

Literature survey on intellectual property rights and sustainable human development

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Introduction

Intellectual property rights (IPRs) take various forms. Probably the most prominent are patents, copyrights and trademarks. Other important IPRs include industrial designs, trade secrets, plant breeders' rights¹, geographical indications such as appellations of origin, and utility models². All of these rights have European origins. For example, patents are considered to date back to fifteenth century Venice, and copyrights to early eighteenth century England.

At both international and national levels, IPRs have changed greatly since the late nineteenth century, and the pace of change seems to be accelerating.

According to Peter Drahos³ the history of intellectual property at the international level can be divided into three phases. The first is what he calls "the territorial period". This phase is characterised by an absence of international protection. The second phase – "the international period" – starts with the formation in the 1880s of unions of (at that time) mostly European countries for the protection of industrial property (the Paris Convention) and of literary and artistic works (the Berne Convention). The third phase is "the global period" which begins in 1994 with the conclusion of the Uruguay Round of trade negotiations and the signing of the TRIPS Agreement⁴, one of its main outcomes.

The evolution of developed country intellectual property right (IPR) regimes since the late nineteenth century has been characterised by three phenomena:

(1) The widening of protectable subject matter

Definitions of protectable subject matter have been widened. There has also been a tendency to reduce or eliminate explicit exceptions from patent legislation. Examples include the extension of copyright protection to computer programs as if they are literary works, the application of patent protection to cover genetically modified organisms and cloned genes, computer programs and business methods, and the removal of exclusions on product patents for drugs.

(2) The creation of new (sui generis) rights

Examples of *sui generis* systems created this century include plant variety rights, rights to layout-designs of integrated circuits, performers' rights, and protection of databases not protectable under copyright law.

(3) The progressive standardisation of the basic features of IPRs

For instance, patent regulations increasingly provide 20 year protection terms; require prior art searches and examinations for novelty, inventive step (or non-obviousness) and industrial application; assign rights to the first applicant rather than the first inventor; and provide protection for inventions in all industries and fields of technology.

Such fundamental developments in IPR law have virtually without exception emerged first in Europe or North America and then spread to other parts of the world. But even in these countries the above trends are mostly very recent. Most of the examples

given date back no further in time than the 1960s while some of these innovations go back only to the 1980s (e.g. the patenting of cloned genes). In the developing world, in contrast, there was little interest in expanding IPRs at least to anywhere near such an extent. With the coming into force of TRIPS in 1995 we can expect that this situation will change rapidly as the minimum standards of IPR protection established in this agreement become universal to the extent that all but a few countries will have to adopt such changes in their national laws within the next few years. As one would expect, the wisdom (or lack of it) of creating new rights and expanding existing rights into new subject matter is hotly debated within and outside the community of individuals and organisations conventionally engaged in intellectual property policy making and implementation. And with the recent globalisation of intellectual property regulatory standards heralded by TRIPS, IPRs have become an issue that the development community can no longer ignore. One of the problems is that policy formulation in this area is fraught with uncertainties and incomplete information. This is the case at both theoretical and practical levels. As the World Bank has acknowledged, for the developing countries especially there is a dearth of reliable research data to forecast accurately the development-related effects of strengthened IPR protection.

So at a time when the developed countries have achieved a global IPR regime in which minimum standards of protection are mandatory so their own firms can protect their 'information value-added' more and more widely, it becomes difficult to know what exactly are the implications for developing countries seeking ways to develop and/or acquire scientific and technological information for development. Should they simply imitate the national IPR regimes of developed countries as some of the latter nations and transnational corporations are pressuring them to do? Or should they be allowed the freedom to use their discretion even if this results in levels of protection deemed inadequate by many developed country governments and corporations? In considering these questions, we need to address three major gaps in the state of our knowledge. These are as follows:

1. The relationship between IPRs and such vital development matters such as direct foreign investment and the circulation *and affordability* in developing countries of important welfare-enhancing technologies and products such as medicines and educational materials is highly complex making it difficult to draw generally applicable conclusions.
2. It is generally accepted that the application of traditional knowledge and technologies can add value to the genetic resources that many developing countries are rich in. While patents are clearly unsuitable mechanisms to protect the rights of traditional knowledge holders, the use of other IPRs like trade secrets, plant variety rights and geographical indications may in some circumstances be feasible.⁵ However, this is an under-researched subject and very few experiments in applying IPRs to traditional knowledge and the products based up traditional knowledge are taking place.
3. For at least 60 years, economists have attempted to evaluate the economic efficiency of patent rights. Approaches adopted include estimating the optimal breadth of the rights granted; their duration; the extent to which patents induce increased R&D expenditure; and the welfare losses caused by the temporary monopolies provided. Although these

studies are useful⁶, none of them provides a trustworthy guide to the level of IPR protection that would be the most economically efficient or socially optimal for any legal jurisdiction, even less the world as a whole.^{7 8} With respect to plant breeders' rights, few of these kinds of economic analyses have been conducted at all, but a review by Godden⁹ suggests that "it is currently impossible to form a definitive judgement as to the net economic effects of PBRs, or similar methods of establishing intellectual property rights in plant varieties". Similarly, Vaver¹⁰ concludes that "[i]t seems impossible to argue that the current [IPR] laws encourage just the right amount of research, creativity and financing, and just in the right areas". This is important to bear in mind when pressure is placed on developing countries to introduce protection as strong as that of the developed countries.

Addressing such knowledge gaps and uncertainties requires us to confront some quite fundamental questions about IPRs, none of which have such self-evident answers as many advocates of universal IPRs would have us accept: Why do IPRs such as patents, copyrights and trademarks exist at all? Is the system we have the best possible system? If not, what would a best possible system actually look like? Can we assume that an IPR system that suits the United States is necessarily the most beneficial one for India or Kenya? Is an IPR system that satisfies the needs of Glaxo SmithKline an equally attractive one for a start-up biotech firm in Britain? What is a 'level playing field' in terms of access to and enforcement of legal protection of intellectual property rights? Satisfactory answers to these questions may still be beyond our grasp, yet policymaking in this area cannot wait. A survey of the literature directed at the task of assessing the state of the art should help considerably in terms of guiding informed policymaking until such time as definitive solutions are reached.

For much of the twentieth century the international IPR regime attracted little controversy. However, during the 1970s the United Nations Conference on Trade and Development (UNCTAD) provoked a debate on the development aspects of IPRs with some highly critical studies of the international system. Controversies over IPRs became especially intense again from the late 1980s to the present. This time participation in the debates has broadened considerably to include environment, development and human rights activists and non-governmental organisations on one side, and industrial associations and other groups propagandising in the opposite direction for stronger IPR protection.

Two recent closely-related developments were responsible for galvanising these increasingly heated debates.

First, the successful attempt of the United States – supported by the European Community and Japan – to place IPRs on the GATT Uruguay Round agenda created a backlash which has since resulted in a proliferation of critical studies. Some of these critiques highlight the inherently protectionist motivation for setting minimum IPR standards at a high level as compared to the majority of countries.¹¹ Others are motivated by concern for the environment¹²; the rights of indigenous peoples¹³; the general interests of the developing countries including issues such as economic development, technology transfer and direct foreign investment, prices of drugs and educational materials; food security and the rights of farmers¹⁴; and sometimes some or all of these.¹⁵ Much of this more recent literature shows that the existence of TRIPS requires developing country governments to establish

IPR regimes of a kind that many of these authors believe – with some considerable justification – to be inimical to their economic advancement.¹⁶ However, these debates are quite polarised and many of these works – though by no means all – take a black-and-white position lacking in objectivity and reliable evidence. Consequently, there is a need for further research to investigate the full extent of developing countries’ opportunities and constraints within the prevailing – and ever changing – IPR regime. Such a task could benefit enormously from – and may actually be dependent upon – a survey of the existing literature.

Second, the ‘patenting life’ controversy has, since the 1980s stimulated a growth of critical literature which focuses on a whole range of areas of concern (see Section 4 below).

As one might expect, this expanded interest in the subject of intellectual property rights is echoed in increased academic interest from researchers in disciplines which traditionally did not consider IPRs as being of relevance. So while the study of intellectual property was hitherto carried out almost exclusively in law and economics departments, the intellectual property literature has proliferated and expanded, attracting the interest of researchers in such fields as sociology¹⁷, anthropology and ethnobiology¹⁸, international relations and political science¹⁹, and moral and legal philosophy.²⁰ Therefore for a literature survey on IPRs to be at all comprehensive, a very wide net indeed needs to be cast.

The Literature Survey

Guide to the literature survey

The literature on intellectual property rights dates as far back as Adam Smith and beyond. Not surprisingly, then, the volume of literature on the subject that has accumulated over the years is immense, and a survey of this kind can only cover a small fraction of what actually exists.

The survey focuses on writings published since 1995. However, particularly significant earlier texts are also included. The references are arranged by the following subject areas:

1. General texts
2. Agricultural development and food security
3. Biodiversity and the environment
4. IPRs and biotechnology
5. IPRs, media and information technology
6. Human rights
7. Business and industrial development
8. The knowledge, innovations and practices of indigenous peoples and local communities
9. Public education
10. Public and private research capacity building
11. Public health
12. Technology transfer and direct foreign investment
13. Trade and competition
14. The TRIPS Agreement

It is not always easy to place works within these categories since many of the writings cover two or more topics. Indeed, many of the best writings are those having a broad scope. Key texts are marked with an asterisk. This does not signify that unmarked texts should be considered as being in some way inferior. Rather, for busy development practitioners and policy-makers who are unfamiliar with the subject of intellectual property rights, the most profitable return on a limited time investment is likely to be gained by focusing on those selected texts. It is worth pointing out that some of the most interesting studies on different aspects of intellectual property may be found in works that are not primarily about IPRs. A good example of this is the Braithwaite and Drahos volume (“General texts”).

Each section starts with an introduction, which provides some background, explains the key issues involved – with analysis where this might be helpful – and briefly reviews some of the most important writings. The observant reader will discover the seemingly arbitrary placement of certain writings that are listed in one section but referred to in another. This is probably unavoidable in a literature survey which stresses informativeness rather than a strict logical orderliness that is hardly attainable or even desirable with complex and multi-faceted topics like intellectual property rights and sustainable development. It will also be noticed that the quantity of references included in each section varies widely. In some

cases, this is a reflection of how long the topic in question has been written about and also how technical it is. Thus, the TRIPS section is fairly small, and most of the writings are by legal scholars. However, the controversial nature of some of the newer topics (e.g. traditional knowledge, biotechnology, and the environment) has attracted the attention of an extremely broad range of individuals and organisations, not just in the IPR 'heartlands' of Europe and North America, but in the other continents too. The result is a sudden proliferation of literature.

It should be stressed that this is a working draft. Readers are encouraged to submit, or suggest, additional literature to the Department for International Development for inclusion in a revised version.

1. General texts

These general texts are a mixture of textbooks, reference books and other publications that cross so many categories that it would be misleading to place them in any specific one. Almost certainly the finest textbook available on intellectual property rights is the Cornish book. It is a useful guide for lay readers and IPR specialists alike. The David article is a superb survey of the changing history of intellectual property rights since the fifteenth century as well as a review of the economic literature on IPRs. In spite of the breadth of coverage and depth of analysis, the article reminds us how little we actually know about the development effects of intellectual property rights, especially at the international level. The volume containing the David article includes several other useful papers and is recommended. The Drahos edited volume is an excellent anthology of journal articles published between 1962 and 1997.

The writings

Abbott, F., T. Cottier and F. Gurry (1999). The International Intellectual Property System: Commentary and Materials. The Hague, London and Boston, Kluwer Law International.

Voluminous (two volume) resource book set on the international IPR system. It provides an integrated perspective including history, economics and social implications and contains excerpts of articles by other authors, court cases and legal materials.

Boyle, J. (1996). Shamans, Software and Spleens: Law and the Social Construction of the Information Economy. Cambridge, Harvard University Press.

Author uses his legal background to construct a social theory of the information society. Central to the analysis is a critique of the notion of authorship upon which Western IPR are founded. This notion is blamed for the restriction of information and stifling of innovation under existing IPR regimes.

* Braithwaite, J. and P. Drahos (2000). Global Business Regulation. Cambridge, Cambridge University Press.

Based on interviews with 500 international leaders in business and government, this book examines the role played by global institutions such as the WTO, WHO, OECD, IMF as well as various NGOs and significant interviews, the authors develop a theory of globalisation that draws the links between key mechanisms, actors and principles. The authors cover a range of critical areas of regulation including contract, IPRs, trade and competition, drugs, food and environment.

* Cornish, W. R. (1999). Intellectual Property: Patents, Copyright, Trade Marks and Allied Rights. London, Sweet and Maxwell.

Definitive textbook on intellectual property rights. The new edition takes account of new developments in areas such as database protection rights, rights in performances, biotechnological patents, internet copyright, parallel importing and UK and EU trademark law.

* David, P. (1993). "Intellectual property institutions and the panda's thumb: patents, copyrights, and trade secrets in economic theory and history". Global Dimensions of Intellectual Property Rights in Science and Technology. M. B. Wallerstein, R. A. Schoen and M. E. Moge. Washington, DC, National Academy Press: 19-61.

A concise but thoroughly comprehensive overview of the history and economics of patents, copyrights and trade secrets. In conclusion the author argues that proposals to establish a uniform international regime of IPR protection are not practical, even though careful economic analysis would indicate that there may be considerably more points of agreement between the interests of the technologically advanced and the developing countries than has often been supposed.

Doern, G. B. (1999). Global Change and Intellectual Property Agencies. London and New York, Pinter.

This book examines changes in, and relationships among, four national and international intellectual property agencies: the patent offices of the USA, UK, Canada and Australia; the European Patent Office; and the World Intellectual Property Organization. The author traces institutional changes that have affected the core trade-off in IPR policy. These are examined in relation to two broad clusters of interests concerned with protection versus dissemination: the former dominated by big business and the IPR professions and the latter by much more dispersed interests.

Drahos, P. (1996). A Philosophy of Intellectual Property. Aldershot and Brookfield, Dartmouth.

Are IPRs like other property rights? More and more of the world's knowledge and information is under the control of IPR owners. What are the justifications for this? What are the implications for power and for justice of allowing this property form to range across life? Can we look to traditional property theory to supply the answers or do we need a new approach? The author addresses these questions and argues that what lies at the heart of intellectual property are duty-bearing privileges. We should adopt an instrumentalist approach to intellectual property and reject a proprietarian approach - an approach which emphasises the connection between labour and property rights.

* Drahos, P. (1997). "States and intellectual property: the past, the present and the future". From Berne to Geneva: Recent Developments in Copyright and Neighbouring Rights. D. Saunders and B. Sherman. Brisbane, Australian Key Centre for Cultural and Media Policy and Impart Corporation: 47-70. [<http://138.77.20.51/Impart/drahos.htm>]

Following a brief description of the history of the relationship between states on the issue of intellectual property (territorial, the international and the global periods), the author then identifies three types of consequences that flow from the globalisation of intellectual property rights: efficiency, distributive and sovereignty. The subsequent sections develop the onus argument that since the economic benefits of a global intellectual property regime are uncertain at best and there are some clear costs, the onus lies on those who wish to globalise the institutions of intellectual property to provide some evidence as to why this should be done. The author concludes by describing eight strategies for implementing the conclusion of the onus argument.

* Drahos, P. Ed. (1999). The International Library of Essays in Law and Legal Theory. Second Series: Intellectual Property. Aldershot, Dartmouth.

Multidisciplinary anthology of articles on intellectual property rights. The articles are arranged into six sections as follows: economics of intellectual property; the psychology of appropriation; intellectual property and liberalism; the international politics of intellectual property; intellectual property scepticism; and against intellectual property scepticism.

Kinsella, N. S. (1998). "Editorial: is intellectual property illegitimate?" Patent Bar Association Intellectual Property Law Newsletter 1(2): 3.

Patent lawyers take for granted the legitimacy of having a patent system, and intellectual property lawyers in general would probably be surprised to know that the legitimacy of IPR laws historically has been, and continues to be, the subject of some controversy, at least in theoretical or academic circles. The author reviews some of the historical and contemporary justifications for and criticisms of IPRs and argues that IPR lawyers should be prepared to question and reflect on these widely-held justifications.

Machlup, F. (1958). An Economic Review of the Patent System: Study of the Subcommittee on Patents, Trademarks and Copyrights of the Committee on the Judiciary, United States Eighty-fifth Congress, Second Senate. Washington DC, United States Senate.

Classic economic study on the patent system. The oft-cited conclusion continues to challenge IPR economists today: "no economist, on the basis of present knowledge, could possibly state with certainty that the patent system, as it now operates, confers a net benefit or a net loss upon society. The best he can do is state assumptions and make guesses about the extent to which reality corresponds to these assumptions".

May, C. (2000). A Global Economy of Intellectual Property Rights: The New Enclosures. London, Routledge.

This book considers the political construction of intellectual property at the

international level, and how it is linked to the economics of knowledge and information in the contemporary global political economy. It examines disputes about the ownership of knowledge resources - as in the cases of GM foods, the music industry and the Internet - and the problematic nature of the TRIPS Agreement. The author argues that solutions exist in the form of political moves to establish the social availability of information, and in reattaching property to the innovating individual. At present the balance in international IPRs between public good and private reward is more often than not weighted towards the latter.

Merges, R. P. (1996). Patent Law and Policy: Cases and Materials. Charlottesville, Va, Michie.

Fully comprehensive and voluminous (1,300 page) guide to patent law with emphasis on United States law. The book includes summaries and transcripts of important cases such as Diamond v Chakrabarty. The book analyses the basic concepts of patent law such as novelty, utility and enablement, and benefits from being a multidisciplinary work taking in history and economics as well as law.

Moore, A. D., Ed. (1997). Intellectual Property: Moral, Legal, and International Dilemmas. Lanham and Oxford, Rowman and Littlefield Publishers.

Anthology dealing with the ethical, philosophical, legal, and practical issues surrounding the ownership of intellectual property.

Samuelson, P. (1999). "Challenges for the World Intellectual Property Organization and the Trade-related Aspects of Intellectual Property Rights Council in regulating intellectual property rights in the information age." European Intellectual Property Review 21(11): 578-591.

WIPO and the TRIPS Council face considerable challenges. To surmount them, they must pay more attention to economic thinking, attain greater information about technologies, become receptive to new intellectual property paradigms, and recognise that intellectual property is a component of intellectual capital, not an end in itself.

Vaver, D. (1991). "Some agnostic observations on intellectual property." Intellectual Property Journal 6: 125-153.

The oft-made claim that intellectual property laws are socially and economically necessary to encourage individual creativity and innovation appears, on examination, to be long on assertion and short on proof. This article looks at the history and operation of the copyright and patent laws, noting their paradoxes, inconsistencies and shortcomings. It seeks to refocus inquiry about these laws, rejecting conclusory analyses based on the character of these laws as a form of property.

* Wallerstein, M. B., M. E. Mogee and R. A. Schoen, Eds. (1993). Global Dimensions of Intellectual Property Rights in Science and Technology. Washington DC, National Research Council.

A collection of papers which provide a multidisciplinary look at IPRs in an age of rapid growth in science and technology. The book offers an update on current international IPR negotiations and includes case studies on software, computer chips, optoelectronics, and biotechnology. The book also covers modern economic theory as a basis for approaching international IPRs; US intellectual property practices versus those in Japan, India, the European Community, and the developing and newly industrialising countries; trends in science and technology and how they affect IPRs; and the pros and cons of a uniform international IPR regime versus a system reflecting national differences.

Weil, V. and J. W. Snapper, Eds. (1989). Owning Scientific and Technical Information: Value and Ethical Issues. New Brunswick and London, Rutgers University Press.

Collection of 15 essays many of which are by eminent IPR scholars that survey the current IPR system in the United States. They describe several important historical precedents, explore ongoing controversies in computer science and biotechnology, and offer critiques of leading moral and legal theories about the ownership of knowledge.

* The World Bank (1999). World Development Report - Knowledge for Development. New York, Oxford University Press.

The report focuses on knowledge in the context of economic, social and cultural development. Chapter 2 (“Acquiring Knowledge”) argues that developing countries need not only to tap the global stock of knowledge but also to attract direct foreign investment and fund R&D aimed at adapting foreign technologies to local conditions. The chapter considers the pros and cons of strong IPR systems in pursuit of such aims.

World Intellectual Property Organization (1998). Intellectual Property Reading Material. Geneva, WIPO.

Guide to IPRs arranged according to seven chapters: Introduction; Fields of intellectual property protection; The role of intellectual property in development and WIPO’s development cooperation programme; Enforcement of IPRs; International treaties and conventions on intellectual property; Administration and teaching of intellectual property; and Technological and legal developments in intellectual property.

2. Agricultural development and food security

Various concerns have been raised about the effects of intellectual property rights on agriculture. These include the following fears: (a) that the whole world is interdependent in terms of crop germplasm and that while free circulation of breeding material is beneficial, IPRs, especially patents, take such material out of circulation; (b) that IPRs encourage the breeding of crops that are most potentially profitable but which may not be those preferred by or most beneficial for resource-poor developing country farmers and rural communities; (c) that IPRs encourage business consolidation leading to oligopolistic market structures; (d) that IPRs can sometimes result in the privatisation of the fruits of public sector agricultural research so that companies benefit unduly from research financed from the public purse; and (e) that IPRs incentivise the breeding of genetically-uniform varieties and monocultural agriculture. All of these fears have been debated, some for at least two decades, and the writings below cover the issues and the different stakeholder viewpoints.

It is noteworthy that the debate has broadened in the past few years to the extent that non-governmental development agencies (e.g. ActionAid and CIDSE) have added their critical voices to those of advocacy groups that have focused more specifically – and for much longer – on this area, such as Rural Advancement Foundation International and Genetic Resources Action International.

The two Crucible Group books are perhaps the most useful starting point since they are very concise and lay out the issues and various arguments in a balanced manner giving the readers the opportunity to make up their own minds. The Herdt article is extremely useful, presenting the views of a scientist working at the Rockefeller Foundation, a public institution closely associated with the Green Revolution and still a major agricultural research donor.

The writings

Barton, J. H. (1998). “Acquiring protection for improved germplasm and inbred lines”. Intellectual Property Rights in Agricultural Biotechnology. F. H. Erbisch and K. M. Maredia. Wallingford and London, CAB International: 19-30.

This chapter explores the IPR issues involved in traditional breeding and in moving from natural material to the improved lines that are marketed themselves or used as parents of a hybrid. The chapter begins with a review of access to unimproved germplasm and the implications of the Convention on Biological Diversity. It then considers relevant forms of IPR protection as applied in the USA. These include the plant variety protection system, the regular patent system and trade secrecy. The chapter concludes with a description of enforcement.

Barton, J. H. and W. E. Siebeck (1992). “Intellectual Property Issues for the International Agricultural Research Centres: What are the Options?” Issues in

Agriculture No. 4. Washington DC, Consultative Group on International Agricultural Research (CGIAR).

Contains recommendations to the IARCs in the context of the trend within the agricultural research community to protect intellectual property.

* Baxter, B., S. Mayer and A. Wijeratna (1999). "Crops and Robbers: Biopiracy and the Patenting of Staple Food Crops. Preliminary Findings of an ActionAid Investigation". London, ActionAid. [<http://www.actionaid.org>]

This paper shows that as a result of genetic engineering and a change in the world's patent regime, 'biopiracy' is taking place on staple food crops important to the South. Plant genetic material is moving into private ownership – against the wishes of many Southern countries. The world's agribusiness and biotechnology industry own most of the patents on staple food crops. Patents on rice, wheat, sorghum, cassava, maize, millet, potato, soybean and wheat are falling into company hands. The higher prices of patented seeds and accompanying royalties are likely to outweigh any possible benefits of GM plants to poor farmers. This raises questions for food security. Of grave concern to ActionAid is evidence that biotechnology patents are being granted which could allow companies based in the North to substitute crops grown in the South. With advances in mapping the 'genome' (or entire genetic code) of the world's staple food crops, this trend to patent is set to continue. We are in the midst of an explosion of activity in this area. Despite some work by the public sector, it is clear that private corporations are racing to complete the majority of this 'mapping'. Never in history has so much information about the genetic make-up of plants been available. If patents are granted on 'prize' genes from staple food crops, the losers are likely to be poor farmers in the South.

Bhat, M. G. (1996). "Trade-related intellectual property rights to biological resources: socioeconomic implications for developing countries." Ecological Economics 19: 205-17.

TRIPS has been denounced by developing countries, which have relied heavily on indigenous biotechnology from several decades in the area of high-yielding seeds, bio-pesticides and fertilisers, herbal medicines and household consumables. This study analyses the social, economic and preservation implications of TRIPS for biological resources. Establishing IPRs to products derived from genetic resources is necessary but not sufficient for bioprospecting and the long-term survival of these resources. Developing countries must also develop suitable institutions and policies governing the use of their resources and enabling local communities to receive benefits of biodiversity conservation and prospecting.

Buttel, F. H. and J. Belsky (1987). "Biotechnology, plant breeding, and intellectual property: social and ethical dimensions." Science, Technology, & Human Values 12(1): 31-49.

Provides an overview of the development of the seed industry in the USA,

particularly in relation to public plant breeding institutions that have both supported and competed with private sector efforts. Also discusses major types of IPR arrangements pertaining to private plant breeding and identifies several crucial issues in proprietary protection of plant breeding inventions.

* CIDSE International Cooperation for Development and Solidarity (2000). "Biopatenting and the Threat to Food Security - A Christian and Development Perspective". Brussels, CIDSE. [<http://www.cidse.org/pubs/tg1ppcon.htm>]

Half the world relies on a few basic crops for its food and over 830 million people go hungry every day. Taking this reality as its starting point, this report reflects on the impact of bio-patenting on food security for poor countries and communities. It argues that trade policy and food security are matters of justice and human rights, not just economics. Trade rules, especially those relating to IPRs, must be fair and equitable and must promote rather than hinder human development. The report raises concerns about the rise in monopoly power accompanying bio-patents which it is felt is more likely to stifle innovative approaches to the problem of world hunger than it is to provide a solution. The report sets out a series of recommendations for the European Union and the international community to ensure bio-patenting does not further impoverish the world's poor. At the same time it suggests a number of key changes to the structure of international trade relations and food security policies which would promote food for all in the early years of the 21st century.

Cleveland, D. A. and S. C. Murray (1997). "The world's crop genetic resources and the rights of indigenous farmers." Current Anthropology 38(4): 477-514.

Folk crop varieties developed over many generations by indigenous farmers are an important component of global crop genetic resources for use by both industrial and indigenous agriculture. Currently there is a debate between advocates of indigenous farmers' rights in their folk varieties and the dominant world system, which vests IPRs to crop genetic resources only in users of those resources for industrial agriculture. While indigenous peoples at the individual and group levels do have a broad range of IPRs in their folk varieties, they define and use them differently from the industrial world. Therefore industrial world IPRs are generally inappropriate for protecting the IPRs of indigenous farmers, but some could be used effectively. To meet indigenous farmers' need for protection, new approaches are being developed that embed indigenous farmers' rights in folk varieties in cultural, human, and environmental rights. More research on the cultural, social, and agronomic roles of folk varieties, ongoing negotiation of the meaning of key concepts such as 'crop genetic resources', 'rights', and 'indigenous', and an emphasis on a common goal of sustainability will help to resolve the debate.

Correa, C. M. (1994). "Sovereign and Property Rights over Plant Genetic Resources". Commission on Plant Genetic Resources Background Study Paper No. 2. Rome, Food

and Agriculture Organization.

Deals with the concept of sovereign rights and its application to plant genetic resources, particularly in the context of the IUPGR and the CBD; analyses the applicability and extent of IPRs over plant genetic resources; and discusses the so-called 'informal' innovations and the implementation of farmers' rights at the national and international level.

Correa, C. M. (1996). "Intellectual property rights and agriculture: strategies and policies for developing countries". Intellectual Property Rights and Agriculture in Developing Countries. J. Van Wijk and W. Jaffé. Amsterdam, University of Amsterdam: 100-113.

The paper deals first with the different IPRs that are relevant to agriculture. Second, it considers the relevance of such rights. It is suggested that the 'technological distance' and varying degrees of 'technical protection' explain to a great extent differences in the relative importance of IPRs in agriculture. Thirdly, the system of plant genetic resources is briefly described. The tension between conservation goals and the diffusion of modern varieties is addressed. Finally, the paper considers the requirements and difficulties in developing special IPRs to protect traditional varieties.

* Crucible Group (1994). People, Plants and Patents: The Impact of Intellectual Property on Trade, Plant Biodiversity, and Rural Society. Ottawa, International Development Research Centre.

Decisions about IPRs, particularly for plants, have major implications for food security, agriculture, rural development, and the environment for every country in the world. For the developing world in particular, the impact of IPRs on farmers, rural societies, and biodiversity will be profoundly important. In this fast-changing and politicised field, this book identifies and examines the major issues and the range of policy alternatives including consensus positions and the various conflicting viewpoints.

* Crucible Group II (2000). Seeding Solutions. Volume 1. Policy Options for Genetic Resources: People, Plants and Patents Revisited. Ottawa, Rome and Uppsala, International Development Research Centre, International Plant Genetic Resources Institute and Dag Hammarskjöld Foundation.

Volume I of Seeding Solutions brings readers up to date on what has changed, scientifically, politically and environmentally, since the first publication in 1994 of People, Plants, and Patents, the book that summarised the major issues related to the ownership, conservation and exchange of plant germplasm. Vol. 1 offers policymakers a clear description of the facts, the fights and the fora relevant to genetic resources. Volume II, which will be published in late 2000 will provide model legislation.

Dawkins, K. and S. Suppan (1996). "Sterile Fields: The Impacts of Intellectual Property Rights and Trade on Biodiversity and Food Security. With Case Studies from the

Philippines, Zimbabwe and Mexico”. Minnesota, US, Institute for Agriculture and Trade Policy.

Presents the negative impacts of IPRs and free trade on biodiversity and food security, concluding with a series of recommendations to respond to these conflicts. The paper contains reports on the present situation in three developing countries: the Philippines, Zimbabwe and Mexico.

Duvick, D. N. (1993). “Possible effects of intellectual property rights on erosion and conservation of plant genetic resources in centers of crop diversity”. International Crop Science I. D. R. Buxton, R. Shibles, R. A. Forsberg et al. Eds. Madison, WI, Crop Science Society of America.

Discusses the relationship between IPRs and erosion of genetic diversity by comparing the two kinds of plant breeding - by trained scientists and by traditional farmers. The latter make use of in field genetic diversity while the former depend on global exchange of genetic resources. Professional breeders supply farmers, not with internally variable varieties, but with variable arrays of uniform cultivars. Recently interest has grown in the fate of the small farmers in developing countries, and also on the fate of the banked germplasm collections.

* Fowler, C. (1994). Unnatural Science: Technology, Politics and Plant Evolution. Yverdon, Gordon and Breach.

Seeds and planting materials are central to the agricultural industry that feeds us all. Yet, until recently, there has been little interest in analysing the legal and political processes through which IPRs are constructed for these biological materials. Concentrating on the US experience, this book offers a comprehensive history and sociological analysis of the struggle to own and control biological materials from the 1800s, to the first patent law covering plant varieties, to current international controversies.

* Fowler, C. and P. Mooney (1990). The Threatened Gene: Food, Politics and the Loss of Genetic Diversity. Cambridge, Lutterworth Press.

Genetic erosion has very serious social effects, including mass starvation. Control over the gene pool is shifting from farmers to scientists and heads of industry, while political considerations determine agricultural policy with increasing frequency. The North is struggling with the South for control over plant genetic resources.

Frisvold, G. B. and P. T. Condon (1998). “The Convention on Biological Diversity and agriculture: implications and unresolved debates.” World Development 26(4): 551-570.

The CBD addresses two controversies that surround plant genetic resources. One debate has been over property rights governing PGRs and the distribution of benefits from their use. The second has been over the adequacy

of measures to maintain crop genetic diversity. This paper examines how these debates are linked and reviews multilateral attempts to address them.

Funder, J. (1999). "Rethinking patents for plant innovation." European Intellectual Property Review 21(11): 551-577.

In a recent case, the European Patent Office again tackled the exclusion of plant varieties from biotechnology patents. This article presents an alternative approach to understanding the subject matter of patents in general and plant appropriation in particular. Some of the biological and legal factors relevant to the scope of property rights for living organisms are also explored.

Gaia Foundation and Genetic Resources Action International (1998). "Ten Reasons not to join UPOV". Global Trade and Biodiversity in Conflict, Issue 2. London & Barcelona, Gaia Foundation & GRAIN. [<http://www.grain.org>]

Provides ten reasons why joining UPOV is contrary to the interests of developing countries and traditional communities.

Godden, D. (1987). "Plant Variety Rights: framework for evaluating recent research and continuing issues." Journal of Rural Studies 3(3): 255-272.

A review of the economic literature concerning Plant Variety Rights which pays particular attention to empirical evidence on the relationship between PVRs and (1) increasing plant yields; (2) the corporate structure of the plant breeding and seeds industries; and (3) the interaction between private breeders and the State. The author concludes that it is currently impossible to form a definitive judgement as to the net economic effects of PVR, or similar methods of establishing IPRs in plant varieties.

Hamilton, N. D. (1994). "Why own the farm if you can own the farmer (and the crop)?: contract production and intellectual property protection of grain crops." Nebraska Law Review 73: 48-103.

U.S. grain production is experiencing two key developments: (1) the trend towards use of contract production for grain; and (2) the connection between this and the protection of IPRs for seeds and plants. This article surveys the emerging legal issues associated with these two developments.

* Herdt, R. W. (1999). "Enclosing the global plant genetic commons". Paper prepared for delivery at the China Center for Economic Research, May 24.

Property rights are assured by the collective standing behind one's claim to the benefit stream generated by property. Changing technology and institutions have interacted throughout history to create property rights from what had previously been public goods. The discovery of knowledge about

DNA and the useful products that can be created through the applications of that knowledge has generated conditions that have led to intellectual private property claims on many new processes and products. Large multinational life science companies seeking to capitalise on these developments have purchased many heretofore independent seed companies, leading to a high level of concentration in the seed industry. These issues are treated differently in various countries and many developing countries have limited capacity to deal with them. Policies to address the challenges created by this set of events are outlined.

* Jaffé, W. and J. Van Wijk (1996). "The Impact of Plant Breeders' Rights in Developing Countries: Debate and Experience in Argentina, Chile, Colombia, Mexico and Uruguay". The Hague, Ministry of Foreign Affairs.

So far, empirical evidence of the socio-economic impact of IPRs in agriculture is almost non-existent. This study examines the expected impact of breeders' rights on developing countries with respect to: private investment in plant breeding, breeding policies of public institutes, transfer of foreign germplasm, and the diffusion of seed among farmers. Case studies were conducted in five Latin American countries and conclusions of the investigation are presented in this paper.

Kameri-Mbote, A. P. and P. Cullet (1999). "Agro-biodiversity and international law - a conceptual framework." Journal of Environmental Law 11(2): 257-279.

This paper lays out the international framework currently governing agro-biodiversity management which emphasises private property rights and thus provides incentives for the private sector to participate in agriculture. The authors argue that the attendant commercialisation of agriculture has failed to protect the rights of local farmers and generally not contributed to meeting the food needs of every human being. Moreover, it has contributed to the erosion of the genetic base necessary for the further development of agro-biodiversity. They contend that the legal framework can only foster the fulfilment of everyone's food needs if agro-biodiversity is recognised as a common heritage of humankind.

Kerr, W. A., J. E. Hobbs and R. Yampoin (1999). "Intellectual property protection, biotechnology and developing countries: will the TRIPS be effective?" AgBioForum 2(3 & 4): 203-211.

The international protection of IPRs has been a contentious issue between developed and developing countries. Protection of IPRs in agricultural biotechnology is the latest manifestation of the dispute with both developed and developing countries accusing each other of piracy. TRIPS was only grudgingly agreed to by developing countries at the Uruguay Round. The WTO allows trade retaliation to be used for violations of TRIPS commitments. The paper investigates the likely efficacy of trade measures in encouraging countries to live up to their TRIPS commitments. The results suggest that

developed countries will not receive the protection they desire and, hence, there may be a mutual interest in re-opening negotiations related to patenting genetic material.

* Kloppenburg, J., Jr. (1988). First the Seed: The Political Economy of Plant Biotechnology. Cambridge, Cambridge University Press.

The emergence of the new biotechnologies and of large corporations that produce both seeds and chemicals for the agriculture industry is a significant recent phenomenon. In spite of their dependence on the plant genetic resources of the South, the economic and political power of these corporations and of Northern governments has ensured that they continue to enjoy free access to these resources.

Lehmann, V. (1998). "Patent on seed sterility threatens seed saving". Biotechnology and Development Monitor 35: 6-8. [<http://www.pscw.uva.nl/monitor>]

A patent recently granted on a technology which produces sterile seeds has revived the discussion on the consequences of in-built biological protection against seed saving. Seed companies see this as an incentive to develop new varieties. But what will be the consequences for farmers in developing countries if they cannot re-use their harvest as seed material?

* Lele, U., W. Lesser and G. Horstkotte-Wesseler (2000). "Intellectual Property Rights in Agriculture: The World Bank's Role in Assisting Borrower and Member Countries". Environmentally and Socially Sustainable Development series. Washington DC, The World Bank.

Papers from a workshop held in June 1998 on IPRs and agriculture, and the possible role that the World Bank might play in assisting developing countries. It includes perspectives from the International Agricultural Research Centres, industry, and national systems and universities.

* Leskien, D. and M. Flitner (1997). "Intellectual Property Rights and Plant Genetic Resources: Options for a *Sui Generis* System". Issues in Genetic Resources No. 6. Rome, International Plant Genetic Resources Institute.

This study aims at the development and evaluation of elements for inclusion in a sui generis system for the protection of plant varieties as permitted by the TRIPS Agreement. The report studies the legal obligations posed by TRIPS in relation to plant genetic resources, and analyses the status of plant genetic resources under the existing international regulatory framework, in particular the CBD. The study gives an overview of and discusses possible elements for recognition of Farmers's Rights, which, if included in a protection system for plant varieties, may reconcile the interests of formal breeders with the rights and interests of informal breeders. There is a broad range of possible TRIPS-compatible sui generis systems. These should be explored and discussed before ready-made protection systems currently being used in many

industrialised countries are adopted.

Lesser, W. (1997). "Assessing the implications of intellectual property rights on plant and animal agriculture." American Journal of Agricultural Economics 79(5): 1584-1591.

The author starts by noting that little economic research has to date been completed on the implications of expanding IPR protection for living agricultural inputs. What has been explored extensively, though, are expressed concerns about IPRs on farm structure, ethics, university/industry relationships, information exchange, and related matters. In concluding, the author finds surprisingly limited analysis of the effects of IPRs on R&D investment. But what exists supports the expectations that protection encourages private investment in developed economies, especially for easily copied products such as living plants and animals. But the situation appears less well documented for developing economies, where access seems a more significant issue than investment. In any case, attempts to identify an optimal IPR system are apparently of little practical use.

Lesser, W. (1998). Sustainable Use of Genetic Resources Under the Convention on Biological Diversity: Exploring Access and Benefit Sharing Issues. Wallingford, CAB International.

While only limited progress has been made in applying the CBD, countries are acting unilaterally on the placement of genetic resources as their sovereign right to exploit. This book focuses on the presentation of legal and economic issues regarding the sustainable use and transfer of genetic resources and associated technologies, identifying steps that can be taken and their expected consequences.

Mooney, P. R. (1996). "The Parts of Life: Agricultural Biodiversity, Indigenous Knowledge, and the Role of the Third System". Development Dialogue. Special Issue (1996:1-2). Uppsala, Dag Hammarskjold Foundation. [<http://www.rafi.org>]

Describes the debates at FAO in the early 1980s resulting in the creation of the Commission and the IUPGR, and the discussions of the Keystone Dialogue Series on Plant Genetic Resources. The author comments on the process leading to, and the outcome of, the 1996 Leipzig conference on plant genetic resources, the CBD Conference of the Parties, and the 1996 World Food Summit. He explains the need to reform the CGIAR system, comparing the official view with those who maintain that food security means supporting local farmers in pursuing their practices and technologies within their own development framework. He discusses the commercial prospecting of other genetic resources to develop new products, including human genes. Linked to this is the growing concentration of capital and power among corporations in the area of food security and biodiversity. Finally, he discusses the roles of the different actors and particularly those of civil society organisations (the Third System).

Perrin, R. K. (1999). "Intellectual property rights and developing country agriculture." Agricultural Economics 21: 221-229.

Theoretical studies indicate that the welfare of the developing countries might either be improved or damaged by strengthening of their own IPRs. Net gains through their agricultural sectors will be positive if the payoff from new innovations is sufficiently different as compared to the technology-importing countries. Scattered evidence supports the hypothesis that agricultural R&D is responsive to IPRs in developing countries, but there is also evidence that developed-country technology is sufficiently appropriate for developing countries to offer substantial free-rider gains. However, without IPRs it seems unlikely that the agricultural productivity rates in developing countries can begin to catch up with those in developed country agriculture.

Rangnekar, D. (1996). "GATT, Intellectual Property Rights, and the Seed Industry: Some Unsolved Problems". Kingston upon Thames, Surrey, Kingston University - Faculty of Human Sciences. Economics Discussion Paper 96/5.

Reflects on recent changes for the international protection of IPRs achieved through GATT. Specific aspects of the global harmonisation of domestic regimes of protection are identified. These substantive changes contrast with general presumptions of theoretical economics on IPRs. Through a survey of economic literature on this subject, the paper concludes that the achievements at GATT are not supported by theory. Emphasis is given to the subject of plant variety protection.

Santaniello, V., R. E. Evenson, D. Zilberman and G. A. Carlson (2000). Agriculture and Intellectual Property Rights: Economic, Institutional and Implementation Issues in Biotechnology. Wallingford, CAB International.

Collection of papers by agricultural economists and policymakers providing a range of perspectives on agro-biotechnology, plant breeding, IPRs and their interrelationships.

Suppan, S. (1998). "Biotechnology's Takeover of the Seed Industry". Minneapolis, Institute for Agriculture and Trade Policy.

Describes the growing dominance of the global seed industry by a small number of life-science corporations such as Monsanto. In spite of the optimistic claims of such companies, there is little discussion of how the application of agricultural biotechnology to agricultural trade policy's emphasis on monoculture production will reverse the loss of plant diversity essential for reinvigorating plant breeding programmes.

* Tansey, G. (1999). Trade, Intellectual Property, Food and Biodiversity: Key Issues and Options for the 1999 Review of Article 27.3(b) of the TRIPS Agreement. London, Quaker Peace and Service. [<http://www.zen.co.uk/home/page/g.tansey/trips-col.pdf>]

This paper draws on various perspectives presented in the literature on IPRs, food, farming, biodiversity, TRIPS and related agreements. It aims to highlight the policy questions for developing countries by TRIPS Article 27.3(b); examines the key ethical, economic, environment and social issues surrounding its provisions; and considers the possible contributions of overseas development assistance.

Tripp, R. and Byerlee, D. (2000). "Public plant breeding in an era of privatisation". Natural Resource Perspectives No. 57. London, Overseas Development Institute. [<http://www.odi.org.uk/nrp/index.html>]

Both agricultural research and national seed systems are undergoing increasing privatisation. Although there are a number of possibilities for making public agricultural research more efficient and better able to interact with the private sector, the major opportunities are in plant breeding. This paper examines the possibilities and limitations associated with revenue generation through public plant breeding; the opportunities for moving the products of public plant breeding through the private sector; and the need for increased contacts with, and contributions from, private research.

van Wijk, J. (1996). "How does stronger protection of intellectual property rights affect seed supply? early evidence of impact". Natural Resource Perspectives No. 13. London, Overseas Development Institute. [<http://www.odi.org.uk/nrp/index.html>]

A study on the relationships between stronger IPR protection in developing countries and seed supply, which finds that stronger plant-related IPR protection has apparently not increased the diversity of plant material available to farmers or enhanced the rate of innovation in plant breeding. Although evidence suggests a strong likelihood that flows of improved genetic material will increase in line with stronger protection, the author predicts that while commercial farmers might benefit from this, middle and lower income farmers will not because of likely restrictions on seed saving and exchange.

3. Biodiversity and the environment

The debate on IPRs and the environment is one that is generally characterised by more heat than light. There are really three sets of questions that ought to be addressed to focus the debate constructively:²¹

1. Do intellectual property rights encourage the spread of monocultural agriculture consisting of genetically-uniform varieties? And if so, does this cause erosion of biodiversity?
2. Is the increasing production and sale of seed-agrochemical ‘packages’ (such as transgenic crops sold with pesticides and/or herbicides for which they have built-in resistance) harmful to biodiversity? And if so, are IPRs an inducement for companies to produce these kinds of ‘package’? In other words, is this an IPR issue at all?
3. Do IPRs conflict with certain provisions and objectives of the Convention on Biological Diversity such as national sovereignty, benefit sharing, technology transfer, and the interests of holders of traditional knowledge?

Taking the first set of questions, one of the most plausible criticisms of IPRs is that they encourage centralised research. According to Walter Reid, the prevailing policy framework for the use of genetic resources for food and agriculture favours “centralised crop breeding and the creation of uniform environmental conditions, and discourages agro-ecological research or local breeding tailored to local conditions.” IPRs enhance incentives to develop seeds that will have a large potential demand. To ensure maximum demand for their products, the seed companies will tend to focus their research on commonly utilised high-value crops and develop varieties that can be cultivated as widely as possible. To do so means either breeding through selection of genes for maximum adaptability, or introducing the new seeds while also promoting farming practices that reduce environmental heterogeneity. The biodiversity-erosive effects of this IPR-supported bias towards centralised crop breeding programmes are: (i) decreased crop diversity; (ii) decreased spatial genetic diversity; (iii) increased temporal genetic diversity²²; and (iv) increased use of external inputs.

Dwijen Rangnekar has sought to push the discussion forward by taking a historical/institutional analysis of the relationship between plant breeders’ rights and genetic uniformity. He reaches the interesting conclusion that such IPRs *do* in fact incentivise plant breeding based upon existing material already in scientific use, while providing “juridical legitimisation to the breeding of genetically uniform varieties”.

But it is important to point out that *if* a monocultural system produces higher yields per harvest and/or more harvests per year compared to a more polycultural agro-ecosystem it replaced, pressure to open up biodiverse ecosystems to cultivation *may* be reduced as a consequence.

With respect to the second set of questions, the hybrids and other modern varieties developed by seed companies often depend upon applications of agrochemicals to achieve high yields. A common accusation is that excessive use of these chemicals is encouraged and other plants growing nearby are killed as a result. It is also said that

increased use of hybrids and other modern varieties *specifically designed* for use with other proprietary agricultural inputs such as fertilisers and pesticides may have serious social impacts, especially in developing countries. These crop-herbicide-pesticide linkages can be considered to represent a shift towards capital intensive agriculture that increases the costs of farming and may therefore be detrimental to small farmers, especially those in developing countries.

It is important to point out though that this trend in crop breeding dates back to when the Green Revolution began, and earlier still in some countries. The varieties most commonly associated with the Green Revolution were developed by public crop breeding institutions, not corporations. On the face of it, this suggests that this may not be an IPR-related problem at all.

However, a negative IPR link may be quite strong in the case of genetically modified crops. In recent years, life-science corporations (often originally chemical companies that have bought seed companies) have increasingly been creating transgenic plants with built-in resistance either to herbicides marketed by the same company or to insect pests. In the former case, *both* the herbicide and the seed for which it is designed are likely to be patent-protected. These corporations argue that without patents they would have no incentive to create or market such products.

According to critics including a number of scientists, genetically-engineered herbicide resistance has some serious negative environmental effects. Among the claims commonly made are that use of herbicide-resistant transgenic plants may: (a) encourage excessive use of herbicides which may kill other plant varieties and species; (b) accelerate the development of resistance among pests; and (c) create the possibility of herbicide resistant genes crossing over to other plants including the weeds being targeted. This could create 'superweeds' which would render the herbicide ineffective in the long term, and cause ecological impacts that cannot easily be predicted. It may also be possible that transgenic plants themselves could become 'weeds' if the added characteristic gives them a competitive advantage over neighbouring wild species, though this seems unlikely in the case of the most highly domesticated crop species.

A more indirect way that IPRs may encourage such allegedly environmentally-unfriendly R&D is that IPRs are sometimes said to stimulate industrial restructuring in ways that make such R&D more attractive to industry than it would otherwise be.²³

As regards the Convention on Biological Diversity, the technology transfer issue is part of a much wider controversy about intellectual property rights that the writings in Section 12 should help shed light upon, while literature pertaining to the traditional knowledge issue is provided in Section 8. But what appears to be true is that conflicts between the CBD and IPRs as far as they exist are mostly likely to be revealed as the relevant policies and laws are put into effect than in the specific provisions of such agreements as the CBD and TRIPS etc. Debates on the CBD/TRIPS relationship have taken place at the inter-governmental level under the auspices of both the World Trade Organization and the Conference of the Parties to the CBD ever since TRIPS came into force in 1995 (see SCBD and WTO papers below).

The writings

Atkinson, N. and B. Sherman (1991). "Intellectual property and environmental protection." European Intellectual Property Review (5): 165-170.

With the enactment of the UK Environmental Protection Act, the themes of IPRs and environmental protection find themselves in a close association. This paper explores the relationship between these hitherto separate spheres and suggests that one should at least begin to question the appropriateness and relevance of the ideas and assumptions of patent law formed a century or more ago to the modern world. The Act may well provide the impetus for a re-examination and ultimate improvement in the ideas and principles which have, on the whole, served so well.

Biber-Klemm, S. Ed. (1998). Legal Claims to Biogenetic Resources: Proceedings of the International Workshop. National Research Program 42: Foreign Policy. Berne, Swiss National Science Foundation.

Proceedings of a workshop that sought to contribute to the evolution of the Swiss position vis-à-vis the CBD. In view of the re-negotiation of Article 27.3b of TRIPS, which offers the opportunity to create a new (sui generis) system for the protection of plant varieties, the discussions and presentation focused on the question as to whether IPRs are an adequate instrument to secure traditional resource rights. Speakers represented industry, government, NGOs, and academe.

Bragdon, S. H. and D. R. Downes (1998). "Recent Policy Trends and Developments Related to the Conservation, Use and Development of Genetic Resources". Issues in Genetic Resources No. 7. Rome, International Plant Genetic Resources Institute.

The erosion of genetic resources continues at an alarming pace. Simultaneously, technologies which develop and make use of these resources outpace the ability of laws and societies to understand and cope with them. Spurred by technological advances, appreciation of the monetary and non-monetary value of genetic resources has grown, leading to increasing conflict over rights and responsibilities for these resources. Developments in international and national law and policy over the past 5 years have significantly changed the policy environment relating to the management and control of genetic resources. The task of discerning all the issues of relevance to the conservation and management of genetic resources and then integrating them into consistent policy is extremely complex. This paper analyses developments in the past 5 years, identifying cross-cutting issues and trends that have emerged including farmers' rights and interests of indigenous and local communities, benefit-sharing, access to genetic resources, patenting and industry trends, and sui generis protection of plant varieties.

Cameron, J. and Z. Makuch (1995). "The UN Biodiversity Convention and the WTO

TRIPS Agreement: Recommendations to Avoid Conflict and Promote Sustainable Development”. Gland, World Wide Fund For Nature.

Negotiation of the CBD took place with little discussion of linkages to GATT-TRIPS. The authors analyse the relationship and potential conflicts between these two agreements and make recommendations to defuse any such conflicts and ensure that the objectives of the CBD are not undermined by TRIPS.

Cosbey, A. (1996). “The Sustainable Development Effects of the WTO TRIPS Agreement: A Focus on Developing Countries”. Winnipeg, International Institute for Sustainable Development.

This paper examines the TRIPS Agreement and analyses those areas in which the Agreement will impact on sustainable development in developing countries such as Pakistan. Sustainable development, throughout the paper, embraces the fundamentally interrelated concerns of environment, development and economy. After brief introductions to the Agreement itself, and to the concept of IPRs, the paper examines the possible effects of the Agreement, focusing on agriculture, manufacturing and copyrighted goods. It ends by proposing a number of policy actions which might contribute to sustainable development in the context of the Agreement, and suggesting ways to interpret provisions to developing countries’ advantage.

Costa e Silva, E. da (1996). “Biodiversity-Related Aspects of Intellectual Property Rights”. UNU/IAS Working Paper. Tokyo, United Nations University.

Reviews legal developments internationally and in Brazil relating to biodiversity conservation and IPRs. One of the greatest challenges the international community faces is to determine a balance between the common interests of biodiversity conservation and the private interest related to the activities of industries which use biodiversity resources as a main source of materials. This balance is hard to achieve. An IPR framework must consider the particular characteristics of access to genetic resources, technology transfer agreements, biotechnology and the protection of traditional knowledge and practices.

Duessing, J. H. (1996). “The role of intellectual property rights in the exploitation of plant genetic resources and for technology transfer under the Convention on Biological Diversity”. Valuing Local Knowledge: Indigenous Peoples and Intellectual Property Rights. S. B. Brush and D. Stabinsky. Covelo, CA, Island Press.

Analyses CBD from pro-business perspective. National sovereignty is now a kind of property right, but it does not adequately protect a biological resource once it leaves the legal domain or control of a culture (for example through the CGIAR system). This makes it difficult to implement important parts of the convention. Standardised international IPRs with acceptance of national sovereignty over genetic resources points to a solution.

Dutfield, G. (1997). "Can the TRIPS Agreement protect biological and cultural diversity?" Biopolicy International No. 19. Nairobi, African Centre for Technology Studies.

According to the author criticism of TRIPS is fully justified. However, creative interpretations of TRIPS that comply with its requirements but also address issues outside the remit of the WTO, such as protecting traditional knowledge and supporting the aims of the CBD, are not precluded. Neither is the development of laws that go beyond the agreement's requirements. While acknowledging that TRIPS contains no panaceas whatsoever for communities whose basic human rights are being abused, this paper seeks to fill a gap in the critical literature by considering options that TRIPS allows for laws that protect traditional knowledge while addressing the 'biodiversity-related aspects of intellectual property rights'.

Dutfield, G. (1999). "Sharing the benefits of biodiversity: access regimes and intellectual property rights". Science, Technology and Development Discussion Paper No. 6. Cambridge, Center for International Development and Belfer Center for Science and International Affairs, Harvard University. [<http://www.cid.harvard.edu/cidbiotech>]

Two types of legal regime have emerged to regulate the allocative aspects of the trade in biogenetic resources and products derived from them: access and benefit sharing laws and IPRs. This paper describes both, but IPRs are emphasised because: (1) the acquisition by firms of patent and plant variety right portfolios appears to influence the unequal allocations of benefits obtained from industrial use of biogenetic resources; (2) the number of countries allowing strong IPR protection for life-science products and technologies is increasing rapidly. The effect may be to reinforce this asymmetry of benefit allocations; (3) patents and plant breeders' rights have been accused of encouraging biodiversity-erosive breeding and cultivation practices; and (4) just as inappropriate IPRs may harm the interests of developing countries, well-designed IPR systems could conceivably be highly beneficial, helping such countries to add value to their biogenetic wealth. Unfortunately, the global IPR system has become increasingly inflexible in recent years, reducing such opportunities for developing countries.

* Dutfield, G. (2000). Intellectual Property Rights, Trade and Biodiversity: Seeds and Plant Varieties. London, Earthscan and IUCN.

Plant genetic resources are crucial for world agriculture, food security and the global economy. They are vital for the pharmaceutical industry and important assets of biodiversity-rich developing countries. The patents and intellectual property rights IPRs associated with the development of new products are critical to trade in these resources. This book examines the relevant international agreements: the CBD, TRIPS and the UPOV Convention. It provides an account of how to integrate the requirements of the CBD into an equitable global IPR regime, taking into account ethical concerns, environmental and social impacts, technology transfer and traditional knowledge.

Gaia Foundation and Genetic Resources Action International (1998). "TRIPS versus CBD: conflicts between the WTO regime of intellectual property rights and sustainable biodiversity management". *Global Trade and Biodiversity in Conflict*, Issue 1. London & Barcelona, Gaia Foundation and GRAIN. [<http://www.grain.org>]

Because TRIPS and the CBD embody and promote conflicting objectives, systems of rights and obligations, many states are questioning which treaty takes precedence over the other. It is argued that the CBD has primacy over the WTO in the areas of biodiversity and traditional knowledge, that the review of TRIPS allows states to exclude all life forms and related knowledge from IPR systems, and that the a priori collective rights of indigenous peoples and local communities over their biodiversity and related knowledge must be recognised.

Hoagland, K. E. and A. Y. Rossman, Eds. (1997). Global Genetic Resources: Access, Ownership, and Intellectual Property Rights. Washington DC, Association of Systematics Collections.

Collection of papers from a conference that aimed to explore issues related to ownership of and access to genetic resources and biological specimens. The volume examines the current status of the various treaties, national laws, and agreements in effect around the world; presents case studies that demonstrate how research using international resources benefits the global community; explores models of equitable use of genetic resources; and discusses potential solutions to develop a mutually beneficial compromise for the equitable use of genetic resources.

Johnston, S. with F. Yamin (1997). "Intellectual property rights and access to genetic resources". Access to Genetic Resources: Strategies for Sharing Benefits. J. Mugabe, C. V. Barber, G. Henne, L. Glowka and A. La Viña. Nairobi, ACTS Press: 245-269.

Discussion of IPRs in the context of the CBD. Problems with conventional IPRs are identified and options for a sui generis IPR system are considered.

McAfee, K. (1999). "Selling nature to save it? biodiversity and green developmentalism." Environment and Planning D: Society and Space 17: 133-154.

New institutions like the CBD and the 'green' World Bank reflect attempts to regulate international flows of 'natural capital' by means of an approach the author calls 'green developmentalism' underpinned by a post-neoliberal environmental-economic paradigm, according to which nature is constructed as a world currency and ecosystems are recoded as warehouses of genetic resources for biotechnology industries. The author critiques and condemns this new paradigm.

McManis, C. R. (1998). "The interface between international intellectual property and

environmental protection: biodiversity and biotechnology.” Washington University Law Quarterly 76: 255.

The debate over TRIPS and the CBD has exposed a series of fault lines dividing technology-rich industrialised countries located in the temperate zone of the Northern Hemisphere, and the biodiversity-rich developing countries located primarily in the tropics and Southern Hemisphere. This Article describes two of the most visible North-South conflicts, and examines the treaty provisions that have given rise to these conflicts and the two specific issues that are at their root. It concludes with a more cooperative vision of the interface between international IPR and environmental protection.

* Rangnekar, D. (2000). “Plant Breeding, Biodiversity Loss and Intellectual Property Rights”. Kingston upon Thames, Surrey, Kingston University - Faculty of Human Sciences. Economics Discussion Paper 00/5.

There is a general perception that modern agroecosystems have a negative biodiversity impact. The adverse implications are a reflection of modern varieties being bred from a narrow circle of parental genetic material and of the high level of genetic uniformity of the varieties. The paper historically examines the breeding of genetically uniform varieties. Institutional factors, like IPRs, that reinforce the bias towards genetic uniformity are also examined. The paper concludes that the system of IPRs was developed in a specific manner to provide juridical legitimisation to the breeding of genetically uniform varieties.

* Reid, W. V. (1992) “Genetic resources and sustainable agriculture: creating incentives for local innovation and adaptation”. Biopolicy International No. 2. Nairobi and Maastricht, African Centre for Technology Studies.

Current policy regimes fail to promote local innovation or provide incentives for the upstream exploration of potential values of genetic resources. Changes will require acceptance by all countries of new ownership regimes for genetic resources. It is argued that the only lasting solutions to maintaining the genetic resources base of agriculture are in situ conservation, recognition of local and national ownership of genetic resources, and research and investment aimed at informal innovation.

* Secretariat of the Convention on Biological Diversity (1996). “The impact of intellectual property rights systems on the conservation and sustainable use of biological diversity and on the equitable sharing of benefits from its use: a preliminary study”. Note by the Executive Secretary for the Conference of the Parties to the Convention on Biological Diversity, Third Meeting. Buenos Aires, Argentina. 4 to 15 November 1996. Item 14.1 of the provisional agenda. Montreal, CBD Secretariat. [<http://www.biodiv.org>]

Provides a preliminary review of the impact of IPR systems on the conservation and sustainable use of biodiversity and on the equitable sharing of benefits from its use. The paper reviews the range of viewpoints that have been expressed on the issue and provides examples of recent policy proposals.

Secretariat of the Convention on Biological Diversity (1996). "The Convention on Biological Diversity and the Agreement on Trade-Related Intellectual Property Rights: relationships and synergies". For the Conference of the Parties to the Convention on Biological Diversity, Third Meeting. Buenos Aires, Argentina. 4 to 15 November 1996. Item 14 of the provisional agenda. Montreal, CBD Secretariat. [<http://www.biodiv.org>]

Reviews relationships and synergies between the CBD and TRIPS, and concludes with a list of options for future work.

Subramanian, A. (1992). "Genetic resources, biodiversity and environmental protection: an analysis, and proposals towards a solution." Journal of World Trade 26: 105-109.

Genetic resources have the property that access to one unit is sufficient for the purpose of propagating millions of copies of them. This leads to market failure with potentially significant consequences for environmental protection. A solution to correcting this market is proposed which consists of the grant of a new property right (genetic resource right) akin to and inspired by IPRs. The solution has the attractions of addressing the problem of forest degradation, of being a market-based solution and of providing a simple means of securing international cooperation which would not necessarily rely on public financial transfers.

Swanson, T., Ed. (1995). Intellectual Property Rights and Biodiversity Conservation: An Interdisciplinary Analysis of the Values of Medicinal Plants. Cambridge, Cambridge University Press.

Provides a detailed analysis of the economic and scientific rationales for biodiversity conservation. It discusses the justification for, and implementation of, IPR regimes as incentive systems to encourage conservation. An interdisciplinary approach is used, encompassing fields of study that include evolutionary biology, chemistry, economics and legal studies. The arguments are presented using the case study of the use of medicinal plants in the pharmaceutical industry.

Swanson, T. (1995). "The appropriation of evolution's values: an institutional analysis of intellectual property regimes and biodiversity conservation". Intellectual Property Rights and Biodiversity Conservation: An Interdisciplinary Analysis of the Values of Medicinal Plants. T. Swanson. Cambridge, Cambridge University Press: 141-175.

Explains how the decline of biodiversity has been generated by the human development process; categorises the opportunity costs of such development, i.e. the values of biodiversity; and demonstrates the nature of the institution required to bring these values into the calculus. It is essential to invest in a diversity of institutions in order to capture the values of biodiversity.

Tarasofsky, R. (1997). "The relationship between the TRIPs Agreement and the Convention on Biological Diversity: towards a pragmatic approach." Review of European

Community and International Environmental Law 6(2): 148-156.

The connection between the CBD and the TRIPS Agreement is the subject of considerable rhetoric and political controversy. This article explores the issues, proposes strategies to harmonise the objectives of the two agreements, and suggests that the legal regimes governing IPRs may need to be changed.

Tobin, B. (1997). "Certificates of origin: a role for IPR regimes in securing prior informed consent". Access to Genetic Resources: Strategies for Sharing Benefits. J. Mugabe, C. V. Barber, G. Henne, L. Glowka and A. La Viña. Nairobi, ACTS Press: 329-340.

Proposes a multilateral certificates of origin system linked to patent rights as a means of securing prior informed consent. Such a system, it is asserted, might be of greater benefit to developing countries and their people than an access/benefit sharing regime, which might diminish interest in bioprospecting.

Walden, I. (1995). "Preserving biodiversity: the role of property rights". Intellectual Property Rights and Biodiversity Conservation: An Interdisciplinary Analysis of the Values of Medicinal Plants. T. Swanson. Cambridge, Cambridge University Press: 176-197.

Considers the use of property law to protect the commercial exploitation of genetic material in naturally occurring biota. Attention is then given to the extent to which IPRs are currently being used by the biotechnology industry to protect their research investments. The final section reviews some of the issues underlying the creation of some form of sui generis property right in such genetic material.

World Trade Organization - Committee on Trade and Environment (1996). "Environment and TRIPS". (WT/CTE/W/8). Geneva, WTO. [<http://www.wto.org>]

A background document to assist the CTE in its work dealing with TRIPS. It assesses the links between environmental concerns and IPRs by considering the relevant features of the CBD. The paper then provides a negotiating history of the CBD, especially Article 16. It continues by summarising relevant ongoing work in other international organisations which, with the CBD, indicate the IPR issues that have been raised as having a link with environment. Relevant TRIPS provisions are presented, GATT exemptions are considered, and the paper ends with a note on the UPOV Convention.

World Trade Organization - Committee on Trade and Environment (1996). "Report of the WTO Committee on Trade and Environment". (Press/TE 014). Geneva, WTO. [<http://www.wto.org>]

Report on discussions that took place during the year's CTE meetings covering all ten agenda items, of which Item 8 is on the relevant provisions of TRIPS. Under this Item, issues discussed included the relationship of TRIPS to: the environment generally; the generation of, access to and transfer of environmentally-sound technology; environmentally-unsound technologies;

indigenous and traditional knowledge; and the CBD.

World Trade Organization - Committee on Trade and Environment (1999). "The relationship between the Convention on Biological Diversity (CBD) and the Agreement on the Trade-related Aspects of Intellectual Property Rights (TRIPS); with a focus on Article 27.3 (b) - Background Note by the Secretariat". (WT/CTE/W/125). Geneva, WTO. [<http://www.wto.org>]

This paper was prepared in response to a request by the Committee on Trade and Environment for a factual paper on the relationship between the CBD and TRIPS, in particular with respect to Article 27.3(b). It is divided into four sections: Section 1 provides an overview of existing international instruments relevant to plant variety protection; Section 2 introduces the information provided by some WTO Members to the TRIPS Council on their sui generis systems; Section 3 presents three country studies on the implementation of sui generis systems based on the International Convention for the Protection of New Varieties of Plants (UPOV Convention); and Section 4 presents examples of legislation enacted to implement the CBD.

Yamin, F. (1995). "The Biodiversity Convention and Intellectual Property Rights". Gland, Switzerland, World Wide Fund for Nature.

Examines the link between IPRs and the CBD. The author proposes recommendations for the CBD to ensure that such rights are supportive of and do not run counter to the objectives of the Convention.

4. IPRs and biotechnology

Although it was not the beginning of so-called ‘patenting life’²⁴ the celebrated Diamond versus Chakrabarty case at the U.S. Supreme Court in 1980 concerning the patentability of an oil-eating microbe set an important precedent in the direction of increased patent protection of biotechnological inventions.

Five years later, the way was opened in that country for the patenting of plants.²⁵ By 1988 42 patents on crop plants had been issued.²⁶

In 1987, a ruling concerning a patent on polyploid oysters established that multicellular organisms were patentable. Soon after, the United States Patent and Trademark Office publicly announced that it was willing to consider applications for “nonnaturally occurring nonhuman multicellular living organisms, including animals”. The following year, the first ever animal patent, the notorious ‘oncomouse’, was granted.²⁷

The United States was no pioneer when it came to the patenting of micro-organisms or plants²⁸, but it was first routinely to grant patents on these types of organism. The USA was very much a pioneer in the patenting of DNA sequences. According to Herdt, the US Patent and Trademark Office began to receive a huge increase in applications on DNA sequences, from 4,000 in 1991 to 500,000 in 1996, putting tremendous strain on the patent examination system. In Europe attempts to patent life-forms aroused a great deal more sustained opposition. The oncomouse patent there was eventually granted by the EPO but only after earlier rejection on the grounds of being for an animal *variety*. In making its decision the Examining Division was instructed by the Technical Board of Appeal to weigh up the benefits of the invention against the suffering caused to the animal. This case aroused determined opposition from environmental and animal welfare groups.

Conforming to long established European practice, the European Patent Convention expressly excludes plant *varieties* from patentability.²⁹ What does this imply for the patentability of transgenic plants? In 1995 a ruling of the European Patent Office Technical Board of Appeal³⁰ determined that a claim for plant cells *contained in a plant* is unpatentable since it does not exclude plant varieties from its scope. This implied that transgenic plants *per se* were not patentable because of this plant variety exclusion. However, this was overturned by a December 1999 decision of the Enlarged Board of Appeal which determined that “a claim wherein specific plant varieties are not individually claimed is not excluded from patentability under Article 53(b), EPC *even though it may embrace plant varieties*” [emphasis added].

In 1989, the European Commission, concerned about the legal uncertainties which, it was felt, could be prejudicial to the future of biotechnology in Europe, and fearing that some European countries might respond to mounting controversy by banning patents on living organisms and genes, drafted a Directive on the Legal Protection of Biotechnological Inventions. The aim was essentially to harmonise patent law relating to biotechnology around high minimum standards, while preventing member states from ‘backsliding’. However, it took nine years for the Directive to be approved by the European Parliament and to enter into force. Opposition came from within the Parliament (especially from the Greens), and outside from several environmental, development, and anti-genetic

engineering NGOs, and even a number of national governments such as the Netherlands which is still opposed to the Directive.

Concerns about 'patenting life' tend to revolve around the following issues:

- The moral significance of assigning property rights over life-forms.³¹
- The way that these patents challenge such fundamental considerations as description, disclosure, repeatability and exhaustion of rights, and appear in some cases to render the invention/discovery distinction meaningless.³² In these ways, it is sometimes suggested, they may even be subverting the patent system from within.
- The possibility that such patents may sometimes harm research when overly broad 'species-wide' patent claims are allowed³³, biotechnology research tools such as gene sequences³⁴ are protected, and openly collaborative inter-organisational research is replaced by rivalry, secrecy and lack of trust.
- That allowing 'life-form' patents supports the practice of 'biopiracy' in which traditional knowledge and genetic resources taken from developing countries become 'owned' by corporations.³⁵
- That patents on plants infringe the basic right of farmers to save and exchange harvested seed.³⁶

On the other hand, pharmaceutical, agribusiness, and biotech firms argue that without the exclusivity afforded by patent rights they would have no incentive to make the tremendous investments they must commit to in order to develop new products, including compliance with product regulations (especially stringent in the case of new drugs). For the smaller start-up firms the possession of patent portfolios enables them to attract investment funds and to collaborate with the larger firms.

The writings below comprise a broad spectrum of views on the highly controversial (and fast-moving) topic of intellectual property rights and biotechnology. Ironically, it is some of the older publications that are the most interesting and helpful.³⁷ Ducor and Grubb are both highly technical and should probably be read after looking at these earlier and more general works. The Sterckx collection of papers is useful in that it comprehensively covers all the issues and contains an extremely broad range of perspectives.

The writings

Barton, J. H. (1993). "Adapting the intellectual property system to new technologies". Global Dimensions of Intellectual Property Rights in Science and Technology. M. B. Wallerstein, R. A. Schoen and M. E. Moge. Washington, DC, National Academy Press: 256-283.

This chapter examines whether the intellectual property system is able to adapt to the current rate of change of technology. It uses as examples biotechnology, computer software, and computer-maintained and searched databases. The author describes the new issues posed by these technologies,

reviews the approaches taken to adapt the IPR system in each case, and evaluates the performance of this adaptation process by looking at three levels: (1) the mechanisms for developing doctrine; (2) the systems that grant IPRs; and (3) the formal systems (primarily courts) and informal systems (e.g. cross-licenses) that enforce IPRs and shape their practical economic implementation.

*Barton, J. H. (1991). "Patenting life". Scientific American. 264: 40-46.

Entrepreneurs can now legally protect any novel plant, animal or micro-organism they 'invent'. However, the courts have not yet settled many questions about the reach of biotechnology patents.

BioIndustry Association (1996). "Innovation from Nature: The Protection of Inventions in Biology". London, BioIndustry Association.

This report contains contributions that set out the important issues in the patenting of biotechnological inventions. The publication is intended to contribute to an informed discussion of the ethics and regulation of biotechnology, with particular reference to the forthcoming debate in Europe on the new Directive for the Legal Protection of Biotechnological Inventions. The report was prepared by the BioIndustry Association's Intellectual Property Advisory Committee.

Busch, L. (1995). "Eight reasons why patents should not be extended to plants and animals." Biotechnology and Development Monitor 24: 24. [<http://www.pscw.uva.nl/monitor>]

Biotechnology industry interests normally call for an extension of patents to plants and animals as a requirement to stimulate investments in biotechnological research, and to insure the wide distribution of the benefits from such research. The author, on the other hand questions whether such an extension will serve this purpose. If IPRs must be extended to living organisms, he argues, another legal form would be needed.

Crespi, S. (1995). "Biotechnology patenting: the wicked animal must defend itself." European Intellectual Property Review 9: 431-441.

Vigorous defence of biotechnology patents. The author dismisses the objections to such patents, such as ethics and morality, and argues that 'patenting life' is a meaningless slogan.

Dronamraju, K. R. (1999). Biological and Social Issues in Biotechnology Sharing. Aldershot, Ashgate.

A comprehensive summary of both the global and institutional issues involved in biotechnology sharing. The book covers IPRs and the patenting of new

discoveries in genetic knowledge in both agriculture and the human genome. Specific issues covered in the book include the creation of public and private DNA sequencing databases; the North-South dimension of biotechnology sharing; and the exploitation and erosion of biodiversity.

Ducor, P. G. (1998). Patenting the Recombinant Products of Biotechnology and Other Molecules. London, The Hague, Boston, Kluwer Law International.

Examines the requirements for patentability in the biotech context, with a special focus on non-obviousness. The book closes by considering broader issues such as the growing secrecy in basic science.

Gaia Foundation (1997). Raiding the Future: Patent Truth or Patent Lies. London, Gaia Foundation.

Comprehensive collection of documents critical of the patenting of life-forms.

Gannon, P., T. Guthrie and G. Laurie (1995). "Patents, morality and DNA: should there be intellectual property protection of the Human Genome Project?" Medical Law International 1: 321-345.

Examines the appropriateness of using existing patent laws in an effort to secure protection of the work being carried out on the Human Genome Project. Certain ethical and practical problems are explored. It is submitted that it might be appropriate to consider alternative means of rewarding those involved in unravelling human DNA. An attempt is made to outline some appropriate matters to consider in developing such an alternative.

Gollin, M. A. (1993). "An intellectual property rights framework for biodiversity prospecting". Biodiversity Prospecting. W. V. Reid, S. A. Laird, C. A. Meyer et al. Washington DC, WRI, INBio, Rainforest Alliance, ACTS: 159-197.

Outlines how IPRs can be applied to the new technologies, commercial practices and ethical standards of bioprospecting and discusses the merits of creating new bioprospecting rights. IPR laws are no panacea without the harmonisation of intellectual property, environmental protection, and commercial laws. The various IPR types are explained and analysed.

Grubb, P. W. (1999). Patents for Chemicals, Pharmaceuticals and Biotechnology. Oxford, Clarendon Press.

Provides a comprehensive description of the techniques and industry know-how that underlie successful patent practice and portfolio management in the fields of chemicals, pharmaceuticals and biotechnology.

*Llewelyn, M. (2000). "The patentability of biological material: continuing contradiction and confusion." European Intellectual Property Review 22(5): 191-197.

The public distancing of bioscience companies from the image of corporate concerns taking precedence over public and environmental safety has meant a renewed focus on more traditional methods of producing new plant varieties. There is a clear need, if the bioscience industry is to survive, for it to regain public confidence as well as that of the marketplace. One of the key factors in this lack of confidence is the insistence on patent protection for all aspects of genetic research. The need to reclaim confidence cannot and should not be simply seen in terms of human genetic research, but also in respect of all bioscience. The failure within Europe to reach agreement on the issue of the provision of patent protection for genetic material should serve as evidence that it is time for those who have sought to gain acceptance of the patent system as an appropriate means of protecting biological material to admit defeat. While the exclusions remain they leave the system open to abuse through encouraging legal sleight of hand. It is time for the situation to be clarified. In respect of plants this could be achieved either by removing the exclusion or by banning patent protection for all plant material leaving the plant variety right as the sole means of protection.

McNally, R. and P. Wheale (1996). "Biopatenting and biodiversity: comparative advantages in the new global order." The Ecologist 26(5): 222-228.

Over the last two decades, the biotechnology industry has been stretching the interpretation of patent law in order to obtain IPRs over genetically engineered living organisms. Such patent rights, coupled with moves to gain exclusive access to the biodiversity of the South, are leading to a new global order. Opposition to such 'biotechnological imperialism' is gaining in momentum.

Moufang, R. (1998). "The concept of 'ordre public' and morality in patent law". Octrooirecht, Ethiek en Biotechnologie/Patent Law, Ethics and Biotechnology/Droit des Brevets, Ethique et Biotechnologie. G. v. Overwalle. Brussels, Bruylant: 65-77.

Argues that patent law is not ethically neutral. The moral foundations of patent law largely depend on the values of technical progress and free market economy since the primary task of patent law is to protect technical innovation by exclusive property rights. Considerations based on ethical arguments pervade the entire normative structure of the patent system and play an important role in its further development.

Overwalle, G. v., Ed. (1998). Octrooirecht, Ethiek en Biotechnologie/Patent Law, Ethics and Biotechnology/Droit des Brevets, Ethique et Biotechnologie. Brussels, Bruylant.

Collection of papers by lawyers, academics and ethicists considering the ethical dimensions of patent law with respect to biotechnological inventions.

Purdue, D. (1995). "Hegemonic trips: world trade, intellectual property and biodiversity." Environmental Politics 4(1): 88-107.

This article argues that the attempt to establish uniform global IPRs over living material is a hegemonic project driven by the biotechnology industry with its complex articulations of molecular biology, agrochemical transnational corporations and state intervention.

Rai, A.K. (1999). "Intellectual property rights in biotechnology: addressing new technology". Wake Forest Law Review 34: 827-847.

The author raises various issues about the application of existing IPRs to new technological fields with particular reference to biotechnology.

Scalise, D. G. and D. Nugent (1995). "International intellectual property protection for living matter: biotechnology, multinational conventions and the exception for agriculture." Case Western Reserve Journal of International Law 27: 83-118.

The authors argue that TRIPS, the CBD and UPOV are all failed opportunities as far as the US biotech industry is concerned. If the international community desires an equitable sharing of wealth and technology with developing nations, it should not use the mechanism of IPR conventions to achieve that goal. Forcing the financial burden on the biotech industry - in the sense of requiring these firms to seek patent protection in every country and being unable to do so in countries where biotech inventions are not allowed - creates a disincentive to future investment and consequently sacrifices the progress of technology. Instead, the authors propose a UN-supervised fund to support technology-sharing and the promotion of agreements like the one between INBio and Merck.

*Sterckx, S., Ed. (1997). Biotechnology, Morality and Patents. Aldershot, Ashgate.

Documents an international workshop held in January 1996 on the ethical aspects of the patenting of biotechnological inventions. The book includes contributions from Greenpeace and animal welfare societies, geneticists, moral philosophers, patent lawyers and politicians from European countries and the USA. The general public perception of biotechnology is discussed and how these perceptions relate to ethical, social and cultural factors. The legal framework is laid out by several experts in the field of patent law and the situation in the U.S. is also described. Attention is focused on the European Commission's Directive on the legal protection of biotechnological inventions.

Sung, L. M. and D. J. Pelto (1998). "The biotechnology patent landscape in the United States as we enter the new millennium." Journal of World Intellectual Property 1(6): 889-901.

While still in its infancy, relative to most other technical disciplines, biotechnology has progressed at a pace that has already outstripped the ability of the U.S. legal system to cope. Even so, the authors argue that patent coverage per se, even to basic research tools, does not impede technological advance on a practical level. The patenting of newer applications, such as

bioinformatics, is likely to proceed undaunted as biotechnology industry members continue to hedge their infringement liability risks by shoring up defensive patent portfolios.

*United States Congress – Office of Technology Assessment (1989). New Developments in Biotechnology: Patenting Life – Special Report. Washington DC, U.S. Government Printing Office. [http://www.wws.princeton.edu/~ota/ns20/pubs_f.html]

This report reviews US patent law as it relates to the patentability of micro-organisms, cells, plants, and animals; as well as specific areas of concern, including deposit requirements and international considerations. The report includes a range of options for congressional action related to the patenting of animals, intellectual property protection for plants, and enablement of patents involving biological material.

Wells, A. J. (1994). “Patenting life forms: an ecological perspective.” European Intellectual Property Review 3: 111-118.

Far from being an inappropriate place for the consideration of ethical and moral issues, patent regimes have continually been used explicitly to make moral value judgements. The ideology of development and technocentricity embodied in the patent system has allowed patent systems to grant patents for new life forms, despite many calls by the broader community for limits to this extension. The ecological implications of allowing these patents are numerous. The author argues that the patent application mechanism should be opened up to a broad range of community views.

* Winter, G. (1992). “Patent law policy in biotechnology.” Journal of Environmental Law 4(2): 167-187.

Examines the logic of patenting life-forms which is found to be faulty in certain respects. The author explains why interests favouring the expansion of patent law into biotechnological products were successful.

5. IPRs, media and information technology

Apart from biotechnology, the other technological field in which tremendous advances have been achieved in a very short time – and almost simultaneously – is in electronic information-processing and communication. Like biotechnology, information technology has multiple industrial applications, and businesses involved in such sectors as computers, telecommunications, entertainment, financial services and retailing, have become major users and/or developers of these technologies. Just like the biotechnology, agribusiness and pharmaceutical concerns, corporations that develop information technology components, products and services, or the technologies themselves, as well as those corporations which use these in the development of their own products and find that these technologies make mass-copying quick and inexpensive, routinely seek IPR protection so as to maximise returns from their often enormous research and product development investments.

While there is nothing new in patenting telecommunications technologies or copyrighting books and motion pictures, the IT revolution has pushed the boundaries of the IPR system in a number of different ways. Thus, software programs are copyrightable. Though it can be argued that computer programs are in essence a long sequence of binary-coded instructions to a computer, copyright law nowadays treats them as if they are literary works. In the United States, programs are now patentable. In Europe officially they are not though some commentators believe that they can be depending upon how patent claims and specifications are drawn up. The semi-conductor manufacturers came up with a different approach. They deemed existing IPRs to be unsuitable for the protection of their chip designs and successfully lobbied for a *sui generis* system, first in the United States and now globally through the TRIPS Agreement.

As for digital information generally, views on the applicability of IPRs vary from the opinion of those who believe that IPRs are inapplicable and others believe that IPRs have evolved over time and that it is nothing new for them to accommodate new technologies even while there may be problems at first. Among the former are radicals (e.g. former rock musician John Perry Barlow) who believe that “information wants to be free”, and that attempting to use them only holds up technological development while intruding on freedom of expression. Many, if not most, others hold to a view somewhere in between (e.g. McManis and Samuelson).

Although the writings below are rather small in number, these issues come up in numerous publications included in other sections, such as the Boyle, Weil and Snapper, and Wallerstein *et al* volumes (Section 1).

The writings

Barlow, J. P. (1994). “The economy of ideas: everything you know about intellectual property is wrong”. *Wired* March [also in Moore, A. D. (1997): 349-371].

The author explains why copyright is inapplicable to protection of digital information. Among the reasons given are that copyright makes no

accommodation for expressions that do not become fixed, that develop cumulatively and that may lack a specific author, and that it is not completely enforceable anyway.

Bettig, R. V. (1996). Copyrighting Culture: The Political Economy of Intellectual Property. Boulder and Oxford, Westview Press.

Radical study of copyright law and the media. Beginning with a critical interpretation of copyright history in the USA, the author goes on to explore such issues as the videocassette recorder and the control of copyrights, the invention of cable television and the first challenge to the filmed entertainment copyright system, the politics and economics of intellectual property as seen from both the neoclassical economists' and radical political economists' points of view, and methods of resisting existing laws.

Boyle, J. (1997) "A politics of intellectual property: environmentalism for the Net?" Duke Law Journal 47: 87-116. [<http://www.james-boyle.com>]

This article argues that we need a politics, or perhaps a political economy, of intellectual property. Using the controversy over copyright on the Internet as a case-study and the history of the environmental movement as a comparison, it offers a couple of proposals about what such a politics might look like – what theoretical ideas it might draw upon and what constituencies it might unite. The author fears that the present IPR regime inter alia could: (a) lead to extraordinary monopoly and concentration in the software industry, as copyright and patent trump antitrust/ competition policy; (b) "privatise" words, or aspects of images or texts that are currently in the public domain, to the detriment of public debate, education, equal access to information and the like; and (c) impose a pay-as-you-read architecture on the Internet without considering some of the costs resulting from that decision.

* McManis, C. R. (1996). "Taking TRIPS on the information superhighway: international intellectual property protection and emerging computer technology." Villanova Law Review 41(1): 207-288.

The author concludes that the one genuinely new international IPR issue posed by digital technology and the emerging global information superhighway is how to enforce territorially-limited IPRs in what is rapidly becoming an integrated global economy. The emergence of digital technology and global computer networks is rapidly undermining the whole concept of territorially-limited IPRs, and, to a certain extent, the concept of intellectual property itself.

* Samuelson, P. (1993). "A case study on computer programs". Global Dimensions of Intellectual Property Rights in Science and Technology. M. B. Wallerstein, R. A. Schoen and M. E. Moge. Washington, DC, National Academy Press: 284-318.

Balanced historical and contemporary analysis of the pros and cons of IPR

protection of software programs in the United States, Europe and Japan.

Thurow, L. (1997). "Needed: a new system of intellectual property rights." Harvard Business Review (September-October): 93-103.

Argues that fundamental shifts in technology and in the economic landscape are rapidly making the current system of IPRs unworkable and ineffective. Designed more than 100 years ago to meet the simpler needs of an industrial era, it is an undifferentiated one-size-fits-all system. Moreover the global IPR regime does not reflect the interests of Third World countries since every country that has caught up with more technologically advanced countries has done so by copying.

6. Human rights

What do intellectual property rights have to do with human rights? There are two ways in which IPRs may be said to be a human rights issue. The first is the notion, supported by international human rights law, that the right to own intellectual property *is* a human right. The Universal Declaration of Human Rights and the International Covenant on Economic, Social and Cultural Rights both proclaim the right of everyone “to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author.” Nevertheless, intellectual property right laws are most commonly framed and justified as economic rights that serve the public interest. Even, so moral rights (the so called rights of paternity and integrity) are incorporated in many countries’ copyright laws.

Rosemary Coombe has gone so far as to argue that international customary law has moved towards the position that indigenous peoples’ rights over their knowledge is a human right. This is not an argument that corporations can so easily take advantage of. Although inventors are always named in patent applications, it is generally the case that employees’ patents are assigned to the companies they work for. It makes no sense to say a corporation is entitled to IPRs on human rights grounds since it is a juridical person legally separate from the people who work for it or own it.

The other way to frame IPRs as a human right issue is far more negative. An argument can be made that if, for example, patents make essential drugs more expensive than they would otherwise be and that access to affordable healthcare is a human right, then patent law that allows the patenting of drug products and diagnostic kits may contravene human rights. A similar argument can be propounded with respect to IPR protection of seeds of staple crops and perhaps even school textbooks in developing countries with miniscule public education budgets.

The writings

* Aoki, K. (1998). “Neocolonialism, anticommons property, and biopiracy in the (not-so-brave) new world order of international intellectual property protection.” Indiana Journal of Global Legal Studies 6(1): 59-115. [<http://www.law.indiana.edu/glsj/vol6/no1/aoki.html>]

The author raises issues about the emerging globalised vision of IPR protection embedded in multilateral agreements such as TRIPS. In particular, there are serious distributive questions about the international political economy of intellectual property protection that should be addressed. Additionally, the question of constructing and maintaining an intellectual public domain or commons remains extremely important, if only because the unprecedented grab by IPR owners of the developed nations seems to be imminent. This grabbing obscures traditional understanding that IPR law is about striking a balance between the rights of authors and inventors and the public of consumers and users as well as the fact that all IPR owners are also users. The final issue is the massive and generally uncompensated flow of

cultural and biological resources out of the developing nations into the laboratories, universities, and factories of the developed countries.

* Coombe, R. J. (1998). "Intellectual property, human rights and sovereignty: new dilemmas in international law posed by the recognition of indigenous knowledge and the conservation of biodiversity." Indiana Journal of Global Legal Studies 6(1): 59-115. [<http://www.law.indiana.edu/glsj/vol6/no1/coom.html>]

The author situates intellectual property in the human rights framework and considers some of the challenges that full recognition of intellectual property as a human right would pose. Conflicts over the meaning and location of culture create fundamental ambiguities with respect to the scope of IPR protections. The author examines recent controversies over the use of IPRs to protect traditional knowledge and as a means to implement provisions of the CBD to illustrate the point and demonstrate the limitations of traditional understandings of sovereignty. The recognition of IPRs as human rights entails a renewed concern for social justice issues in an era of so-called global harmonisation of intellectual property protections that further challenges our considerations of sovereignty.

Gana, R. L. (1996). "The myth of development, the progress of rights: human rights to intellectual property and development." Law and Policy 18(3 & 4): 315-354.

The recognition of IPRs in the Universal Declaration of Human Rights legitimised the efforts of developed countries and international institutions to encourage developing countries to recognise IPRs and to join the international IPR system. But after three decades of experimenting with Western-style IPR laws and an inordinate emphasis on technology from developed countries as an agent of development, Africa remains mired in underdevelopment. The author argues that the human right to intellectual property must be understood in context with the right to development and self-determination. Such an approach would delegitimise the myth of a universally valid IPR system and protect the right of developing countries to establish IPR regimes that reflect their unique socio-economic and cultural norms and that are consistent with development objectives.

* World Intellectual Property Organization, Ed. (1999). Intellectual Property and Human Rights. Geneva, WIPO.

Proceedings of a panel discussion organised by WIPO in collaboration with UNCHR to commemorate the 50th anniversary of the Universal Declaration of Human Rights. Contributors include Peter Drahos, Christine Steiner, Silvia Salazar, John Mugabe, Audrey Chapman and Silke von Lewinski.

7. Business and industrial development

Under this category are two kinds of writing. The first examines the ways that businesses actually use intellectual property rights. The second type of work seeks to discover whether IPRs actually stimulate industrial development.

How does economic theory explain why businesses use IPRs? And is this explanation realistic? With respect to patents, the conventional interpretation of the modern patent system since the nineteenth century in economics is as a regulatory response to the failure of the free market to achieve optimal resource allocation for invention. According to Geroski³⁸:

patents are designed to create a market for knowledge by assigning propriety rights to innovators which enable them to overcome the problem of non-excludability while, at the same time, encouraging the maximum diffusion of knowledge by making it public.

The assumption behind such a view is that valuable knowledge is essentially a public good; that is to say it is characterised by non-rivalry and non-excludability. Moreover, the holder of such knowledge can demonstrate its value only by revealing it, yet in doing so he or she can no longer control access to it and thereby capture all of its value. So by providing temporary *legal* monopolies – which may or may not translate into *market* monopolies – for inventions, patents may stimulate greater investment in inventive activity and very probably do in some industrial sectors at least (especially pharmaceuticals).³⁹

But patent monopolies are not the only possible means of achieving excludability, and patent specifications may not be efficient mediums for diffusing knowledge anyway.⁴⁰ Moreover, patents may be used to block equally legitimate attempts by rivals to achieve excludability for *their* inventions. Such arguably anticompetitive practices are described (approvingly) by Rivette and Kline. ‘Clustering’ means “building a patent wall around a product”, preferably consisting of a large quantity of interlocking patents. ‘Bracketing’ means surrounding a competitor’s key patent with so many of one’s own that that it cannot be commercialised. A fairly obvious inference is that patent law is open to abuse. A less obvious one, though, is that the award of a patent is a state-sanctioned grant of a property right, and as with all such grants affects the interests and opportunity sets of others.

Paul Doremus of the U.S. Department of Commerce gives support to the view that IPRs are regulatory institutions that clearly affect the opportunity sets and freedoms of right and non-right holders, and are thus bound to be the focus of interest group competition when reforms are being considered:

IPR ... are a form of *adversarial regulation*. IPR rules distribute costs and capabilities among competing groups that are in a zero-sum relationship (as opposed to policies that regulate individuals or groups for their own individual or collective benefit) [emphasis added].

It is important to make clear that intangible property is different from tangible property in at least one important respect. As Peter Drahos⁴¹ has observed “abstract objects have no

natural boundaries”. In the case of patents one consequence is that transaction costs of defining and enforcing the rights are potentially very high. Another is that claims within a patent are very likely to overlap with those in others held by competitors. The scope of a patent is determined through an examination by trained specialists and, in some cases, also by litigation. The high costs involved mean that the system is more accessible to larger companies. This situation may also encourage free-riding by such firms since they may find that they can infringe the property rights of smaller firms, independent inventors and, for example, indigenous peoples safe in the knowledge that these other parties lack the economic muscle to mount an effective challenge. Moreover, one can surmise that other opportunistic behaviours will be encouraged. Possible examples include: speculative accusations of patent infringement made by large companies to intimidate smaller firms; excessively broad patent claims in the hope that at least some of these will slip through the examination system and be allowed; and the ‘bracketing’ and ‘blocking’ strategies described above. With respect to plant breeders’ rights, considering the less rigorous novelty criterion compared to patents, and the fact that there is no prior art search, it is highly probable that on occasions certificates are awarded for what are really landraces or varieties which result merely from ‘cleaning’ a landrace.⁴² And trademarks may be awarded for what are commonly used words and expressions that could not possibly have been coined or first applied by the owner.

Turning to the second type of work, Siebeck *et al* is a good review of the economic literature which concludes cautiously concerning the effects of strengthened IPRs on developing countries, highlighting the dearth of evidence so far. Ten years later its caution still seems to be realistic. The more recent World Bank, UNDP and UNCTAD⁴³ reports contain sophisticated analyses of the international IPR regime in terms of how far it supports or hinders development of industry and advanced technology in developing countries. The fact that the World Bank and UNDP are now examining the real costs and benefits for developing countries of implementing TRIPS in their most widely disseminated publications is indicative not only of genuine concern within these particular agencies but also a growing acceptance among many of the member governments of legitimate reasons to question whether what is good for Pfizer and Microsoft in the IPR sphere is necessarily good for the world.

The writings

Doremus, P. N. (1996). “The externalization of domestic regulation: intellectual property rights reform in a global era”. Indiana Journal of Global Legal Studies 3(2). [<http://www.law.indiana.edu/glsj/vol3/no2/doremus.html>]

IPR issues in the software, biotechnology, and semiconductor industries exemplify the pressure that new technologies and international competition are placing on domestic and international regulatory systems. Traditional IPR rules cannot easily accommodate any of these technologies. At the same time, the high costs of R&D, relative ease of replication, and global markets characteristic of these technologies heighten the importance of both domestic and foreign IPR protection. In the context of rapidly changing technological conditions, borderless

markets, and inflexible international regimes, national policymakers face a political dilemma: how to accommodate new technologies at home, encourage similar accommodation abroad, and do both without undermining either long-standing domestic IPR arrangements or the international patent and copyright regimes. This article reviews the different strategies of externalization associated with IPR reform in the software, biotechnology, and semiconductor industries.

Gerster, R. (1998). "Patents and development: a non-governmental organization view prior to revision of the TRIPS Agreement." Journal of World Intellectual Property 1(4): 605-619.

The author uses a historical approach to argue against any moves to strengthen the global IPR regime through a revision of TRIPS. He notes for example, that Switzerland industrialised in the absence of a patent system, and that the victory of interest groups favouring patents in nineteenth century Europe was actually a victory for protectionists, not free traders.

* Primo Braga, C. A., C. Fink and C. P. Sepulveda (2000). "Intellectual Property Rights and Economic Development". World Bank Discussion Paper No. 412. Washington DC, The World Bank.

Over the past decade, the protection of IPR has undergone tremendous changes - fostered on the one hand by a widening of the range of products and technologies covered by proprietary rights, and on the other hand by policy shifts that have initiated a move towards globally harmonised standards of protection. This discussion paper reviews these changes and their implications for developing countries. It briefly outlines the main IPR instruments, the institutions that govern IPRs at the national and international levels, and the importance of IPRs in various economic activities. Based on this review, the paper explores approaches to IPR reforms in developing countries. The authors conclude that recent changes in the IPR field pose significant challenges to the developing world. At the same time, developing countries can enhance the benefits of recent policy changes by establishing an effective institutional framework for IPRs. Assistance from industrialised countries and multilateral organisations can make important contributions in this regard.

Rivette, K. G. and D. Kline (2000). Rembrandts in the Attic: Unlocking the Hidden Value of Patents. Boston, Harvard Business School Press.

Provides a business strategy for how companies can unlock the enormous financial and competitive power hidden in their patent portfolios.

* Siebeck, W. E., with R. E. Evenson, W. Lesser and C. A. Primo Braga (1990). "Strengthening Protection of Intellectual Property in Developing Countries: A Survey of the Literature". World Bank Discussion Paper No. 112. Washington DC, The World Bank.

Will developing countries benefit economically from strengthening their protection of intellectual property? In search of the answer to this question the authors review a substantial body of economic literature, theoretical and

empirical, covering the economics of patents and other IPRs. The vast majority of studies to date have focused on industrial economies. This body of research suggests that increases in IPR protection generate R&D activity sufficient to offset the social cost of the limited monopoly granted to patentees, copyright holders, and other IPR owners. For developing countries, unfortunately, similar research is lacking. The paper proposes a research agenda that includes an assessment of IPR protection in developing countries, the incentive effects on local R&D, foreign direct investment and technology licensing, and the potential benefit to developing countries of “petty patents” and plant breeders’ rights.

* Stoneman, P., Ed. (1995). Handbook of the Economics of Innovation and Technological Change. Oxford and Cambridge, Blackwell.

This book claims to be the first comprehensive, detailed and up-to-date overview of current knowledge in the economics of technological change. It both reviews what is known and accepted as the best thinking in the field and sets the agenda for research in the future by taking the reader to the boundaries of the subject. Key topics covered are: theory empirics and policy; technology and trade; the theory and practice of technology policy; finance and technological change; R&D and diffusional measuring both technological change and its impact; and game theoretic modelling of technological change.

* United Nations Development Programme (1999). Human Development Report 1999. New York and Oxford, Oxford University Press.

The 1999 HDR argues that globalisation is not new, but that the present era of globalisation, driven by competitive global markets, is outpacing the governance of markets and has repercussions for everyone. Chapter 2 (“New technologies and the global race for knowledge”) argues that global governance of technology must respect and encompass diverse needs and cultures. With respect to new knowledge and technologies the global gap between the haves and the have-nots is widening because: in private research agendas money talks louder than need; tightened IPRs keep developing countries out of the knowledge sector; patent laws do not recognise traditional knowledge and systems of ownership; and the rush and push of commercial interests protects profits, not people, despite the risk in the new technologies.

Watal, J. (1999). “Intellectual property and biotechnology: international trade interests of developing countries”. Science, Technology and Development Discussion Paper No. 6. Cambridge, Center for International Development and Belfer Center for Science and International Affairs, Harvard University. [<http://www.cid.harvard.edu/cidbiotech>]

Biotechnology has the potential to provide the answers to some of the developing world’s most intractable problems. There is scope for developing countries to interpret the provisions of TRIPS on biotechnology at different levels, as evidenced by differing interpretations in the developed world. Equally, however, demands of developing countries on biodiversity-related

issues can be countered through the ambiguities in the CBD. Instead of attempting to amend TRIPS, developing countries should aim to obtain access to the new technologies, at reasonable terms, by collaboration and not confrontation with their owners, with the help of multilateral developmental institutions.

8. The knowledge, innovations and practices of indigenous peoples and local communities

The proliferation of literature on traditional knowledge and intellectual property rights was stimulated by the 1992 Earth Summit, and in particular the Convention on Biological Diversity. But the idea that traditional or local knowledge might have a useful role to play in development predates the Earth Summit. According to William Adams in his book “Green Development”, enlightened attitudes towards the knowledge, skills and subsistence practices of rural communities in developing countries emerged in the 1970s “as part of a liberal and populist reaction against the unsuccessful technological triumphalism of rural development practice”. These attitudes have become increasingly mainstream in academia and among international development and conservation agencies. And in the mid-late 1980s as the public became increasingly concerned about tropical deforestation, the depletion of the ozone layer and global warming, the idea that indigenous peoples – through their environmentally-friendly resource management practices – held the key to humankind’s survival became fashionable. At the same time there was a growth in awareness that traditional knowledge relating to health and agriculture not only had tremendous commercial potential, but that seed and drug companies had effectively been free-riding on traditional knowledge for decades while the holders of this knowledge were not only left uncompensated but were finding themselves and their communities mired in ever increasing deprivation. Among the first people to speak out about this situation were the Canadian activist Pat Mooney, the United States anthropologist Darrell Posey, and the Indian Vandana Shiva.

During the 1990s claims that indigenous/local communities were being subjected to massive and increasing ‘biopiracy’⁴⁴ by companies from the pharmaceutical, seed and agrochemical industries seemed to increase exponentially each year. Biopiracy is rarely defined in the literature though it tends to imply the unauthorised extraction of traditional knowledge or biological resources and/or the patenting of ‘inventions’ that derive from such knowledge or resources without provision for benefit sharing with the providers.

There is no doubt that in the past commercial use of traditional knowledge has generated vast profits for industry without the providers receiving any benefits at all except perhaps for a small collection fee. Anecdotal – but often well-substantiated – evidence suggests that such unfair practices continue although it is very difficult to estimate how prevalent they are. Most pharmaceutical companies claim to have no interest in the ethnobotanical approach to drug discovery and it is true that the most famous company to use this strategy, Shaman Pharmaceuticals, has only just marketed its first product (a botanical rather than a pharmaceutical), and underwent a period of serious financial difficulties. Similarly, the seed industry is not as great a user of folk varieties as is often supposed, although this is mainly because it is able to draw upon the huge stocks of such varieties that were collected and used as breeding material in the past. It is likely, though, that industrial use of traditional knowledge goes on, and on a large scale, but is underreported.

It is sometimes asserted that intellectual property rights – in terms of their characteristics or their effects – are inequitable or even exploitative of indigenous peoples and local communities. Is this true? Two questions must be considered when discussing the relationship between IPRs, especially patents, and the rights of the holders of traditional

knowledge, innovations and practices. First, do IPRs have characteristics that are inherently unjust or which lead to injustices *vis-à-vis* traditional knowledge holders? Second, to what extent can IPRs be used to protect their rights? The quality of published work on these questions varies tremendously. Some of the literature makes ill-informed and naïve assumptions about intellectual property rights, incorrectly assuming for example that IPRs and patents are synonymous and that a patent relating to a folk variety or medicinal plant allows the owner of the patent to prevent the provider farming community or shaman from continuing to use that plant. Many of the same writings also seem to presume that traditional communities share everything and have no conception of communal, group or individual property rights. Whether or not western notions of ownership and property necessarily apply exactly to non-western or traditional societies⁴⁵, the anthropological literature demonstrates conclusively that such presumptions are far too sweeping. However, the writings below are without exception of a high standard, and the highlighted ones especially will help to resolve these controversial questions in the reader's mind.

The writings

Axt, J. R., M. L. Corn, M. Lee and D. M. Ackerman (1993). "Biotechnology, Indigenous Peoples and Intellectual Property Rights". Congressional Research Service. Washington DC: The Library of Congress.

The world may be experiencing mass extinctions of species. There is now an increase in biodiversity prospecting, but with concerns being expressed that indigenous peoples should be involved. Some arrangements have been forthcoming, such as INBio, the NCI Letter of Intent and Shaman Pharmaceuticals, but an emerging issue is the debate about indigenous peoples' rights and their possible entitlement to protection of their knowledge under IPR laws. The authors suggest that the most promising avenues for compensating indigenous peoples while promoting biodiversity conservation are not through IPR, but through contracts between such peoples and companies and research organisations.

Berryman, C. A. (1994). "Toward more universal protection of intangible cultural property." Journal of Intellectual Property Law 1: 293-.
[<http://www.lawsch.uga.edu/~jipl/vol.1/berryman.html>]

The notion of a state as the guardian of its people's cultural heritage has evolved from the mere association of objects and monuments with a particular nation's culture to an international framework that authorises states to protect and preserve cultural objects from theft, mutilation, and destruction. Extant cultural property conventions recognise the status of cultural property as part of the "common heritage of mankind" and place an international duty on states to protect not only their own cultural heritage but also all other nations' cultural property. The protection of these measures, however, is limited in scope by the definition of cultural property. Protection is not extended to the non-physical or intangible aspects of cultural property. What national and international measures

currently protect intangible cultural property and are they adequate to preserve this form of cultural heritage? This article explores these questions in an effort to determine what steps can be taken to establish more uniform and universal intangible cultural property protection and whether conventions should be extended or developed for intangible cultural property.

Biothai/GRAIN (1998). "Road Maps to a Peoples' Sui Generis Rights Plan of Action". Bangkok, Biothai & GRAIN.

Proceedings of an international NGO seminar that sought to elaborate a coherent response to the TRIPS provision allowing for a sui generis alternative to patents for protection of plant varieties. The main outcomes of the seminar were the Thammasat Resolution and a Plan of Action.

Blakeney, M. (1998). "Communal intellectual property rights of indigenous peoples in cultural expressions." Journal of World Intellectual Property 1(6): 985-1002.

In recent years there has been an increase in activism in the area of IPR protection for indigenous peoples' knowledge and cultural expressions. Up to now copyright courts have refused to allow indigenous communities to enforce their rights in such expressions, This article considers some recent Australian cases which have sought to delineate the boundaries of the rights of Aboriginal peoples in asserting communal rights in cultural expressions. This Australian jurisprudence will be of assistance in formulating the new IPR regime in this area. The article concludes with an examination of reform proposals.

* Blakeney, M., Ed. (1999). Intellectual Property Aspects of Ethnobiology. Perspectives on Intellectual Property. London, Sweet and Maxwell.

This volume contains a detailed examination of the legal, economic and political contexts within which proposals for the protection of ethnobiological knowledge under intellectual property law are discussed. The broadening of the subject of IPR protection is currently being debated by the World Intellectual Property Organization and this book aims to contribute to the debate.

Brown, M. F. (1998). "Can culture be copyrighted?" Current Anthropology 39(2): 193-222.

The digital revolution has dramatically increased the ability of individuals and corporations to appropriate and profit from the cultural knowledge of indigenous peoples, which is largely unprotected by IPR law. In response, legal scholars, anthropologists, and native activists now propose new legal regimes designed to defend indigenous cultures by radically expanding the notion of copyright. Unfortunately, these proposals are often informed by romantic assumptions that ignore the broader crisis of intellectual property and the already imperilled status of the public domain. This essay offers a

sceptical assessment of legal schemes to control cultural appropriation -- in particular, proposals that indigenous peoples should be permitted to copyright ideas rather than tangible expressions and that such protection should exist in perpetuity. Also examined is the pronounced tendency of intellectual property debates to pre-empt urgently needed reflection on the political viability of special rights regimes in pluralist democracies and on using copyright law to enforce respect for other cultures.

* Brush, S. B. (1993). "Indigenous knowledge of biological resources and intellectual property rights: the role of anthropology." American Anthropologist 95(3): 653-686.

IPRs for ethnobiological knowledge have been proposed as a way to compensate indigenous peoples. Four obstacles are critical: whether general and collective knowledge can be protected; whether certain indigenous groups can claim exclusive control over knowledge and resources; the uncertain status of indigenous peoples; and the lack of a well-developed market for biological resources or traditional knowledge. Anthropologists can play a critical role in the debate by providing analysis and ethnobiological information.

* Brush, S. B. and D. Stabinsky, Eds. (1996). Valuing Local Knowledge: Indigenous Peoples and Intellectual Property Rights. Covelo, CA, USA, Island Press.

Papers from the 1993 conference on IPR and Indigenous Knowledge, which took place in Lake Tahoe, California. Includes sections on equity and indigenous rights, conservation, knowledge, and policy options and alternatives.

Brush, S. B. (1996). "Is common heritage outmoded?" Valuing Local Knowledge: Indigenous Peoples and Intellectual Property Rights. S. B. Brush and D. Stabinsky. Covelo, CA, Island Press: 143-164.

Writer argues that biological resources are and should remain common heritage of mankind. IPRs can be justified on utilitarian grounds but are inappropriate and impracticable for conservation and indigenous knowledge. Instead he advocates public subsidy approach.

* Chadwick, D. J. and J. Marsh, Eds. (1994). Ethnobotany and the Search for New Drugs. Ciba Foundation Symposium (185). Chichester, John Wiley & Sons.

Contains papers and discussions from a symposium which presented studies of traditional medicine around the world and debated ways to encourage conservation of natural habitats and cultivation of medicinal plants. IPR are considered, including the application of patent laws and methods of compensation for the local communities.

Costa e Silva, E. da (1995). "The protection of intellectual property for local and

indigenous communities.” European Intellectual Property Review 17(11): 546-549.

Presents and analyses recent legislative processes in Latin America relevant to the intellectual property rights of indigenous peoples. These processes are concerned with national and regional implementation of TRIPS in conformity with the requirements of the CBD vis-à-vis indigenous peoples.

Dougherty, T. (1998). “Group rights to cultural survival: intellectual property rights in Native American cultural symbols.” Columbia Human Rights Law Review 29: 355-399.

This article deals with some of the theoretical and jurisprudential issues that arise when Native American cultural symbols are appropriated by non-Native individuals and businesses to sell products. Legal challenges to these acts of appropriation are generally unsuccessful since the acts are not considered thefts. Rather, the cultural symbols are considered part of the public domain and as a result are available for use in business contexts. In fact, through trademark law, it is the appropriator of the symbol that is often given a property rights in the symbol. In contrast, this article contends that the conceptions of property underlying such legal protection are not relevant to the specific context of Native American culture and law and, further, that they are based on an outdated notion of individual property rights. Specifically, the author argues that in the context of certain Native American claims implicated in the survival of Native American culture, U.S. courts ought to consider these claims from a group, rather than an individual, rights perspective.

* Downes, D. (1997). “Using Intellectual Property as a Tool to Protect Traditional Knowledge: Recommendations for Next Steps”. Washington DC, Center for International Environmental Law. [<http://www.ciel.org>]

Although IPRs currently provide limited incentives to communities, it is argued that some form of IPRs could be a valuable tool for communities to use to control their traditional knowledge and gain greater shares of the benefits. CBD Parties are urged to explore possible modifications to existing IPRs, or the creation of sui generis rights, that could accomplish these goals. Various recommendation are proposed, including: exploring the use of geographical indications, trademarks and authors’ moral rights; supporting the establishment of national and international registries of traditional knowledge; and considering a requirement for patent applicants to disclose traditional knowledge and its origin as well as the origin of genetic resources used in the invention.

* Downes, D. R., Laird, S.A., (with contributions by G. Dutfield and R. Wynberg) (1999). “Innovative Mechanisms for Sharing Benefits of Biodiversity and Related Knowledge Case Studies on Geographical Indications and Trademarks”. Prepared for UNCTAD Biotrade Initiative. [<http://www.ciel.org>]

This paper explores the innovative use of selected legal tools to support the efforts of the people of local and indigenous communities to conserve and use

sustainably their biological diversity, biological resources, and associated traditional knowledge. The paper reviews concepts of intellectual property – in particular trademarks and geographical indications – as possible incentives for the marketing of products from biological resources produced through traditional and environmentally friendly methods. It includes preliminary case studies drawn from Asia, Africa and Latin America.

* Downes, D. R., Laird, S.A., (with contributions by G. Dutfield, T.D. Mays and J. Casey) (1999). “Community Registries of Biodiversity-related Knowledge: The Role of Intellectual Property in Managing Access and Benefit Sharing”. Prepared for UNCTAD BiTrade Initiative. [<http://www.ciel.org>]

This paper explores the promise and peril of using registries of knowledge as tools for the people of local and indigenous communities to employ for the conservation, sustainable use and sharing of benefits from their biological diversity, biological resources, and associated traditional knowledge. In particular, the paper explores the impact of applying intellectual property rights and other tools for controlling ownership and access to registries. It includes brief preliminary case studies reviewing current efforts.

* Downes, D. R. (2000). “How intellectual property could be a tool to protect traditional knowledge.” Columbia Journal of Environmental Law 25: 253-281.

The article starts by critiquing the polarised international debate over IPRs and traditional knowledge in an effort to clarify the terms of discussion. The author then proposes five ways to explore the potential of using IPRs to help traditional knowledge holders benefit from their knowledge and thereby increase incentives for them to preserve it and the biodiversity to which it is related.

Drahos, P. (1997). “Indigenous knowledge and the duties of intellectual property owners.” Intellectual Property Journal 11(2): 179-201.

This paper argues that in a world of global production indigenous peoples should embrace the western commodity form, otherwise their knowledge will simply function as a free input of production. In order to ensure that the western commodity form is consistent with their version of community, indigenous peoples should draw on those theories of property that link property to freedom of personality. This line of argument the author contends will make it easier to establish the idea that intellectual property owners owe other duties.

* Drahos, P. (2000). “Indigenous knowledge, intellectual property and biopiracy: is a global bio-collecting society the answer?” European Intellectual Property Review(6): 245-250.

Finding ways to encourage mutually satisfactory contractual arrangements between life science companies and indigenous groups over the use of traditional knowledge has become a major regulatory challenge. Part of the

solution, it is argued in this article, lies in the creation of a global bio-collecting society (GBS). A GBS will overcome some of the problems of uncertainty and enforcement that confront contracting parties in this area. The first section of the article sketches the problems that need to be addressed. The second part outlines the role that the GBS could play.

Dutfield, G. (1999). "Protecting and revitalising traditional ecological knowledge: intellectual property rights and community knowledge databases in India". Intellectual Property Aspects of Ethnobiology. M. Blakeney. London, Sweet and Maxwell: 101-122.

While scientific and commercial interest in traditional knowledge and resource management practices have never been greater, human cultural diversity is eroding at an accelerating rate. Concerned scientists are calling for the documentation of such knowledge before it disappears. But some indigenous peoples' organisations worry that documentation initiatives are likely to be top-down and exploitative. This article consists of five sections: (a) the growing interest in and respect for traditional knowledge; (b) the protection of traditional knowledge as an IPR issue; (c) case studies of patents and traditional knowledge; (d) the protection of IPRs and traditional rights in India; and (e) an evaluation of Indian initiatives to document traditional knowledge.

* Dutfield, G. (2000). "The public and private domains: intellectual property rights in traditional knowledge." Science Communication 21(3): 274-295.

IPR law contains an in-built bias that protects the intangible assets of companies while failing to recognise traditional knowledge as protectable subject matter. The rapid globalisation of high-level IPR minimum standards is certain to exacerbate the situation. The main reason why IPRs are unfair is not that they are explicitly discriminatory, but that they treat all knowledge in the world as the intellectual commons except that which is protected under patent or other mainstream IPRs. This situation is unjust to indigenous people and contrary to the interests of everybody except those who profit from exploiting traditional knowledge unfairly.

Frow, J. (1998). "Public domain and collective rights in culture." Intellectual Property Journal 13: 39-52.

Author explores a model of the communal control and authorisation for cultural rights in indigenous societies in order to explore its relevance to the concept of public domain in Western IPR law. Concludes that this model cannot directly be applied to Western law, but that its analysis may help to clarify the presuppositions of each system.

* Greaves, T., Ed. (1994). Intellectual Property Rights for Indigenous Peoples: A Sourcebook. Oklahoma City, Society for Applied Anthropology.

The rights of indigenous societies to control the use of their cultural

knowledge by outsiders has become an issue of global importance. This book includes both cases where indigenous groups have asserted these rights, and analyses of the legal and political contexts for such rights.

Grenier, L. (1998). Working with Indigenous Knowledge: A Guide for Researchers. Ottawa, International Development Research Centre.

In the 1990s, indigenous knowledge has been fertile ground for research, and a wealth of information now exists on the topic. The information, however, is disparate and no truly comprehensive guide exists until now. This guidebook demonstrates what indigenous knowledge can contribute to a sustainable development strategy that accounts for the potential of the local environment and the experience and wisdom of the indigenous population. Through an extensive review of field examples as well as current theory and practice, it provides a succinct yet comprehensive review of indigenous knowledge research and assessment.

* Gupta, A. K. (1996). "Rewarding creativity for conserving biodiversity in the Third World". Presented at AIPPI Forum on Ethical and Ecological Aspects of Intellectual Property Rights, 10-14 September, Interlaken. [<http://www.sristi.org/papers/cottier.html>]

Evaluates the arguments of those who condemn the TRIPS Agreement for the inability of IPRs to protect traditional knowledge or on the grounds of morality and international equity. The author dispels many of these arguments, while proposing an alternative based on the development of local innovations databases linked to a low-cost and more accessible patent system.

* Halewood, M. (1999). "Indigenous and local knowledge in international law: a preface to *sui generis* intellectual property protection." McGill Law Journal 44: 953-996.

*The author analyses the development in international law of means by which local communities and developing countries could increase their own control over others' use of their resource-related innovations. Exactly how these norms should be implemented in domestic law, however, is far from clear. The author argues that one plausible means of implementation would be through policies to increase the participation of indigenous communities in resource management decision-making. Another possible means would be through the creation of national *sui generis* IPR laws to protect indigenous and local knowledge. At least in theory, vesting IPRs in indigenous and local communities over their innovations would assist them to stop undesired use of their knowledge and/or compel compensation when it is used.*

Huft, M. (1995). "Indigenous peoples and drug discovery research: a question of intellectual property rights." Northwestern University Law Review 89(4): 1678-1730.

Focuses on questions relating to how the nature of indigenous knowledge relates to IPRs. In particular, the article examines the nature of indigenous

knowledge of medicinal plants and its role in the search for new drugs in order to address three issues: (i) whether the contribution of indigenous knowledge to a final drug is the sort of contribution that would allow one or more indigenous persons to be considered a joint inventor; (ii) whether publication of information concerning indigenous plant use would bar the availability of a patent; and (iii) whether IPRs are the most appropriate vehicle for addressing problems of compensation in the exploitation of genetic resources.

Janke, T. (1999). Our Culture: Our Future – Report on Australian Indigenous Cultural and Intellectual Property Rights. Surry Hills, Michael Frankel & Co., Australian Institute of Aboriginal and Torres Strait Islander Studies and Aboriginal and Torres Strait Islander Commission. [<http://www.icip.lawnet.com.au>]

This report maps the rights indigenous peoples want to their cultural heritage and analyses the laws and policies that affect the ability of indigenous peoples to realise these rights. The report also lists a range of measures and recommendations -- both legislative and non-legislative -- for protecting Indigenous Cultural and Intellectual Property. Many of these have much wider applicability than Australia alone.

Kadidal, S. (1997). "Subject-matter imperialism? biodiversity, foreign prior art and the neem patent controversy." IDEA - The Journal of Law and Technology 37(2): 371-403.

Under Section 102 of the United States Patent Act prior knowledge, use or invention in that country can be used as evidence to invalidate a U.S. patent for lack of novelty. However, almost all similar foreign activity cannot be used against a U.S. patent. This article recommends that the foreign-activity prior art distinctions in Section 102 (which also exist in Japanese patent law but not in Europe) should be eliminated. First, this article discusses the neem patent controversy. Then, the application of knowledge, use and invention in the USA is explained. Next, the exclusion from prior art of foreign knowledge, use or invention is analysed. Then the inadequacy of foreign patents and printed publications as prior art in biodiversity inventions is discussed. Finally, the article presents several criticisms of the foreign-activity distinctions under Section 102.

King, A. B. and P. B. Eyzaguirre (1999). "Intellectual property rights and agricultural biodiversity: literature addressing the suitability of IPR for the protection of indigenous resources." Agriculture and Human Values 16(1): 41-49.

Intellectual property has been suggested as a means to protect indigenous resources from misappropriation, and to create increased investment in their conservation. This article reviews four books that discuss the problems that arise from the application of IPRs for the protection of indigenous resources. All of them highlight a salient issue: that current IPR systems may conflict with and undermine the culture, social structure, and knowledge systems of indigenous societies. The books are by Brush, Swanson, Greaves and Posey

and Dutfield.

Nijar, G. S. (1996). "In Defence of Indigenous Knowledge and Biodiversity: A Conceptual Framework and Essential Elements of a Rights Regime". Penang, Third World Network.

Explains the link between traditional knowledge and the protection of biodiversity and discusses international developments affecting recognition of rights in biodiversity of nations, farmers and indigenous peoples. Three draft model laws are presented: the Collectors of Biological Resources (Control and Licensing) Act, the Contract between the Collector and the Government; and the Community Intellectual Rights Act.

* Posey, D. A. and G. Dutfield (1996). Beyond Intellectual Property: Toward Traditional Resource Rights for Indigenous Peoples and Local Communities. Ottawa, International Development Research Centre.

A handbook for indigenous, traditional and local communities providing useful information and case studies on the issues raised by the use and appropriation of traditional intellectual, cultural and scientific resources. It is presented in an accessible style and format so that it may serve as a practical guide to the key questions, legal tools, and options available for protection of and just compensation for traditional knowledge and biogenetic resources. In this way it is hoped that traditional communities, individuals, and institutions will be in a better position to set the terms of their relationships with researchers, companies, and others, and to determine whether involvement in research and commercial projects is in their best interest.

Posey, D. A. and K. P. assisted by G. Dutfield, E. da Costa e Silva & A. Argumedo (1996). Traditional Resource Rights: International Instruments for Protection and Compensation for Indigenous Peoples and Local Communities. Gland, IUCN.

A survey of international agreements relating to indigenous peoples and biodiversity conservation. Proposes a new integrated rights approach as an alternative to IPRs for the protection of traditional knowledge and resources. This approach, Traditional Resource Rights, provides new opportunities for constructive dialogue with indigenous and traditional peoples on their own terms.

Sarma, L. (1999). "Biopiracy: twentieth century imperialism in the form of international agreements." Temple International and Comparative Law Journal(Spring): 107.

This paper explores the property right claims indigenous groups have regarding their indigenous innovations and the ways in which the contrasting Northern and Southern views affect such claims. Moreover, the role of transnational corporations and the ability to exploit this knowledge as well as the North-South conflict will be discussed. Because the United States and India are two countries in the forefront of the North-South debate, the impact of each country's respective patent laws on indigenous communities will also

be explored. Whether governing bodies in lesser developed countries could protect traditional knowledge in their jurisdiction by amending their laws to grant these communities a property right to their innovations will be discussed. Ways in which lesser developed countries could work with indigenous communities so that both can benefit from their valuable knowledge will be proposed. However, such affinity between governments of lesser developed countries and indigenous groups is unlikely, since many of these governments value profit over indigenous rights.

Secretariat of the Convention on Biological Diversity (1998). "Implementation of Article 8 (j) and related provisions. Note by Executive Secretary". For the Conference of the Parties to the Convention on Biological Diversity, Fourth Meeting. Bratislava, Slovakia. 4 to 15 May 1998. Item 10 of the provisional agenda. Montreal, CBD Secretariat. [<http://www.biodiv.org>]

COP-3 invited Governments, international agencies, research institutions, representatives of indigenous and local communities and NGOs to submit to the Executive Secretary, case studies on measures taken to develop and implement the CBD's provisions relating to indigenous peoples and local communities. These studies were to highlight key areas of discussion and help in considering the implementation of Article 8 (j) and related articles, including, inter alia, interactions between traditional and other forms of knowledge relating to the conservation and sustainable use of biodiversity; the influence of current laws and policies on knowledge, innovations and practices of indigenous peoples and local communities; and incentive measures. This Note provides a synthesis of shared experiences gathered from these case studies, reviews and other documentation on the implementation of Article 8 (j) and related articles.

Simpson, T. (1997). Indigenous Heritage and Self-determination: The Cultural and Intellectual Property Rights of Indigenous Peoples. Copenhagen, International Work Group for Indigenous Affairs.

After centuries of disparagement, indigenous peoples suddenly find their millennial wisdom coveted by outsiders and they are demanding that mechanisms be established to effectively protect their rights. The problem is how. This study examines the legal avenues open to indigenous peoples to defend their cultural heritage, and seeks to elucidate the advantages and disadvantages of the various approaches so far advocated. It aims not to determine indigenous policy but to help them define their own local, national and international proposals to secure their futures, in accordance with their right to self-determination and to exercise their customary law.

Tobin, B. (1997). "Know-how licences: recognising indigenous rights over collective knowledge". Bulletin of the Working Group on Traditional Resource Rights: 17-18.

Legally-binding agreements such as contracts and licences can be used to guarantee benefit sharing with local communities. In Peru, the Aguaruna

people have negotiated a know-how licence with the American drug company Searle. The Aguaruna pass on medicinal plants and knowledge (i.e. 'know-how') to the company and in exchange receive an annual know-how licence fee.

Tunney, J. (1998). "European Union, intellectual property, indigenous people and the digital age: intersecting circles?" European Intellectual Property Review 20(9): 335-346.

The contemporary evolution of intellectual property is largely in response to pressure exerted by commercial interests, causing a conceptual fault line which emphasises existing exclusionary tendencies. If examined from the ostensibly unrelated perspectives of indigenous people and the digital age difficulties, the conceptual challenge becomes clear. However, the EU provides an ideal opportunity to encourage a conceptual re-alignment consistent with the emergence of other international legal standards.

9. Public education

One way that copyright law seeks to strike a balance between the rights of the owners and the public interest is to allow – within certain limits – unauthorised copying of protected works for educational or other non-commercial purposes. In the U.K. this is called fair dealing (fair use in the U.S.). However, there are concerns that as part of the tendency towards strengthened copyright protection, fair dealing will be one of the casualties. Either it will be restricted further or it might even be eliminated altogether. Information technology provides both opportunities and threats for the copyright industries. It sometimes appears, though, that these industries would prefer to emphasise the threats when lobbying governments to reform the law to accommodate technological changes. The Crews, Lyman and Okerson articles all highlight various contemporary concerns about trends in copyright law, including public education and libraries.

As for developing countries whose public education systems are dependent upon foreign publications, it is obvious that price is a very important determinant of access. While private schools and colleges may be able to afford imported copyright-protected texts and distribute them to all the students, the public sector may not. The temptation is to encourage or turn a blind eye to the copying of such texts by students, schools and colleges. This creates a difficult dilemma for developing countries: should they clamp down on copyright infringers but allow textbook prices to be prohibitively high for most students and educational institutions? Or should they allow copying with impunity but risk being threatened with trade sanctions by the governments of the copyright-owning publishing companies?

The writings

* Crews, K. D. (1998). “Harmonization and the goals of copyright: property rights or cultural progress?” Indiana Journal of Global Legal Studies 6(1): 117-. [<http://www.law.indiana.edu/glsj/vol6/no1/crews.html>]

The author raises four main concerns about the effects of international harmonisation of copyright on the United States law. First is the contraction of the public domain. Loss of the public domain, even a partial loss, is a loss of one of the few clear opportunities for a member of the public to build upon existing works and to expand upon the base of creative resources available in the marketplace. Second, the trend toward tightened copyright protection harms the public good by narrowing the exercise of fair use. Fair use is essential not only to the public seeking to build on existing works, but also for the creation of the next generation of many new copyright-protected works. Third is undue restriction on the deployment of new technologies. The success of many new technologies, from the photocopier to the Internet, depends on the ability to utilise copyright protected materials in ways that raise questions about the possibility of infringement. Just as the motion picture and publishing industries might argue that stronger copyright protection can reinforce their businesses and have strong positive consequences for the

economy, so could the computer and technology industries argue that greater opportunities for reproduction and transmission of copyrighted works can make new technologies more useful, more valuable, and consequently of greater importance to the economy. Fourth is the diminished ability to share or disseminate protected works. If teachers are barred from using materials in the classroom, leaders are constrained from sharing materials at public functions, and cultural programmes are prohibited from performing or otherwise making works available to an audience, then the public is simply denied exposure to creative works. That lack of exposure translates into a loss of learning opportunities and a curtailment of cultural progress.

Lyman, P. (1996). "What is a digital library? technology, intellectual property, and the public interest." Daedalus: Proceedings of the American Academy of Arts and Sciences 125(4): 1-33.

Critical analysis of the implications for the public interest, education and human rights of the application of IPR protection over digital libraries and the Internet.

* Okerson, A. (1996). "Who owns digital works?" Scientific American (July): 64-68.

This article, written by a university librarian discusses the challenges to copyright law presented by the new information technologies. Recent proposals in the United States to reform copyright law to accommodate such challenges would appear to be detrimental to the public interest. Library and education groups, on-line services and private citizens have all criticised these proposals, which would severely restrict fair use (fair dealing) exceptions, treat all information appearing in a computer's memory for any length of time as constituting 'fixation' and therefore a possible copyright infringement, and would not apply the first sale doctrine to electronic copies of works.

Pedley, P. (1998). Copyright for Library and Information Service Professionals. Colchester, Portland Press.

This book explains the changes in UK copyright law as well as international developments in the IPR field as they affect libraries. Sections deal with topics such as user permissions, licensing, electronic copying and digital use of copyright works, case law, and case studies.

Shulman, S. (1999). Owning the Future. Boston and New York, Houghton Mifflin Co.

Author argues that the free exchange of essential information is being hoarded, fought over, and controlled as never before. He explains that in the rush to stake claims in the knowledge economy, we risk auctioning off our technological and cultural heritage and eroding the public education and public access that are the bedrock of our democratic society.

10. Public and private research capacity building

When the relationship between IPRs and research capacity building is discussed the key issue that arises is whether and/or how far the availability of IPR protection stimulates basic and applied research whether for commercial or non-commercial ends.

On the non-commercial basic research side, concerns are sometimes raised about the clash between IPRs and the social norms within the scientific community which tend to favour collaboration over competition, disclosure over secrecy, and the public domain over privatisation of research data. While it would be naïve to assume that scientists are less competitive than individuals working in other professions there is a genuine fear that lawyers will dictate to scientists whether or not they should publish their findings, that scientists attending conferences will be urged not to disclose any data that could have commercial application, and that the pressure to privatise will be detrimental to science generally. It is undoubtedly the case that university science departments are increasingly expected to generate funds to support themselves including from the private sector, and that basic scientific research should somehow contribute to the economy. And there are those who might consider that such developments and expectations are on balance a good thing.

As for commercial research, a number of studies over the years have come to an interesting conclusion that pharmaceuticals is one of the few industrial sectors in which patents are effective means to capture returns from R&D. Or to express this in another way, with the exception of pharmaceuticals, industry does not find the patent system to be a significant encouragement to invest in research and product development.

However, the choice for politicians and patent officials is not simply whether or not patents are a good thing in stimulating private R&D investment, but what the scope of the rights should be. In longer established industries and technological fields, legislators and patent offices may be experienced and impartial enough to ensure that the extent of the rights available and which are granted are neither so broad as to deter innovation nor so narrow as to provide inadequate incentive to do research. But it is far more difficult to achieve this with new technologies such as the new biotechnologies, especially if governments are unduly pressured by powerful economic interests, and if patent offices lack the capacity to conduct adequate prior art searches and examinations.

Two situations can arise that may be extremely problematic. First, a disproportionately large quantity of patents may be granted in relation to the number of commercial products based upon them. Second, the scope of a patent may be drawn so broadly as to allow monopoly protection of a range of possible products including many unforeseen by the applicant. Both situations can create perverse incentives which may reduce the rate of innovation.

Heller and Eisenberg warn of an emerging IPR problem in the United States in the field of biomedical research which they call the “tragedy of the anticommons”. Specifically, this refers to a situation in which the increased patenting of premarket, or “upstream” research “may be stifling life-saving innovations further downstream in the course of research and product development”. One way this can happen is based on the fact that developing future

commercial products such as therapeutic proteins or genetic diagnostic tests often requires the use of multiple patented gene fragments. And there is an increasingly high number of patents on isolated gene fragments. The cost of R&D will be affected by the existence of so many of these patents because a company intending to develop such products will need to acquire licences from other patent holders, and thus will incur large (and possibly prohibitive) transaction costs. Since the first patent for gene fragments of the type known as expressed sequence tags (ESTs) was awarded to Incyte Pharmaceuticals in 1998, this problem could become more serious. It may also be compounded by unscrupulous patent-holding firms demanding license fees from rival companies they accuse of infringing their patents, and threatening them with legal action unless they pay up.⁴⁶

Potential for such situations also appears to exist in agro-biotechnology. It is certainly true that technology transfers may consist of a highly complex and expensive bundle of transactions beyond the means of developing country agricultural research institutes to carry through without outside assistance. Lesser⁴⁷ shows how complicated it can be to transfer a technology that would be useful in some developing countries:

A technology for controlling papaya ring spot virus ... is actually five separate technologies, of which the resistance gene is owned by Cornell [University], two vectors by Asgrow (which was recently sold), and the 'gene gun' was used, itself licensed by Cornell to DuPont to Agricetus which added its own improvement patents.

The second problem has been with modern biotechnology for many years. Cohen and Boyer's recombinant DNA patent described a method of inserting genes only into *E. coli*, yet it covered applications of the technology for a much wider range of micro-organisms.⁴⁸ Similarly the Harvard oncomouse patent disclosed an 'invented' mouse containing a human cancer gene, but its scope embraced all non-human mammals into which the gene may be inserted plus, presumably, their progeny.⁴⁹ A more recent example is US patent 5159135 awarded in 1992 to Agracetus for *all* transgenic cotton. The patent claims covered any variety of cotton produced by means of any gene transfer technology.

With respect to the first problem, there is little that patent offices can do themselves except leave it to the patent holders involved either to accept the high transaction costs entailed by their need to acquire or license other firms' patents or to collaborate with their rivals by setting up private collective rights organisations (CROs) to pool their patents. The advantage for members of setting up such a CRO would be to reduce the transaction costs that would otherwise be incurred both by the need to negotiate multiple-licensing arrangements among them, and to distribute royalties from non-member technology licensees. Although CROs would presumably reduce transaction costs for non-member licensees as well, there is also a danger that CROs can become too dominant in the market, leading to reduction of competition and the stifling of innovation.⁵⁰

As for the second, solutions may be found at the patent offices through more careful examinations, pre-⁵¹ or post-grant opposition, or re-examination requests, and in the courts through litigation. In 1994 the above Agracetus-owned patent was cancelled by the US Patent and Trademark Office "on the basis that other researchers already knew what was disclosed in the patent application as being novel and new".⁵² The cancellation followed complaints about the patent's excessive breadth from other companies, the US Department

of Agriculture, NGOs, and a re-examination request made on behalf of an anonymous party. Also, Calgene's attempt to acquire a 'genus patent' on transgenic *Brassica* failed when the PTO "denied the broadest claims and awarded the company rights only to *Brassica* cells transformed using Calgene's method".⁵³

Nowadays, patent applicants are 'customers' of the patent offices, which are required to become more service-oriented and financially self-sufficient.⁵⁴ They are expected to demonstrate their efficiency by examining patents speedily and avoiding backlogs. The danger is that the proportion both of excessively broad scope patents and of issued patents lacking genuine novelty and inventive step will increase. The latter phenomenon appears to have become a reality in the United States to the extent that some critics consider the U.S. regime to have become a *de facto* registration system. While the non patent-owning public is obviously not a customer of the patent system as such, it is still meant to benefit from its existence. However, public interest organisations opposed to such trends and also to specific patents are likely to find that mounting legal challenges requires financial commitments well beyond their means.

The writings

Eisenberg, R. S. (1994). "Technology transfer and the genome project: problems with patenting research tools." Risk: Health, Safety and Environment 5(2): 163-175.

The author raises various concerns about the patenting of basic human genomic research tools. She concludes that patents have a critical role in promoting technology transfer, but the incentives created by patent rights in government-sponsored inventions would do little to compensate for the damage we could do to our research enterprise if we allocate too much of our knowledge to private owners and too little to the public domain.

Griliches, Z., Ed. (1984). R&D, Patents, and Productivity. Chicago and London, University of Chicago Press.

A ground-breaking collection of papers on the links between R&D, patents, technology development and economic performance. Major findings include the documentation of a significant relationship between R&D expenditures and productivity growth, the usefulness of patents as an indicator of inventive activity, and the relative unimportance of R&D in accounting for the late '70s-early '80s world wide slow-down in productivity growth.

Price, S. C. (1992). "The economic impact of novel genes in plant biotechnology: not without strong intellectual property rights". Conservation of plant genes: DNA banking and in vitro biotechnology. R. P. Adams and J. E. Adams. San Diego & London, Academic Press.

The historical basis of patents is reviewed along with the development of IPRs as they pertain to plants and biotechnology. The thesis is advanced that

patents and licensing will not inhibit research and development, but actually promote R&D amid the free exchange of information and materials. This is a world wide concept that applies equally to developed and developing countries.

* Rai, A. K. (1999). "Regulating scientific research: intellectual property rights and the norms of science." Northwestern University Law Review 94(1): 77-152.

The issue of IPRs in basic scientific research forces scholars to consider not only various competing theories of intellectual property but also the social norms that have traditionally governed claims of ownership in basic science. The author argues that legal change has been insufficiently sensitive to the contexts in which the central instrumental goals of IPRs - success in stimulating creation, disclosure, and development of inventive or creative works - would be maximised not through stronger IPRs, but through norms that militate against the securing of such rights. Fortunately, those scientific research norms that have been most resistant to change are more likely to achieve creation, disclosure, and development than full-blown IPRs.

Shavell, S. and T. van Ypersele (1999). "Rewards Versus Intellectual Property Rights". Cambridge, MA, National Bureau of Economic Research. NBER Working Paper No. 6956. [<http://www.nber.org/papers/w6956>]

This paper compares reward systems to IPRs. Under a reward system, innovators are paid for innovations directly by government (possibly on the basis of sales), and innovations pass immediately into the public domain. Thus, reward systems engender incentives to innovate without creating the monopoly power of IPRs, but a principal difficulty with rewards is the information required for their determination. The authors conclude in their model that IPRs do not possess a fundamental social advantage over reward systems, and that an optimal reward system - under which innovators choose between rewards and IPRs - is superior to IPRs.

11. Public health

The AIDS crisis in Africa has attracted the world's attention to the health-related implications of the patent system as never before. But convictions that patent protection of medicines is immoral or contrary to the public interest are more than a century old and have much to do with the fact that many European countries and Canada did not allow such patents until very recently. France and Germany only permitted them in the 1960s, Japan, Switzerland, Italy and Sweden during the 1970s, and Canada in the 1980s. In 1970 India, which had inherited its patent law from Britain decided to abolish patents on pharmaceuticals, and Indian governments, the domestic pharmaceutical lobby and many advocacy groups have fairly consistently been opposed to their re-introduction over the years. A result of India's patent law is that drug prices are lowest in the world. Even so, modern drugs are available to only 30 percent of the population.

Essentially the fear for developing countries is that the introduction of product patents on drugs – as is required by TRIPS – will make medicines more expensive. Even if governments introduce price controls, foreign companies may threaten to withdraw their drugs from that market leaving governments with the difficult choice between availability and affordability. Lanjouw's paper on India is extremely well researched and goes a long way towards resolving the debate, at least in the specific Indian context. Watal (both papers) also analyses the India situation and looks at specific provisions in TRIPS which could be utilised to address such concerns.

The tragedy of the anticommons situation described above as presented by Heller and Eisenberg uses health biotechnology as a case study. The result may be fewer products for improving human health. This is a somewhat theoretical paper which is supported by anecdotal evidence, suggesting that rapid expansion in the range of patentable subject matter may be unwise and – in this context – have possibly serious health-related implications.

The writings

Dumoulin, J. (1998). "Pharmaceuticals: the role of biotechnology and patents". Biotechnology and Development Monitor: 13-15. [<http://www.pscw.uva.nl/monitor>]

The world market for pharmaceuticals shows a clear division: products are developed for industrialised countries promising high profits whereas developing countries are still in need of basic health care. While advancements in biotechnology have a drastic impact on drug development in general, changes in IPR protection will especially influence the health care policies of developing countries.

* Heller, M. A. and R. S. Eisenburg (1998). "Can patents deter innovation? the anticommons in biomedical research." Science 280(1 May): 698-701.

The 'tragedy of the commons' metaphor helps explain why people overuse

shared resources. However, the recent proliferation of IPRs in biomedical research suggests a different tragedy, an ‘anticommons’ in which people underuse scarce resources because too many owners can block each other. Privatisation of biomedical research must be more carefully deployed to sustain both upstream research and downstream product development. Otherwise, more IPRs may lead paradoxically to fewer useful products for improving human health.

* Lanjouw, J. O. (1998). “The Introduction of Pharmaceutical Product Patents in India: Heartless Exploitation of the Poor and Suffering”. Cambridge, MA, National Bureau of Economic Research. NBER Working Paper No. 6366. [<http://www.nber.org/papers/w6366>]

The report shows that it is too soon to draw any strong conclusions on the effects of India’s upcoming introduction of product patents for pharmaceuticals. In answer to the question posed in the title, the answer is probably “no”, if nothing else because the “poor” in India are too poor to consume pharmaceuticals. Moreover, of the drugs currently on the market, just under 10% are on-patent in Europe. Extrapolating this percentage into the future suggests that even if product patents result in significantly higher prices, much of the pharmaceutical market will not be affected. Considering only the part of the market that will be affected by the new regime suggests that the low incomes of India’s consumers and the lack of medical insurance will not ensure low prices, even with price controls. As to whether product patents will contribute to more R&D being done in India, given the centralised nature of R&D and fact that costs are not the primary concern there appears to be no compelling reason for them to locate in India even after product patents are available. Although stronger IPRs may make the Indian environment more appealing to MNCs as a location for R&D, it is unlikely that product patents will make a dramatic difference to their choices. There is more reason to think that the upcoming introduction of product patents will make a difference to the amount and type of R&D being done by Indian firms.

Watal, J. (2000). “Access to essential medicines in developing countries: does the WTO TRIPS Agreement hinder it?” Science, Technology and Development Discussion Paper No. 8. Cambridge, Center for International Development and Belfer Center for Science and International Affairs, Harvard University. [<http://www.cid.harvard.edu/cidbiotech>]

TRIPS could, in certain cases, lead to higher prices for patented medicines, including for important diseases such as HIV/AIDS. However, policy instruments available under TRIPS, such as compulsory licenses or government use, parallel imports and price controls, if designed with care, could attenuate such adverse effects on the affordable access to medicines considered essential.

Watal, J. (2000). “Pharmaceutical patents, prices and welfare losses: policy options for India under the WTO TRIPS Agreement.” The World Economy 23: 733-752.

The objective of the paper is to simulate the maximum likely increase in pharmaceutical prices and decrease in welfare in India with the instantaneous introduction of product patents in the existing 22 patentable pharmaceutical markets. The author predicts that prices are likely to increase and welfare is likely to decrease in moving from current market structure to patent monopoly. But the extent of simulated price increase over the patented pharmaceutical segment differs widely depending upon the assumption made on demand functions.

12. Technology transfer and direct foreign investment

An oft-repeated claim is that if strong patent rights are not available in a developing country, developed world corporations will not transfer their technologies and will prefer to make their direct investments elsewhere. Is this true? First it is important to understand what ‘technologies’ are and how transfers are conventionally made.

According to Crespi and Straus, technologies are “industrial and agricultural processes and products, and the relevant enabling technology for practical realisation”. To Mugabe and Clark technologies may also be conceived as a range of elements such as “knowledge about plant design, process know-how, plant construction, feasibility studies, production management, marketing, distribution, and so on”.

Mugabe and Clark warn against simplistic understandings of North to South technology transfer which envision it as “a costless flow of hardware”. They define technology transfer as:

a non-linear flow from one production locus to another, of systematic knowledge, skills and equipment for the manufacture of a product and/or the application of a process to generate a product or service.

Industrial technologies are conventionally transferred through such formalised means as: foreign direct investment (FDI); turnkey projects; joint ventures; wholly owned subsidiaries; licensing; technical-service arrangements; joint R&D arrangements; training; information exchanges; sales contracts; and management contracts. Of these FDI accounts for over 60 percent of technology transfer flows to developing countries.

IPRs are relevant to all of these mechanisms of technology transfer though not of course to every transfer.

A number of empirical studies have been conducted on the links between stronger IPRs, investment flows, R&D and technology transfers. On the whole, Correa notes, these have proved inconclusive. The study by Maskus claimed some evidence of a positive correlation, while conceding that IPRs are one of several factors that may enhance technology transfers, and also that strengthening IPRs can involve costs as well as benefits for developing countries.⁵⁵ A World Bank study (by Primo Braga and Fink) was even more cautious and recommended further research before firm conclusions could be made. Evidence from Turkey published in 1985 found that the banning of pharmaceutical patents appeared to have no significant effects on levels of direct foreign investment, technology transfers or domestic innovation. Similarly, Kondo, taking manufacturing industry as a whole, found no evidence to support the notion that foreign direct investment levels in Brazil are greatly affected by patent protection. In short, a great deal of uncertainty remains as to whether IPRs support or hinder technology transfers to developing countries.

The writings

Almeida, P. R. de (1995). "The political economy of intellectual property protection: technological protectionism and transfer of revenue among nations." International Journal of Technology Management 10(2/3): 214-229.

This paper discusses the differing attitudes of developing and developed countries to protection of IPRs and the effects on international trade negotiations. It highlights the trend in industrialised countries towards technological protectionism and the economic and social costs for developing countries. Finally, suggestions are made as to how these difficulties may be resolved.

Correa, C. M. (1995). "Intellectual property rights and foreign direct investment." International Journal of Technology Management 10(2/3): 173-199.

This paper discusses the relationship between foreign direct investment and IPRs. It aims to provide an analytical framework with which to understand this relationship, the industries involved and the degree of development of countries concerned. The main developments in legislation, WIPO, UPOV and GATT that have recently taken place are outlined with regard to strategies and decisions for FDI. An analytical framework is then presented and the significant differences it exposes when applied to different types of IPR are exemplified by case studies.

Crespi, R. S. and J. Straus (1996) "Intellectual Property, Technology Transfer and Genetic Resources: An OECD Survey of Current Practices and Policies". Paris, OECD. [<http://www.oecd.org>]

This report reviews current practices and policies on intellectual property, technology transfer, and access to genetic resources, in an attempt to better understand the links between these topics that have recently been highlighted by the adoption of the Convention on Biological Diversity (CBD). The analysis is based primarily on responses to an OECD Questionnaire which complemented work done in other parts of the Organisation in relation to the CBD.

Juma, C. and J. Mugabe (1997). "Public policy and new generic technologies: the case of biotechnology in Sub-Saharan Africa". New Generic Technologies in Developing Countries. M. R. Bhagavan. Basingstoke, Macmillan Press: 115-139.

Discussion on the challenges faced by African countries in terms of developing capacity in biotechnology. The authors propose a range of policy-related approaches to address the problems. With respect to technology acquisition, they take the view that while strong IPRs increase transaction costs of accessing technologies, relaxing IPRs will not necessarily lead to technology transfer. Developing countries are still failing to use technologies already in the public domain, and most of the biotechnologies needed by developing countries are in the public domain.

Kondo, E.K. (1995) "The effect of patent protection on foreign direct investment". Journal of World Trade 29(6): 97-122.

Study on manufacturing in Brazil which casts doubt on claims that strong patent rights are necessary for direct foreign investment.

Kumar, N. (1996). "Intellectual property protection, market orientation and location of overseas R&D activities by multinational enterprises." World Development 24(4): 673-688.

This paper develops an analytical framework to explain the determinants of location of overseas R&D by multinationals in terms of the nature and extent of FDI and host country resources and policy regimes. Empirical findings for U.S. MNCs suggest that MNCs prefer to locate their R&D activities in countries that are able to offer them, among other things, large markets, technological resources and infrastructure. Host market-oriented affiliates are more likely to have R&D units than the export-oriented ones, especially in developing countries. The relative strength of the patent regime appears to affect the direction rather than the magnitude of R&D investments made in a country.

* Maskus, K. (1998). "The role of intellectual property rights in encouraging foreign direct investment and technology transfer." Duke Journal of Comparative and International Law 9(1): 109-161.

A review of globalisation which suggests that emerging countries have strong and growing interests in attracting trade, foreign direct investment, and technological expertise. In this context, IPRs are an important element in a broader policy package that governments in developing economies should design with a view toward maximising the benefits of expanded market access and promoting dynamic competition in which local firms take part meaningfully. This broad package would include promoting political stability and economic growth, encouraging flexible labour markets and building labour skills, continuing to liberalise markets, and developing forward-looking regulatory regimes in services, investment, IPRs, and competition policy.

* Mugabe, J. and N. Clark (1996). "Technology transfer and the Biodiversity Convention: issues of conservation and sustainable use." Science, Technology and Development 14(3): 1-31.

This paper is concerned with how to facilitate the development and transfer of technology relevant to conservation of biodiversity and sustainable use of its components. It examines the range and nature of technologies relevant to the objectives of the CBD and suggests ways or means to facilitate the development and transfer of such technologies. Developing countries treat IPRs as a barrier to transfer of technology while developed countries argue that to stimulate and promote private investments in technological

development, countries should strengthen IPRs. However, neither position is informed by empirical evidence of how IPRs affect the transfer of specific technologies to developing countries.

* Primo Braga, C. A. and C. Fink (2000). "International transactions in intellectual property and developing countries." International Journal of Technology Management 19(1): 35-.

This paper discusses the international dimension of intellectual property protection with an emphasis on the implications for developing countries. It explores the effects of IPR protection on trade, foreign direct investment, and technology licensing, and reviews empirical evidence in this context. Finally, it discusses how international transactions in intellectual property affect the international transfer of knowledge.

Vishwasrao, S. (1994). "Intellectual property rights and the mode of technology transfer." Journal of Development Economics 44: 381-402.

Transferring technology in an environment where patent protection is uncertain can pose significant risks to an innovating firm's ability to appropriate rents. This paper incorporates asymmetric information in a screening game where the innovating firm has the choices of licensing a new product at arm's length to a foreign firm, exporting it, or licensing it to a subsidiary. Subsidiary production avoids the risk of imitation but involves higher costs for the innovating firm. The gains to the Southern country from the lack of IPR protection may be offset by strategic behaviour by Northern firms who opt for technology transfer via subsidiary or monopoly production.

13. Trade and competition

The WTO is intended to promote and enforce the *deregulation* of international trade. At the same time, the TRIPS Agreement establishes a global regime of economic *regulation* intended to protect producers from competitive practices deemed by certain criteria contained within the Agreement to be ‘unfair’. Do IPRs help to establish the level playing field needed to allow fair competition to exist in the products and services provided by high technology industries? Or do IPRs create monopolies that actually hinder competition?

In fact whether IPRs support fair trade or protectionism is largely a matter of one’s own perspective. It is worth bearing in mind that in late nineteenth century Europe free trade economists were generally opposed to patents on ideological grounds, while those favouring protectionism supported the patent system. These economists tended to view IPRs not as – in the Lockean tradition – natural rights, but as monopoly privileges. Nowadays, opponents of strong IPRs are often depicted as being against free trade.

Somebody promoting the interests of a developed country may regard an international IPR convention defining high global minimum standards (e.g. TRIPS) as a desirable pro-free trade measure that helps tear down discriminatory barriers to trade and benefits everybody in the long run. A representative from a developing country who considers his or her nation has benefited from being able to copy or export foreign inventions may regard being prevented or restricted from doing so as a protectionist restraint on trade, or alternatively as an undesirable free trade measure that conflicts with the need to allow infant industries to flourish before being exposed to competition from long-established foreign firms.⁵⁶

Clearly, then, whether TRIPS supports free trade or protectionism and increases or impedes the convergence of national economic wealth indices throughout the world, are matters for continued debate. And one should hardly be surprised that criticism of TRIPS from those favouring developing country interests has come both from people supporting free trade and those who are much more sceptical about liberalisation. From the first perspective, the economist Jagdish Baghwati has criticised TRIPS on the grounds that: (a) it will increase financial transfers from poor to rich countries in the form of royalties and licence fees thereby further impoverishing the former and enriching the latter nations; and (b) that it is protectionist in the sense that it allows developed countries to impose sanctions on countries that fail ‘adequately’ to respect their companies’ intellectual property rights. And from the second, Paulo de Almeida of the Brazilian Foreign Ministry, believes that the establishment of a global IPR regime via the Uruguay Round was an act of technological protectionism by the developed countries which will impose huge economic and social costs for many developing countries. This view is shared by many pro-developing country advocates who tend to be sceptical about free trade and globalisation, at least as these are understood in North America and Europe.

So far we are treating this as a North-South issue but neglecting the micro level and the effects of IPRs on global markets in specific industrial sectors. In fact, concerns are being raised that IPRs catalyse tendencies for global markets to be dominated by small numbers of mega-corporations. Take for example the emergence of that new type of business known as the “life-science corporation”. The growth of these firms is having the consequence that the concentration of technology ownership is becoming ever

more skewed as large corporations in the life science/biotechnology sectors increasingly access rival companies' IPR-protected technologies through cross-licensing, or by purchasing or merging with these companies. Such life science giants as Monsanto, Novartis, AstraZeneca⁵⁷ and Aventis⁵⁸, which hold dominant positions in two or more industrial sectors, are rarely if ever the result of organic (internal) growth but of mergers, acquisitions, joint ventures and strategic partnerships involving companies in such sectors as chemicals, seeds, processed foods and dietary supplements, and pharmaceuticals.⁵⁹ In the case of pharmaceuticals, McManis notes that a major factor driving the consolidation trend is the significant number of patent expiries of recent years, coupled with the lack of new drugs coming on the market to replace them. One of the major inducements for companies to acquire other firms is the opportunity to enlarge their patent portfolios, helping them to secure increased market shares while eliminating rivals.

According to the United Nations Development Programme the ten largest corporations in the main life science sectors now dominate global markets to a very high level, as follows:

- Commercial seed: 32% of a \$23 billion industry
- Pharmaceuticals: 35% of \$297 billion
- Veterinary medicine: 60% of \$17 billion
- Pesticides: 85% of \$31 billion

This situation can be attributed to a combination of possible factors, some of which may operate synergistically, including:

- privatisation of industry;
- privatisation of research;
- stricter environmental and/or safety regulation;
- trade liberalisation;
- mergers and acquisitions; and
- intellectual property rights.

With respect to the agrochemical and seed industry, the Nuffield Council on Bioethics notes that consolidation “continues to shorten the list of owners of the important ‘enabling’ intellectual property for plant genetic modification and plant molecular genetics.” Furthermore:

There are now six major industrial groups who between them control most of the technology which gives freedom to undertake commercial R&D in the area of GM crops.⁶⁰

IPRs have much to do with these trends, which appear to have begun in the 1970s, but really gathered speed in the 1990s. Two U.S. rural sociologists, Frederick Buttel and Jill Belsky, argued that the 1970 United States *Plant Variety Protection Act* increased expectations of seed industry profits and thereby helped to stimulate an upsurge in acquisitions and mergers involving seed companies such that many seed producers became subsidiaries of large agrochemical firms. These

multinational parents of seed companies have larger fertiliser, herbicide, insecticide, and fungicide product lines that generally are far more important in terms of total revenue and profit than are seeds...[a]ccordingly, many agrochemical-based seed company subsidiaries might be hesitant to emphasise plant breeding goals that would threaten fertiliser and pesticide product lines.

Consequently,

a substantial amount of plant research in private firms has been aimed at developing various types of seed-chemical packages that reinforce rather than threaten sales of agricultural chemicals.

Since then, biotechnology emerged to form the 'glue' providing the potential for R&D synergies that made so commercially attractive the construction of conglomerates with interests extending well beyond agribusiness to include human and animal diagnostic and therapeutic products.

The extent and the implications for developing countries of such concentrated market power across the life sciences is difficult to predict but is undoubtedly cause for serious concern.

This is not to paint an entirely negative picture nor to argue that IPRs are anti-competitive *per se*, as well as in their consequences. Neither is it true to say that developing country firms cannot benefit from intellectual property rights. In fact, it can be argued that absence of IPR protection in developing countries is unfair and even disadvantageous to local firms seeking a strong position in the domestic market and looking to IPR protection as a way to secure and maintain such a position. Yet history and recent experience suggest that where IPRs are available to domestic and foreign firms alike, the largest firms will tend to dominate and in developing countries these will probably be foreign transnational corporations.

Can stronger IPRs increase the international competitiveness of firms in developing countries? The history of IPRs suggests that with exceptions this is unlikely to happen at least in the short term. Developing country firms interested in the possibility of exporting innovative products will probably be better off with domestic IPR systems that preclude the dominance of foreign firms even if they themselves are prevented from securing IPR protection as well. History seems to tell us that IPRs will not make them innovative; rather IPRs can strengthen their positions in domestic and international markets *once they have become innovative*. And a vital stage in the process of becoming innovative is to be good at imitating - a possibility that TRIPS makes very difficult.

Even so, blanket generalisations should be avoided. There will always be exceptions to the rule since developing country firms can be innovative where there are strong IPRs as well as where the rights are weak or non-existent. Moreover, freedom to copy does not necessarily create incentives to be innovative or prepare firms for the time when imitation becomes illegal.

The writings

Anderman, S. D. (1998). EC Competition Law and Intellectual Property Rights: The Regulation of Innovation. Oxford, Clarendon Press.

IPR specialists argue that EC competition law should defer to IPR legislation in the interests of innovation. The author argues against such an approach and demonstrates how, both according to the interpretation given to the EC Treaty and as a matter of economic policy, EC competition law must provide a set of outer limits to, and a framework of rules which regulate, the exploitation and licensing of IPRs.

Anderson, R. and N. T. Gallini, Eds. (1998). Competition Policy and Intellectual Property Rights in the Knowledge-based Economy. Calgary, University of Calgary Press.

This book seeks to demonstrate - in the Canadian context - that ensuring a high rate of innovation and productivity improvement is at the core of the challenges facing the Canadian economy. The sound application of well-designed government policies to maximise incentives for innovative activity while maintaining vigorous interfirm rivalry is vital to meeting the challenge. The book also considers competition and IPR policy in other major economies such as the United States, the European Community and Japan.

Capling, A. (1999). "Intellectual property". Trade Politics: International, Domestic and Regional Perspectives. B. Hocking and S. McGuire. London and New York, Routledge: 79-95.

The author argues that the debate over IPRs is characterised by competing normative positions, few of which are grounded in either economic theory or empirically demonstrable outcomes. As a result, it is possible that TRIPS will simply enhance the economic benefits accruing to the holders of IPRs while imposing new and greater economic and social costs for many others.

Coleman, P. (1997). "U.S. Trade in Intangible Intellectual Property: Royalties and Licensing Fees." Industry, Trade, and Technology Review (U.S. International Trade Commission) (April): 23-37.

In addition to the growing emphasis on worldwide protection of IPRs, trade in intellectual property generates intense interest in the United States and abroad, in part because leading experts contend that net exports of intellectual property reflect national competitiveness, especially in advanced-technology industries. This article examines the principle components of trade in intangible intellectual property, identifies underlying patterns, and discusses trade barriers in principle export markets. One of the findings revealed by this article is that in 1995, the US exported intangible intellectual property valued at nearly \$27 billion, and imported intellectual property valued at \$6.3 billion, resulting in a trade surplus of \$20.6 billion.

Cornish, W. R. (1993). "The international relations of intellectual property." Cambridge Law Journal 52(1): 46-63.

Reviews the international relations of IPRs from the 19th century to the Uruguay Round GATT negotiations, and argues that IPRs should be no more than a corrective for those cases where the introduction of novel goods and services would be unduly impeded without the special incentive of an exclusive IPR right.

Hayenga, M. L. (1998). "Structural change in the biotech seed and chemical industrial complex." AgBioForum 1(2): 43-55.

In this paper, the restructuring of the seed and chemical industries is discussed. Impacts on the herbicide and insecticide markets are detailed, along with the contractual relationships between biotechnology seed suppliers and farmers. Antitrust issues raised by the recent wave of merger and acquisition activity and IPR issues are briefly discussed.

* Lesser, W. (1998). "Intellectual property rights and concentration in agricultural biotechnology." AgBioForum 1(2): 56-61.

The relationships between IPRs and structural change are examined in this paper. IPRs are a complex, multifaceted area and one in which corporate strategies are poorly understood. Nevertheless, it is argued here that IPRs can affect firm entry, make vertical integration in downstream industries more or less necessary, and create financial incentives for downstream mergers and acquisitions. Hence, IPRs can have significant structural impacts.

Lippert, O., Ed. (1999). Competitive Strategies for the Protection of Intellectual Property. Vancouver, The Fraser Institute.

This book contains discussions on the global changes in IPRs, including patents and trademarks. It discusses the critical trade and economic issues for the developing and developed countries involved in creating this new international standard of intellectual property protection.

* Maskus, K. E. (1998). "The international regulation of intellectual property." Weltwirtschaftliches Archiv 134(2): 186-.

The TRIPS Agreement will usher in a markedly stronger global system of defining and protecting IPRs. This paper analyses TRIPS as a global regulatory device. It first discusses the concept of intellectual property and the need for its protection and regulation. It presents evidence on the wide variations in IPRs across countries and discusses how TRIPS will affect these differences. Theoretical predictions about how this stronger system will influence global trade, investment, and technology innovation and diffusion are ambiguous, but limited empirical evidence suggests a modest positive

effect overall. However, the distribution of costs and benefits will vary across countries. Countries that are net importers of intellectual property should implement the agreement in ways that promote dynamic competition and should pay attention to linkages to competition policies.

Maskus, K. E. and M. Lahouel (2000). "Competition policy and intellectual property rights in developing countries." The World Economy 23(4): 595-611.

The authors argue that developing countries would gain if a WTO agreement were reached that recognised the principle that competition law should promote open competition, emphasised international cooperation in competition enforcement, and disciplined the most anti-competitive forms of public and private restraints against market contestability. They propose that any new round of trade negotiations should incorporate competition regulation, with a view towards enhancing global market accessibility.

Maskus, K. E. (2000). "Regulatory Standards in the WTO: Comparing Intellectual Property Rights with Competition Policy, Environmental Protection, and Core Labor Standards". Working Paper 00-1. Washington DC, Institute for International Economics. [<http://www.iie.com/catalog/WP/2000/wp00.htm>]

TRIPS greatly expands the purview of the WTO into domestic regulatory standards. The minimum standards required in TRIPS are essentially about production processes, thereby erasing the traditional "product versus process" distinction in the trading rules. This evolution immediately raises the question of whether other regulatory and process standards, including competition policy, environmental standards, and worker rights, should be placed onto the WTO agenda. Because they evidently no longer may be excluded on the grounds of the inability of the trading system to discipline process standards, the argument must proceed on other grounds. In this paper the author reviews the logic and evidence for such inclusion based on economic arguments for multilateral management of market externalities, policy coordination problems, and systemic trade issues. The review concludes that, conditional upon the protection of IPRs in the WTO, a strong case may be made for including competition rules. The case is weaker for environmental regulation and quite weak for labour rights.

McManis, C. R. (1998). "Intellectual property and international mergers and acquisitions." University of Cincinnati Law Review 66: 1283-1314.

Study on the links between IPRs and the consolidation trend in some industries such as pharmaceuticals that are experiencing mergers and acquisitions involving some of the biggest corporations. Inter alia, the author proposes that entrepreneurs in developing countries and the developing countries themselves develop ties with small- and medium-sized firms in the developed world. This is because the developing world and its allies among such small- and medium-sized firms could play a constructive role in the global economy, by combating the market distorting effects of oligopoly and incipient

cartelisation of R&D in industrialised countries.

Moran, W. (1993). "Rural space as intellectual property." Political Geography 12(3): 263-277.

Under free trade agreements nations are questioning the commercial legislation governing production of their partners. Also, for specific commodities, groups of producers and countries are bring litigation against other trading partners over the use of place-names by successfully claiming that they are intellectual property (i.e. geographical indications). Both processes are part of the globalisation of production under capitalism but their effects may be contradictory. Increased similarity in the commercial legislation of countries will enhance the advantage of the most competitive regions and nations leading to greater regional specialisation in rural production.

Nuffield Council on Bioethics (1999). Genetically Modified Crops: The Ethical and Social Issues. London, Nuffield Council on Bioethics. [<http://www.nuffieldfoundation.org>]

Study on the ethical and social issues relating to GM crops. Chapter 3 ("Issues related to commercial implementation") deals with the following issues and questions: commercial investment in GM technologies; the growth of the commercial sector; where are the decisions taken regarding the goals for GM technology?; consolidation of the plant biotechnology industry; the concept of property rights; the development of intellectual property in the life sciences; patenting living organisms; patenting DNA; patents on basic technologies; patenting and the impact of genomics; patents and commercialisation issues; commercialisation and developing countries issues; licensing; compulsory licensing; broad claims; patented technologies which override the UPOV convention; consequences of raw material substitution; globalisation and commodification; and accountability in the international dimension.

* Reichman, J. J. (1996-97). "From free riders to fair followers: global competition under the TRIPS Agreement." New York Journal of International Law and Politics 29: 11-93.

The author argues that developing countries have much to gain by accepting the challenge implicit in TRIPS to become fair followers in the worldwide quest for technical information. To sustain this thesis, the author begins by contrasting the growing tendency of the developed countries to adopt anti-competitive, high-protectionist industrial policies with the developing countries' new prospects for rapid economic growth under free-market conditions. He then outlines a pro-competitive strategy that could strengthen the developing countries' capacities to acquire up-to-date technological knowledge and skills while implementing minimum international IPR standards. In conclusion, the author argues that until a global equilibrium between innovators and competitors is achieved, any developing country willing to adopt and defend a pro-competitive reading of the TRIPS standards actually represents the interests of consumers and second-comers everywhere,

including those in the developed countries themselves.

Ryan, M. P. (1998). Knowledge Diplomacy: Global Competition and the Politics of Intellectual Property. Washington DC, Brookings Institution Press.

Explains the issues, politics, and diplomacy of balancing IPRs with the public's right of access, and discusses the major negotiations to forge international policy in the 1980s and 1990s, including the bilateral US intellectual property negotiations with China and other developing countries, the multilateral negotiations conducted at GATT, and the 1996 copyright treaties negotiated at WIPO. Also – from a strongly pro-U.S. position – analyses the shaping context of global competition in intellectual property-intensive industries – pharmaceuticals and fine chemicals, film and music, publishing, information technology, and software – and the industries' policy advocacy tactics and strategies to protect their markets.

* Sehgal, S. (1996). “IPR driven restructuring of the seed industry”. Biotechnology and Development Monitor: 18-21. [<http://www.pscw.uva.nl/monitor>]

Until recently, success in the seed business could be traced to the strength of a company's classical breeding programme. But with the advent of the first transgenic plants, such breeding, as well as access to germplasm, genes, and biotechnologies have become of considerable strategic importance. Genetic material, biotechnologies and their associated IPRs are leading to a new restructuring of the relations between agrochemical, agro-biotechnological, food processing, and seed industries.

Sell, S. K. (1998). Power and Ideas: North-South Politics of Intellectual Property and Antitrust. Albany, State University of New York Press.

Provides historical perspective, a broad introduction to the issues, and an in-depth, substantive analysis of the North-South politics and diplomacy of intellectual property protection and antitrust from the early 1970s to the present.

14. The TRIPS Agreement

The Agreement on Trade-Related Aspects of Intellectual Property Rights was one of the main outcomes of the Uruguay Round of trade negotiations concluded in 1994, which also led to the establishment of the World Trade Organization. TRIPS is now the key international agreement promoting the harmonisation of national IPR regimes.⁶¹ The purpose of the TRIPS Agreement, as stated in the preamble, is to introduce new rules and disciplines for global trade concerning the provision of:

- adequate standards and principles concerning the availability, scope and use of trade-related intellectual property rights
- effective and appropriate means for the enforcement of trade-related intellectual property rights
- effective and expeditious procedures for the multilateral prevention and settlement of disputes between governments

Protection and enforcement of IPRs should, according to Article 7 (*Objectives*), “contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations.” Just as social and economic welfare are considered as priority matters, Article 8 Paragraph 1 gives priority not only to the public interest in sectors of vital importance to social, economic and technological development, but also to public health and nutrition.

This section consists of legal analyses of the TRIPS Agreement (Blakeney, Correa and Yusuf, and Gervais) plus writings dealing with certain aspects of the Agreement which are of particular relevance to the interests of developing countries (e.g. Correa, Halewood and Juma), in addition to which there is an interesting paper (by Drahos) which describes the political background to the inclusion of trade-related IPRs in the GATT Uruguay Round negotiation and the achievement of the Agreement itself.

These writings generally pay little attention to one of the biggest challenges facing developing countries, which is that of making the domestic IPR regulatory systems function effectively. For example, bearing the heavy administrative and financial burden of establishing a patent office with the capacity to process efficiently an ever-increasing volume of applications in the latest technological fields is going to be a huge difficulty for a great many countries. The exception is the UNCTAD publication, which covers this issue well.

The writings

Blakeney, M. (1996). Trade Related Aspects of Intellectual Property Rights: A Concise Guide to the TRIPS Agreement. London, Sweet and Maxwell.

Comprehensive textual analysis of the TRIPS Agreement.

* Correa, C. M. and A. A. Yusuf, Eds. (1998). Intellectual Property and International Trade: The TRIPS Agreement. London, The Hague and Boston, Kluwer Law International.

TRIPS is the most far-reaching and comprehensive legal regime ever concluded at the multilateral level in the area of IPRs. In ten chapters, this work offers a framework for understanding the background, principles and complex provisions of the Agreement, it highlights the context in which it was elaborated and adopted, and the manner in which it is to be interpreted and applied. The book further analyses the new standards established under TRIPS. Finally, the work aims to stimulate further discussions and analysis in this area of growing importance to international law and international economic relations, particularly in respect of the possibilities offered by TRIPS, the legislative latitudes it leaves its Member States and the loose ends that may need to be addressed at national or international level in the future.

* Correa, C. M. (2000). Intellectual Property Rights, the WTO and Developing Countries: The TRIPS Agreement and Policy Options. London, New York, Penang, Zed Books and Third World Network.

The author explores the TRIPS Agreement's implications for developing countries. These relate to the future of R&D, their access to advanced technology, commercial exploitation of their natural resources and the welfare effects. He focuses on information technologies, integrated circuits and digital information, and also the conservation and sustainable use of genetic resources for food and agriculture. Correa also indicates some TRIPS-compatible policy options.

Drahos, P. (1995). "Global property rights in information: the story of TRIPS at the GATT." Prometheus 13(1): 6-19.

The paper tells the story of how the U.S. managed to secure an agreement, which heavily favoured it, on IPRs at the GATT. This agreement has important implications for global information flows. Understanding this event, the paper argues, will help us to understand some of the mechanisms which operate to bring about global regulatory institutions. Coercion of some kind is bound to be fundamental to the constitution of global regulatory orders.

Evans, G. E. (1996). "The principle of national treatment and the international protection of intellectual property." European Intellectual Property Review 3: 149-160.

Traces the history of the national treatment principle in international IPR law and evaluates the treatment of the principle under the TRIPS Agreement.

* Gervais, D. (1998). The TRIPS Agreement: Drafting History and Analysis. London, Sweet and Maxwell.

This guide to the TRIPS Agreement consists of two parts. The first part is a summary of the negotiations themselves including the informal sessions. The

second provides information on how to interpret the text of the Agreement, and includes texts of earlier versions and a commentary with each Article of the final version. The purposes of the commentary is to explain the underlying issues, any link with other provisions of the Agreement or of other relevant agreements, the possible impact of other GATT rules or principles of international IPR law, and where this is useful, to point out possible divergencies of views of arguments that may surface in the application of the Agreement.

Halewood, M. (1997). "Regulating patent holders: local working requirements and compulsory licences at international law." Osgoode Hall Law Journal 35(2): 243-287.

For decades, industry lobbyists and governments have been mounting pressure on other countries to offer strong protection for foreign owned intellectual property. However, this article argues that there are a wide range of policy options open to patent granting countries which both circumscribe patent holder's rights and comply with TRIPS and NAFTA.

Juma, C. (1999). "Intellectual property rights and globalization: implications for developing countries". Science, Technology and Development Discussion Paper No. 4. Cambridge, Center for International Development and Belfer Center for Science and International Affairs, Harvard University. [[http:// www.cid.harvard.edu/cidbiotech](http://www.cid.harvard.edu/cidbiotech)]

This paper reviews the implications of TRIPS. It focuses on the national implementation, technological development, plant variety protection, geographical indications, and biodiversity and associated traditional knowledge. The paper argues that efforts to promote compliance with TRIPS should be accompanied by measures that address public interest challenges such as health, nutrition and environmental conservation in developing countries. It suggests that addressing these issues will require policy and institutional innovations in the developed and developing countries. While some of the measures can be addressed through multilateral forums, many of them should be addressed through domestic laws and policies designed to foster innovation and expand international trade.

McGrath, M. (1996). "The patent provisions in TRIPS: protecting reasonable remuneration for services rendered - or the latest development in western colonialism?" European Intellectual Property Review(7): 398-403.

Criticises the stance of the United States in international negotiations on IPRs and in its unilateral actions against individual countries. It is argued that for developing countries whose patent provisions seek to tread the narrow path between protecting fair remuneration and promoting national development, TRIPS seems most likely to reinstate and perpetuate dependence.

Seiler, A. (1998). "Sui generis systems: obligations and options for developing countries." Biotechnology and Development Monitor 34: 2-5. [<http://www.pscw.uva.nl/monitor>]

In 1999, the sui generis option for the protection of plant varieties was evaluated by the TRIPS Council. The likelihood is that further periodic reviews will also take place. The shape of a TRIPS-compatible sui generis system will play a key role in establishing alternatives to patents on plant varieties. Five different sui generis approaches are considered: (i) granting community IPRs; (ii) community and collective intellectual rights; (iii) modified plant variety protection (like UPOV but with modifications); (iv) comprehensive biodiversity legislation; and (v) sectoral community rights regime.

* United Nations Conference on Trade and Development (1996). The TRIPS Agreement and Developing Countries. New York and Geneva, United Nations.

This is a study on the financial and other implications of TRIPS on developing countries. Part one of the report assesses the economic implications of TRIPS, focusing on market-related costs and benefits, as well as the direct costs stemming from implementation. It also summarises the results of selected country case studies carried out for the purpose of this study. Part two deals with the main disciplines covered by TRIPS. It highlights the principal provisions of each of these, its main economic and legal implications, general issues arising from its implementation and the costs involved in implementing the specific discipline. A section containing summaries of the main findings and conclusions of the study and the key issues that might require further consideration is presented. The section also explores the role that international organisation can play in assisting developing countries in their efforts to implement TRIPS.

Appendix 1:

Key journals on intellectual property rights and IPR-related themes

Biotechnology and Development Monitor

European Intellectual Property Review

IDEA - The Journal of Law and Technology

Indiana Journal of Global Legal Studies

Intellectual Property Journal

International Journal of Technology Management

Journal of World Intellectual Property

Prometheus

The World Economy

Appendix 2:

Glossary

CBD	Convention on Biological Diversity
CGIAR	Consultative Group on International Agricultural Research
CTE	Committee on Trade and Environment (of the World Trade Organization)
FDI	Foreign Direct Investment
GATT	General Agreement on Tariffs and Trade
INBio	Instituto Nacional de Biodiversidad (The National Biodiversity Institute of Costa Rica)
IPRs	Intellectual property rights – which comprise patents; copyright; trade secrets (undisclosed information); trademarks; industrial designs and design rights; geographical indications such as appellations of origin; semi-conductor protection; utility models (petty patents); database rights; performers rights; unfair competition)
MNCs	Multinational corporations
NAFTA	North American Free Trade Area
PTO	United States Patent and Trademark Office
R&D	Research and development
SCBD	Secretariat of the Convention on Biological Diversity
TRIPS	Trade-related Aspects of Intellectual Property Rights
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UPOV	International Union for the Protection of New Varieties of Plants
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

Endnotes

¹ Sometimes known as plant variety rights (PVRs).

² Sometimes known as petty patents.

³ Drahos 1997.

⁴ The Agreement on Trade-related Aspects of Intellectual Property Rights, which is administered by the World Trade Organization, the successor organisation to the General Agreement on Tariffs and Trade. TRIPS came into force in 1995.

⁵ Downes 1997, 2000; Downes and Laird 1999; Gollin 1993; Posey and Dutfield 1996.

⁶ One useful inference from such studies is that it is impossible to arrive at fixed patent terms and breadths that would be optimal for all industrial sectors, technologies and types of product ('types' here referring to market demand structures or life-cycles) (Primo Braga 1990).

⁷ With respect to patent duration, the eminent economist Jagdish Bhagwati remarked at an NGO roundtable meeting in Geneva in November 1998 that the 20 year minimum term of protection required by TRIPS "had no basis in economics".

⁸ The conclusion of Fritz Machlup in his classic 1958 paper on the patent system remains valid today: "[n]o economist, on the basis of present knowledge, could possibly state with certainty that the patent system, as it now operates, confers a net benefit or a net loss upon society. The best he can do is state assumptions and make guesses about the extent to which reality corresponds to these assumptions".

⁹ Godden 1987.

¹⁰ Vaver 1991.

¹¹ E.g. de Almeida 1995.

¹² E.g. Cameron and Makuch 1995; Downes 1995; Tarasofsky 1997; Yamin 1995.

¹³ E.g. Brush and Stabinsky 1996; Dutfield 1999; Greaves 1994; Posey and Dutfield 1996.

¹⁴ E.g. Hamilton 1994; Jaffé and van Wijk 1995; Leskien and Flitner 1997; Tansey 1999.

¹⁵ E.g. Cosbey 1996; Crucible Group 1994; Dutfield 2000; Mooney 1996; UNDP 1999. It is worth noting that many of these critical studies have been carried out or supported by NGOs dedicated to sustainable development, such as World Wide Fund for Nature, the IUCN-World Conservation Union, Third World Network, Genetic Resources Action International, ActionAid, and Rural Advancement Foundation International.

¹⁶ This point is strongly evidenced by the failure of many developing countries to fully implement TRIPS within the prescribed transitional periods.

¹⁷ E.g. Buttel and Belsky 1987; Kloppenburg 1988.

¹⁸ E.g. Brush 1993; Posey 1997.

¹⁹ E.g. May 2000; Ryan 1998; Sell 1998.

²⁰ E.g. Drahos 1996; Sterckx 1997.

²¹ See Dutfield 2000.

²² Due to the need to replace cultivars with new ones every few years.

²³ See Buttel and Belsky 1987, and the discussion in Section 13 below.

²⁴ That is to say whole plants and animals, micro-organisms, and functional or structural components of life-forms such as gene sequences, proteins and cells.

²⁵ Although so-called 'plant patents' have been available for asexually reproducing varieties of plants since 1930, these are somewhat different from conventional patents.

²⁶ Office of Technology Assessment 1988.

²⁷ OTA 1988.

²⁸ Although it was not till 1988 that the EPO awarded the first patent on a plant (to the US biotechnology company Agrigenetics) several European countries allowed plant patents from the mid twentieth century. Also the counterpart UK patent for the Chakrabarty invention was issued in the late 1970s (Grubb).

²⁹ The same exclusion is contained in the European Union's "Directive 98/44/EC on the Legal Protection of Biotechnological Inventions".

³⁰ Greenpeace v Plant Genetic Systems NV.

³¹ See Sterckx 1997; van Overwalle 1998.

³² E.g. Winter 1992.

³³ E.g. Crespi³³ 1995.

³⁴ E.g. Eisenberg 1994; Heller and Eisenberg 1998

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- ³⁵ E.g. Mooney 1996.
- ³⁶ E.g. Lehmann 1998.
- ³⁷ E.g. Barton 1991, OTA 1988, and Winter 1992.
- ³⁸ In Stoneman 1995.
- ³⁹ Creating property rights is not the only possible solution to the problem. Two others described by Paul David are patronage (i.e. state-funded prizes, research grants and other subsidies to research institutions and individuals), and procurement (i.e. government contracted scientific research and industrial R&D for public purposes).
- ⁴⁰ Several recent studies undermine public goods-based analyses of intellectual property on the grounds that they are based on an over-simplistic notion of innovation which assumes that innovations are discrete and independent. In reality they tend to be cumulative and dependent. Moreover, reproducing them may depend on tacit knowledge which cannot easily be documented in written form, such as in a patent specification, and is therefore available only to the innovator. One might add that apart from patents and secrecy, other possible means of appropriation for innovators include marketing, customer support services, reputation, and the advantage that comes with being first to bring innovations to market.
- ⁴¹ Drahos 1996.
- ⁴² Dutfield 2000.
- ⁴³ Included in Section 14.
- ⁴⁴ A term coined, like Farmers' Rights, by the North American advocacy group Rural Advancement Foundation International, whose director is Pat Mooney.
- ⁴⁵ And indigenous peoples themselves often express preference for words like 'stewardship' and 'custodianship', which imply existence of duties as well as rights.
- ⁴⁶ It is well-known that this does happen. And this is not only a problem for economic theorists to debate and smaller firms to complain about, since hospitals and laboratories performing diagnostic tests may be pressured in this way to pay a fee for each test by patent-owning companies *even though it is very possible that a legal challenge to the patent would result in its invalidation*.
- ⁴⁷ Lesser 1998.
- ⁴⁸ Barton 1991.
- ⁴⁹ Specifically: "a transgenic nonhuman eukaryotic animal (preferably a rodent such as a mouse)".
- ⁵⁰ According to Rai, the history of patent pools does not give cause for optimism in this regard. First, some of the best known patent pools were set up only after very protracted litigation. Second, past patent pools were sometimes anti-competitive. Third, in the biotechnology case, the partners would include a diversity of organisations such as universities, government research agencies, small firms and transnationals. Past experience suggests that patent pools have most often come about among homogeneous partners that have previous experience of collaborating.
- ⁵¹ Possible only in countries where patent applications are published before they are granted.
- ⁵² NBIAP/ISB (1995) Patent office cancels broad patent on transgenic cotton. NBIAP/ISB website (<http://www.nbiap.vt.edu>).
- ⁵³ NBIAP/ISB (National Biological Impact Assessment Program/Information Systems for Biotechnology) (1994) Transgenic cotton patent under pressure.
- ⁵⁴ See Doern 1999.
- ⁵⁵ See also UNCTAD 1996.
- ⁵⁶ A view held by many European governments and companies during their country's industrial revolutions.
- ⁵⁷ Created in 1999 through the merger of Astra with Zeneca, formerly the pharmaceutical and agrochemical divisions of ICI.
- ⁵⁸ Created in 2000 through the merger of Hoechst and Rhône-Poulenc.
- ⁵⁹ See Kloppenburg 1988; Sehgal 1996.
- ⁶⁰ Agrevo/Plant Genetic Systems (PGS); Du Pont/ Pioneer; ELM/ DNAP /Asgrow /Seminis; Monsanto/ Calgene/ Delkalb/ Agracetus/ PBI /Hybritech /Delta and Pine Lane Co.; Novartis; Zeneca/ Mogen/ Avanta.
- ⁶¹ Its intent is to guarantee minimum standards rather than harmonisation *per se*, but the effect will also be to make national IPR systems more similar to each other.