to bring new knowledge to the public domain based on scientific (rather than legal) criteria and merits. The editors are scientists, not lawyers. If an organization such as IRRI were to institute a defensive publication unit (DPU), contrary to the scientific journals in which the findings of IRRI researchers are reported, publications coming out of a DPU would not be edited by scientists and their peers. The staff of a DPU would collaborate with IP professionals not with a view to scientific merit, but rather to provide the specific details required to effectively make IRRI innovations prior art. The objective of a DPU would thus be to make enabling disclosures of IRRI science outputs, thereby making sure that IRRI outputs remain available in the public domain rather than being appropriated by others. (For an explanation of defensive publication, see ISNAR, 2002.)

The Semipublic University

At the other end of the spectrum, some universities, notably in the United States and more recently in Europe, have developed differently. A generation ago, the Bayh–Dole Act of 1980 allowed US universities to split their missions in two and partly act as private-sector units for ownership of their science. Thriving on a strong national IP regime, some of the universities following this path developed technology-transfer offices and effectively protected the fruits of their science as private property. Terminology-wise, therefore, staff members of such universities tend to share partly the perspective and language of private firms when using the term *IP protection*. However, this does not necessarily mean that the quasiprivate university de facto acts as a private company in marketing its proprietary technologies once they are protected. The semipublic mandate of the same university may give rise to significant modifications or ambiguities in the market behavior of such universities. A similar situation is now evolving in Europe. Although American universities following this path have had technology transfer or intellectual property offices for more than a decade now, the path is still often experimental in nature, especially in the context of agricultural universities (in contrast to sectors such as pharmaceuticals and engineering). The empirical evidence on whether to advise other national public goods providers to follow the quasiprivate university path outside a US context may therefore be still limited.[2] For international public goods providers in an international or developed-nation context, it is uncertain where this path will lead.

International Public Goods Providers

International public goods providers such as IRRI (Table 2, column 4) have a structural position comparable to that of national universities with a purely public mission. Because of their international nature, however, their public service orientation is much stronger. At IRRI, understanding these basic differences remains a prerequisite to making proper decisions on IP rights. This field is complicated because different legal regimes or rules apply to different countries and categories of germplasm material. These regimes are not necessarily consistent—they may reflect different agreements reached at different times by different international and national fora representing different interests and powers. The major challenge to IRRI is in trying to move forward despite such conditions and despite rapid biotechnological developments that change many an equation (Egelyng, 2000a). These conditions are less than ideal for IRRI as an international organization meant to serve

2. *After more than a decade of the Bayh-Dole Act, the IP office of Michigan State University (MSU) had received notification of more than 400 possible inventions. Just as in the private sector, only a few prospective inventions survived scrutiny and matured as patents or licenses. Anecdotal evidence indicates that by November 1999, one single patent had earned a major and significant amount of revenue for MSU (MSU staff member, personal communication, Nov. 16, 1999).*

and please all nations, interests, and parties at the same time and in the name of the common good.

IRRI, IP, and the CGIAR

An institute such as IRRI has legitimate concerns about committing expenses and time to IP administration. In 1999, recognizing this problem, IRRI sought to clarify its needs and perspectives in relation to the Central Advisory Service on Proprietary Science (CAS), which was made operational in early 2000 with a mission of "serving centers' needs regarding proprietary technology by providing and facilitating expert advice and exchange of knowledge and experiences" (ISNAR, 1998). Until 2004, CAS was located at ISNAR in the Netherlands. ISNAR has now ceased to exist as an independent organization; CAS has moved to Rome and become part of the CGIAR systems office. IRRI wanted the CAS to provide IP assistance to IRRI in all areas where economy of scale in IP administration is possible. In addition to the CAS, IRRI has also interacted with other external councils, for example concerning a freedom-to-operate study on so-called golden rice.

The field of IP administration at international agricultural research institutions is permeated by classical technology-transfer perspectives, often limiting their scope to managerial procedures to acquire, transfer, and manage IP. It is increasingly important for the CGIAR and its centers to move beyond legalistic, technical, and technocratic exercises and base their IP practices on broader institutional analyses that apply political science and international political and ecological economy perspectives to IP regimes.

Understanding the political reality of IP includes a realization that IP is originally a Western notion currently being introduced into other parts of the world. A historical awareness such as Alford's (1995) is necessary in order to understand why IP law has severe difficulty in taking hold in nonwestern societies in general and in developing countries in particular. First, however, more understanding is required of the differences between economic sectors and the respective roles and functions of public versus private institutions in society. It is paramount that IP professionals with technical and legal backgrounds offering their services to the CGIAR understand the full implications of this reality and refrain from offering advice and services as if the institutional objective of IARCs per se was to preserve the legal identity of its inventions as IP. In fact, IRRI's raison d'être is exactly the opposite.

Conclusions

This article reported on the nature of the IP institution-building process at IRRI, which gained momentum in early 1999 in response to a perceived urgency of demands for institutional change. In the process of describing establishment of an IP unit and implementation of an IP management review along with a range of other activities, the article proceed to identify a set of indicators or requirements for institutionalized handling of intellectual property. Assessed by the same indicators, IRRI's house appears much in order, as far as IP management capacity is concerned. However, the regime under which IRRI shares its biological research products with other parties will probably go on evolving and remain subject to revisions. One such revision, perhaps, may follow from the lesson that the freedom-to-operate challenge is perhaps less important than originally perceived. To protect or not to protect research products, and how, will remain questions that IRRI will have to confront more explicitly in the future.

The IRRI's policy is to secure research materials and findings for the public domain. One strategic consideration is to what extent this policy objective is achievable via a path of preserving research products as IP or whether and to what extent alternative strategies (such as defensive publication) should be applied to prevent IRRI research results from becoming IP. With a Central Advisory Service now part of the CGIAR Systems Office and emergence of a discipline of studying IP challenges confronting nonprofit agricultural R&D, indications are that the evolving capacities for institutionalized management of intellectual property at international agricultural research centers will increasingly be strategically guided towards serving the international public policy mandates of the CGIAR centers.

References

Alford, W.P. (1995). *To steal a book is an elegant offence: Intellectual property law in Chinese civilization*. Stanford, CA: Stanford University Press.

Barton, J.H., & Siebeck,W.E. (1994). *Material transfer agreements for the international agricultural research centers?* Washington, DC: International Plant Genetic Resources Institute.

Binenbaum, E. (2004). The intellectual property strategy of international agricultural research centers. *Agribusiness Review*, *12*.

Byerlee, D., & Fischer, K. (2001). Accessing modern science: Policy and institutional options for agricultural biotechnology in developing countries. *IP Strategy Today*, *1*.

Egelyng, H. (2000a). *Intellectual property & IRRI: A primer for IRRI researchers* (internal document). Los Baños, Philippines: International Rice Research Institute.

Egelyng, H. (2000b). *IP handbook* (internal document). Los Baños, Philippines: International Rice Research Institute.

Egelyng, H. (2000c). Managing agricultural biotechnology for sustainable development: The case of semi-arid India. *International Journal of Biotechnology*, *2*(4), 324-354.

Egelyng, H. (2002). Sui generis protection of plant varieties in Asian agriculture: A regional regime in the making? In R.E. Evenson, V. Santaniello, & D. Zilberman (Eds.), *Economic and social issues in agricultural biotechnology.* Wallingford, UK: CABI Publishing.

Herdt, R.W. (1999). *Enclosing the global plant genetic commons*. Paper presented at the China Center for Economic Research.

Herdt, R.W. (2001). Changing priorities for international agricultural research. México City: International Maize and Wheat Improvement Center (CIMMYT).

International Rice Research Institute. (2005). *Memoranda of agreement: Partner institutions IRRI entered into agreements with in 2004. Annual report of the director general, 2004–2005*. Los Baños, Philippines: IRRI.

International Service for National Agricultural Research. (1998). *Plan of work for a central advisory service on proprietary technology within the CGIAR, 1999–2000*. The Hague: International Service for National Agricultural Research.

International Service for National Agricultural Research. (2002). *Defensive publishing: A strategy for maintaining intellectual property as public goods* (briefing paper no. 53). The Hague: International Service for National Agricultural Research.

Lesser, W. (2003). *Review of biotechnology, genetic resource, and intellectual property rights programs* (thematic working paper). Washington, DC: World Bank Operations Evaluation Department.

Saliwanchik, R. (1988). *Protecting biotechnology inventions: A guide for scientists*. Madison, WI: Science Tech Publishers.

System-wide Genetic Resources Programme (2003). *Booklet of CGIAR center policy instruments, guidelines and statements on genetic resources, biotechnology and intellectual property rights, version II*. Maccarese, Italy: CGIAR Genetic Resources Policy Committee.

Acknowledgements

The author wishes to convey his gratitude to three anonymous reviewers for their highly constructive criticism, which enabled the author to revise an early version of this manuscript.