



International Environmental
Law Research Centre

Food Security and Intellectual Property Rights in Developing Countries

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I. Introduction

Food insecurity is a major problem throughout the South. It is a concern at all levels, from individuals to states. At a basic level, food security is about fulfilling each individual's human right to food. Within the broad question of the human right to food, food security also relates more specifically to issues of agricultural policy, economic development and trade. This study picks up on the specific link between food security and intellectual property rights (IPRs), one – but only one – of the important perspectives from which food security must be analysed.

IPRs have become increasingly important in the past couple of decades in a number of fields. This includes, for instance, agricultural biotechnology where IPRs provide a basic incentive for the development of the private sector in this area. The extension of IPRs to agriculture is of special significance because agriculture and food security are closely interlinked. In other words, the introduction of IPRs in agriculture is directly linked to the realisation of basic food needs.

The introduction and strengthening of IPRs in the agricultural sector of developing countries has been and remains contentious. On the whole, food security constitutes the central concern of all relevant actors. The introduction of IPRs in plant varieties is justified by the need to foster food security in the long-term. Similarly, arguments in favour of an open system where private IPRs are not enforced are also based on the premise that this will contribute to food security. At present, IPRs in agriculture have been and are being introduced in developing countries that are members of the World Trade Organization (WTO). This is taking place in a context where food insecurity remains a central concern for a majority of developing countries where a large proportion of the population does not have access to sufficient good quality food. A host of conceptual and practical issues need to be addressed in the context of the paradigmatic shift from a system seeking to foster food security on the basis of the free exchange of knowledge to a system seeking to achieve the same goal on the basis of the private appropriation of knowledge. This is not only due to the fact that IPRs provide different kinds of incentives for inventiveness than a system based on the free sharing of knowledge but also because some of the new plant varieties are the product of genetic engineering. The latter bring in other environmental and socio-economic dimensions to the subject considered.

This study examines the issue of food security from the narrow perspective of intellectual property. The first section provides a general introduction to the issues and challenges in this field. The second section goes on to introduce the relevant international legal framework for food security and intellectual property. The third section examines some of the implications of recent developments in international law for developing countries and looks in more detail at the way in which India has been implementing its international obligations in this field. Finally, the fourth section, building on the analysis provided in the previous sections provides recommendations for the implementation of existing international legal obligations and the further development of the legal regime in this field.

II. Food Security and Intellectual Property Rights in Developing Countries

Food security remains an overwhelming concern for developing countries even though some countries classified as developing countries have virtually eradicated hunger.¹ In some parts of the world, under nourishment remains dramatic. Thus, 24% of the population of South Asia is undernourished and 33% in sub Saharan Africa.² As often acknowledged, food security is a function of availability, access and distribution of food.³ A number of other links are also relevant such as the links between food security, property rights, agriculture and environmental management. The latter remain fundamental in a context where a majority of the active population is in the agricultural sector and where agriculture provides directly or indirectly the basic food needs of about 70% of poor and undernourished people.⁴

A. Food Security

Food security can be understood at different levels, from the household to the international level.⁵ While the overall availability of food at a global level is not a major concern at present,⁶ food availability in specific regions of the world and access to food by specific individuals remains a major concern in most parts of the South. Further, population growth in countries where undernourishment is already a problem and diminishing arable land availability make food insecurity one of the most important policy challenges of coming years.⁷

Food security is not only dependent on the availability of food but also on effective access and appropriate distribution of existing foodstuffs. Unavailability of foodstuffs is not a major concern at present a worldwide level since the world produces enough food for its present population. Availability is a concern at present in the case of countries suffering from armed conflicts, in situations where sufficient arable land is not available or in the case of persistent drought. Food availability will also be an increasing concern in the future if food production does not keep pace with population growth. At present, however, the problem of under nourishment is often more linked to the problem of lack of access to food and maldistribution of foodstuffs than the problem of unavailability. In countries like India, overall food availability has been more than sufficient for a number of years but the numbers of undernourished keep rising.⁸ This indicates that food security must be analysed at different levels at the same time. The availability of sufficient food within the country does not indicate that each and every household and every individual has access to sufficient food, the latter being the ultimate measure of food security.

Food security at an individual level implies that people must either have a sufficient income to purchase food or the capacity to feed themselves directly by growing their own food. There is therefore a direct link between poverty and food security.⁹ More specifically, food security is influenced by individuals' capacity to work, individual and household access to land and their control over the land and other productive assets, including seeds.¹⁰ Further, food security is also influenced by policies concerning the management of the environment in general and agricultural biodiversity specifically. Diversity constitutes from an environmental point of view one of the ways in which resilience of agricultural systems can be ensured while from a socio-economic point of view, agro-biodiversity constitutes to a large extent one of the basic productive assets of poor farmers.

One of the major debates with regard to food security today is the contribution that agro-biotechnology can make to meeting the food needs of the world's population. This happens in a context where it is expected that most of the increase in food production will continue to come from further intensification of crop production where part of this increase will come in the form of higher yields and part in the increase of multiple cropping and reduced fallow periods.¹¹ It is hoped that transgenic plant varieties can contribute to at least part of this food production increase. In practice, the impacts of transgenic plant varieties on agricultural management are partly similar to the impacts of Green Revolution varieties. The main differences are concerns over environmental safety on the one hand and the impacts of the close link between agro-biotechnology and IPRs. At present, the potential of modern biotechnology for food security in developing countries remains an open question. Firstly, it appears that plant biotechnology research is only likely to benefit poor farmers if it is applied to 'well defined social or economic objectives'.¹² To date, commercialised genetically modified crops have generally

not focused on the needs of developing country agriculture. In fact, it is uncertain whether the large life-science companies that are responsible for most of the applied agro-biotechnology research thanks to the incentives provided by IPRs can ever be expected to focus their research efforts on plant varieties of specific interest to poor farmers and consumers in developing countries.¹³ Secondly, the scale of overall benefits derived from the introduction of transgenic plant varieties remains a matter of debate when agricultural and other factors, such as environmental and socio-economic factors are taken into account. Thirdly, according to projections showing an increase in agricultural trade in coming years, it is possible that further specialisation will occur whereby some developing countries may be led to increase the production of non-food cash crops at the expense of basic food crops.¹⁴ This may have significant implications for local and national food security in a context where it is expected that the development of agro-biotechnology may lead to further market concentration and where access to genetically modified seeds may be hampered by their higher cost.¹⁵

The policy challenges concerning food security are immense. Guaranteeing access to food for each individual around the world today and in the future requires measures to create wealth in poor communities, measures to enhance poor farmers' control over their land and productive assets, measures to conserve the natural resource base while increasing either agricultural productivity or arable land availability and measures to ensure effective distribution of existing food supplies.

There have been various attempts at the international level to define food security. At present, the most widely accepted definition is that adopted at the 1996 World Food Summit (WFS). The WFS Plan of Action acknowledges that food security must be achieved from the individual and household levels up to the global level. It defines food security as physical and economic access to sufficient, safe and nutritious food by all people to meet their dietary needs and food preferences for an active and healthy life.¹⁶ The Plan of Action openly acknowledges that meeting food security objectives implies improving access to food which is itself linked to poverty eradication. Undernourishment is linked to inadequate access to means of production such as 'land, water, inputs, improved seeds and plants, appropriate technologies and farm credit' which in turn implies an incapacity to produce or purchase sufficient food.¹⁷ The Plan of Action also notes the significance of environmental threats to food security which can come in the form of drought, land degradation or loss of biodiversity and negatively impact on food production.¹⁸

The WFS definition of food security, though widely accepted, has been criticised from different standpoints. Some actors tend to use a more restrictive definition which focuses more on the question of global increases in food production than on the issue of household access to food. Other actors have criticised the WFS definition because it does not go far enough insofar as it does not include a rights dimension. Notwithstanding disagreements on the exact definition of food security, the fulfilment of food needs constitutes a generally accepted goal. Thus, at the Doha Ministerial Conference, the WTO emphasised that special and differential treatment was necessary to allow developing countries to take into account their development needs, highlighting among them food security.¹⁹ Similarly, the Plan of Action adopted by the World Summit on Sustainable Development (WSSD) singles out among the goals for poverty eradication the necessity to increase food availability and affordability as well as the need to substantially reduce the number of people suffering from hunger.²⁰

In addition to the dimensions highlighted, the question of food security can also be looked at from a rights perspective. The human right to food provides, for instance, that freedom from hunger requires steps to improve methods of production, conservation and distribution of food.²¹ Further, states have to proactively engage in activities to strengthen people's access to and utilization of resources and means to ensure their livelihood and food security.²² This includes measures such as land reform, ensuring physical and economic access to credit, natural resources, new technologies, rural infrastructure, irrigation, and provision of explicit farmers rights through legislation. Building on the human rights approach the concept of 'food sovereignty' is also noteworthy. Food sovereignty implies the recognition of the freedom and capacity of people and their communities to exercise and realise their right to food, right to produce food and the assurance of access to productive resources. It is a valuable addition to the food security discourse insofar as it is a concept which applies from individual level to the level of nation states.²³

B. Intellectual Property Rights and Food Security

There are a number of links between IPRs and food security. In general, IPRs such as patents or plant breeders' rights seek to give incentives, mainly to private sector actors, to develop seeds that either produce higher yields or have specific characteristics which will improve food security and agro-biodiversity management. IPRs were for a long time underdeveloped in the context of agriculture. Firstly, in many countries and at the international level, agricultural management was premised on the basis of the free exchange of germplasm and knowledge, a system wherein IPRs did not fit well. Secondly, it was generally recognised that agriculture was substantially different from other fields of technology because farmers were often used to save seeds from previous crops and because the link between the fulfilment of basic food needs and agriculture made it undesirable to foster commercialisation in this field.

IPRs have progressively been introduced in agriculture in two main phases. Firstly, a number of developed countries adopted over time a form of intellectual property protection for plant varieties – plant breeders' rights – which is derived from the patent model. Secondly, in the context of the development of genetic engineering, the progressive introduction of patents over life forms has constituted a major incentive for the overall growth of agro-biotechnology. At present, the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) provides a number of specific minimum levels of protection that all WTO member states must respect.²⁴ This includes, for instance, the patentability of micro-organisms and a form of intellectual property protection for plant varieties. Beyond these minimums, there is no uniformity around the world insofar as some countries like the United States have gone further than the TRIPS minimums and accept, for instance, the patentability of plant varieties.²⁵

A number of justifications can be offered for the introduction of IPRs with a view to foster food security in developing countries. In general, the legal protection offered by IPRs is one of the most important incentives for private sector involvement in agro-biotechnology.²⁶ IPRs are thus primordial in ensuring the participation of the private sector in the development of improved plant varieties. Improvements that can be brought about by agro-biotechnology include plant varieties that produce higher yields by enhancing the capacity of the plant to absorb more photosynthetic energy into grain rather than stem or leaf, varieties that have the capacity to combat pests and varieties modified to grow faster through enhanced efficiency in the use of inputs such as fertilisers, pesticides and water.²⁷ From a food security point of view, another potentially interesting feature of agro-biotechnology is the possibility to modify varieties to improve their nutritional value, such as in the case of the pro-vitamin A rice.²⁸ Other arguments include the potential of the introduction of IPRs in developing countries to increase foreign direct investment, increase technology transfers and R&D by foreign companies while at the same time giving domestic actors incentives to be more innovative.²⁹

C. Policy Considerations for Food Security in the Context of Intellectual Property Rights

IPRs have the potential to enhance agricultural production. However, in the context of developing countries, this contribution must be analysed in a broader perspective which takes into account a number of other variables. The introduction of IPRs in agriculture has important links with other forms of property rights directly relevant in agriculture, such as land rights and rights over biological resources.³⁰ In fact, the question of access to biological and genetic resources for food and agriculture has been at the centre of significant debates at the international level for a number of years. Control by individual farmers, private companies and states over the genetic and biological resources they hold and related knowledge has become increasingly contentious with the progressive introduction of IPRs over certain types of plant varieties for instance. While the sharing of resources and knowledge was emphasised until the 1980s, the new system which promotes individual appropriation has led to the formulation of a new set of rules concerning control over knowledge and resources. At the international level, while private individual appropriation of inventions through IPRs has been condoned, state control over primary resources has at least in principle been reinforced. At the national level, the role of farmers in conserving and enhancing agro-biodiversity has generally been recognised but this is not necessarily translated into specific claims over resources or knowledge.

The introduction of IPRs in agriculture raises specific concerns with regard to farmers' control over their resources and knowledge. In general, IPRs tend to facilitate control over seeds and related knowledge by agribusinesses at the expense of small and subsistence farmers. This is linked in part to the royalties that farmers must pay to acquire protected seeds together with the associated restrictions on saving, replanting and selling saved seeds. In principle, it appears essential that farmers should retain control over plant varieties so that they may continue to innovate, improve and adapt varieties to suit changing needs and conditions.³¹ At present, even when IPRs are introduced in the South, it is unlikely that IPRs holders will be able to control farmers' ability to save and replant seeds as much as in countries like the United States where IPRs protection is often enhanced with contractual obligations.³² However, the introduction of genetic use restriction technologies would constitute a specific challenge in this context since this would provide a tool for patent holders to ensure that farmers fully respect patent rights.³³ The challenge that the progressive introduction and strengthening of IPRs in agriculture imposes on relevant actors is, for instance, quite severe for the Consultative Group on International Agricultural Research (CGIAR). Faced with the complete overhaul of the international agricultural system which is taking place, the International Agricultural Research Centres (IARCs) have specifically indicated that '[t]here is some concern that even the Right to Food, as defined by various governments, could be compromised by certain interpretations of intellectual property and other agreements'.³⁴ From a broader perspective, the impacts of IPRs can be compared to the broader impacts of globalisation in food in agriculture of which they are one segment. As noted by the FAO, globalisation can have a number of positive impacts but at the same time may contribute to the disempowerment of certain communities and countries.³⁵ In other words, the potential of transgenic plant varieties to foster food security is partly linked to the development of mechanisms to foster their transfer and ways to ensure that they are affordable for poor farmers.

The introduction and strengthening of IPRs in agriculture fosters two kinds of concerns linked to R&D. Firstly, there are concerns that 'over-patentability' in the biotechnology industry may have the potential to stifle innovation in the private and public sector rather than promote it.³⁶ This is linked to the scope of the claims that can be made in the field of agro-biotechnology. The perception is often that broad claims are necessary to provide the industry with sufficient incentives to innovate but that IPRs claims should not extend to the primary material for research because this tends to stifle scientific and technological innovation. This constitutes a difficult debate in the present environment. Generally, scientific innovation benefits from free access to all primary materials for research. However, current scientific research often requires access to patented technologies beyond the primary biological material. Further, the products of scientific research are increasingly often patented. From a policy-making point of view, it is necessary to determine whether the primary holders of biological material and knowledge should avail their resources and knowledge free to the whole of humankind for the greater common good. It is noteworthy in this context that the introduction of plant breeders' rights, as distinguished from patents, was partly based on the premise that innovations by breeders could only be sustained if the primary and protected material remained freely available for further research. Secondly, an other point concerns the extent to which it is reasonable to expect the research agenda to be geared towards the needs of individuals below the poverty line as long as most of the research is carried out with a view to develop commercially valuable products.³⁷ In fact, it is noteworthy that the first generation of genetically modified crops have generally not been bred for raising yield potential, and that any gains in yields and production have come primarily from reduced losses to pests.³⁸ This tends to indicate that the introduction of IPRs in agriculture in developing countries should be accompanied by further measures to ensure that research is also geared towards the needs of the poor. This concern leads the FAO to suggest that public sector research will have a strong role to play, in particular with regard to the need to raise productivity of the poor in the agro-ecological and socio-economic environments where they practise agriculture and earn their living.³⁹

The introduction of IPRs in agriculture must also be examined in its broader context which includes, for instance, the impacts of IPRs in agriculture on biodiversity management. Biodiversity and agricultural-biodiversity in particular, is of primary importance for the sustainability of agricultural systems in the long term. Agro-biodiversity is of special importance because it directly contributes to feeding people.⁴⁰ Agriculture and biodiversity management are inextricably intertwined because biological resources constitute a primary input to agricultural production systems and the majority of existing agricultural products have evolved through selection and collection of plant and animal species.⁴¹ In this context, landraces which are geographically or ecologically distinct crops or animals selected by farmers for their overall economic value are of special impor-

tance.⁴² IPRs in agriculture have an inherent tendency to displace landraces because protected varieties generally offer higher yields than local counterparts. This process of displacement tends to promote homogenisation in agricultural fields (or in other words monocultures) which leads to a loss in diversity and generally reduces crops' resilience to pests and diseases.⁴³ Other elements that must be taken into account include problems related to the development of resistance by pests to biopesticides. Further, there are some specific concerns with regard to the potential harmful impacts of transgenic plant varieties on specific species.⁴⁴ While a number of the impacts of the introduction of transgenic plant varieties can be compared from an environmental point of view to the impacts of the introduction of Green Revolution varieties and may not be specific to the context of this study, they should nevertheless be fully considered.

III. International Law and Food Security

The international legal framework for food security is found in a number of different treaties and instruments which belong to completely different areas of international law. Firstly, some treaties and institutions deal with food security from the point of view of agriculture. Secondly, IPRs treaties only deal indirectly with food security but their implementation has significant impacts for food security in developing countries. Thirdly, several environment-related treaties have important implications for food security. Finally, human rights treaties focusing on the right to food or related rights also have a central place in the overall framework.

A, Agriculture Related Legal and Institutional Framework

Legal instruments sponsored by the FAO

The FAO, in keeping with its role as the central UN organisation dealing with agriculture, has logically played an important role in defining the food security related legal framework.⁴⁵ In fact, the two main instruments adopted in the FAO context, the 1983 International Undertaking for Plant Genetic Resources (International Undertaking)⁴⁶ and the 2001 International Treaty on Plant Genetic Resources for Food and Agriculture (PGRFA Treaty) clearly reflect the evolution of the overall legal system in this area. The importance of the International Undertaking and the PGRFA Treaty derives from their focus on the legal status of agricultural plant genetic resources, the focus on farmers' rights and at least an attempt to provide a coherent system taking into account the different interests at stake, from the imperative of access to food to agro-biodiversity management and the granting of incentives to commercial breeders through IPRs.

The international legal regime for the conservation and use of agricultural plant genetic resources has been marked by significant changes over the past few decades. Traditionally, plant genetic resources for food and agriculture (PGRFA) were freely exchanged on the understanding that PGRFA constituted a common heritage of humankind. As a result, rights over PGRFA could not be appropriated by private entities. These principles were embodied in the 1983 International Undertaking. It affirms the principle that plant genetic resources are a heritage of humankind which should be made available without restriction to anyone. This covers not only traditional cultivars and wild species but also varieties developed by scientists in laboratories. The International Undertaking was adopted as a non-binding conference resolution. However, the emphasis on the free availability of PGRFA proved to be unacceptable to some developed countries which already had interests in genetic engineering. Broader acceptance of the International Undertaking was only achieved after the FAO Conference passed interpretative resolutions in 1989 and 1991.⁴⁷ These resolutions affirm the need to balance the rights of formal innovators as breeders of commercial varieties and breeders' lines on the one hand, with the rights of informal innovators of farmers' varieties on the other. Resolution 4/89 recognises that plant breeders' rights, as provided for in the UPOV Convention, are not inconsistent with the Undertaking, and simultaneously recognises farmers' rights as defined in Resolution 5/89. Resolution 3/91 further recognises the sovereign rights of nations over their own genetic resources.

Further revision of the International Undertaking was prompted by the growing importance of biological and genetic resources at the international level. In 1992, Agenda 21 called for the strengthening of the FAO Global System on Plant Genetic Resources, and its adjustment in accordance with the outcome of negotiations on the Biodiversity Convention.⁴⁸ Negotiations for the revision of the Undertaking in harmony with the Convention began with the First Extraordinary Session of the Commission on Plant Genetic Resources in November 1994 and continued until November 2001.

The new Undertaking is now a binding treaty, the PGRFA Treaty.⁴⁹ The Treaty was the object of arduous negotiations which led to a final consensus text which was acceptable to all the states present apart from the United States and Japan which abstained from voting.⁵⁰ The overall objectives of the PGRFA Treaty are significantly different from those of the 1983 Undertaking. The Treaty, reflecting the new orientation given by the Biodiversity Convention, emphasises the conservation of PGRFA, their sustainable use and benefit sharing. The guiding principles for these three objectives are the promotion of sustainable agriculture and food security.

The PGRFA Treaty focuses on issues not addressed in other international treaties such as farmers' rights but it does not address directly patents or plant breeders' rights covered in other treaties.⁵¹ The PGRFA Treaty has a number of unique characteristics. Firstly, it is the first treaty providing a legal framework which not only recognises the need for conservation and sustainable use of PGRFA but also delineates a regime for access and benefit sharing, and in this process provides direct and indirect links to IPRs instruments. Secondly, it directly links plant genetic resource conservation, IPRs, sustainable agriculture and food security. Thirdly, the element which remains the distinguishing feature of the PGRFA Treaty in the field of plant variety protection is its focus on farmers' rights. In fact, the term farmers' rights is slightly misleading. The PGRFA Treaty gives recognition to farmers' contribution to conserving and enhancing PGRFA. It further gives broad guidelines to states concerning the scope of the rights to be protected under this heading but overall devolves the responsibility for realizing farmers' rights to member states. This includes the protection of traditional knowledge, farmers' entitlement to a part of benefit sharing arrangements and the right to participate in decision-making regarding the management of plant genetic resources. However, the treaty is silent with regard to farmers' rights over their landraces. In fact, the 'recognition' of farmers' contribution to plant genetic resource conservation and enhancement does not include any property rights. In this context, the only rights that are recognized are the residual rights to save, use, exchange and sell farm-saved seeds.⁵²

One important aspect of the PGRFA Treaty is the novel scheme devised to regulate access and benefit sharing of PGRFA covered under the Treaty. The underlying reason for the inclusion of a system of facilitated access is that the sovereign rights of states over their PGRFA are qualified by the recognition that these resources are a common concern of humankind and that all countries depend largely on PGRFA that originated in other countries. As a result, donor countries have full control over their PGRFA but there are strict limitations on their ability to restrict access to other states. Under the Multilateral System, a series of crops listed in Annex I which account for most of – but not all – human nutrition are covered by a provision under which member states agree to provide facilitated access. As per the PGRFA Treaty, access is to be provided only for the purpose of utilization and conservation for research, breeding and training for food and agriculture. As a result of the recognition of PGRFA as a common concern, access has to be accorded expeditiously. Concerning material which is under development by farmers or breeders at the time when access is requested, the Treaty gives the country of origin the right to delay access during the period of development.

One of the most difficult part of the Treaty negotiations related to the treatment of IPRs. The compromise solution is that recipients of PGRFA cannot claim IPRs that limit the facilitated access to the PGRFA, or their genetic parts or components, in the form received from the Multilateral System. Further, PGRFA accessed under the Multilateral System must also be made available to other interested parties by the recipient under the conditions laid out by the Treaty. This provision which stops the appropriation of isolated components from material accessed under the Multilateral System was strongly opposed by some countries which argued that this would stifle innovation. On the other hand, when the PGRFA in question are already protected by intellectual property or other property rights, access can only take place in conformity with the treaties regulating the particular kind of property rights. As is the case with some other treaties like the Biosafety Protocol, the PGRFA Treaty refuses

to establish a hierarchy between itself and other related treaties, such as IPRs treaties. This leaves the door open for divergent interpretation at the time of implementation.

The question of access is closely related to that of benefit sharing. In fact, the benefit sharing regime constitutes another part of the bargaining process which seeks to make PGRFA a common concern of humankind. The rationale for benefit sharing is that countries providing facilitated access to their PGRFA are granted in return the right to receive some forms of benefits.⁵³ Different types of benefit sharing mechanisms are provided for under the Treaty: These include the exchange of information, access to and transfer of technology, capacity building, and the sharing of the benefits arising from commercialisation. With regard to the sharing of information, the Treaty envisages that member states will, for instance, provide catalogues and inventories, information on technologies, and the results of technical, scientific and socio-economic research. Concerning technology transfer, the Treaty provides only a general obligation to facilitate access to technologies for the conservation, characterization, evaluation and use of PGRFA which is further qualified by the fact that access to such technologies is subject to applicable property rights. In the case of developing countries, specific mention is made of the fact that even technologies protected by IPRs should be transferred under 'fair and most favourable terms', in particular in the case of technologies for use in conservation as well as technologies for the benefit of farmers in developing countries. Finally, the Treaty provides for the sharing of monetary benefits. These include, for instance, the involvement of the private sector in developing countries in research and technology development. Further, the standard Material Transfer Agreement, through which facilitated access will be implemented, will include a requirement that an equitable share of the benefits arising from the commercialisation of products that incorporates material accessed through the Multilateral System will have to be paid to the Trust Account set up under the Treaty. The benefits that arise under the benefit sharing arrangements must be primarily directed to farmers who conserve and sustainably use PGRFA.

Overall, the Treaty which constitutes the outcome of many years of negotiations is noteworthy for linking the conservation of PGRFA, their use, the rights of farmers over resources and knowledge and finally the IPRs system. It provides an interesting, though inconclusive, attempt to link these different elements. The provisions concerning access and benefit sharing typically seek to build a bridge between the different forms of property rights recognised under the PGRFA Treaty and in other relevant treaties such as the TRIPS Agreement. They, however, largely lack in specificity, partly because they reflect the difficult balancing of interests that the negotiators had to achieve between the interests of developed and developing countries, big private seed companies and small farmers and a number of other actors in between.

The Consultative Group on International Agricultural Research

Since its inception in 1971, the CGIAR has played an important role in the management of genetic resources used to meet food needs and in defining property rights policies in this regard. The CGIAR brings together a network of IARCs which have important *ex situ* germplasm collections. The CGIAR aims at alleviating poverty, achieving food security and assuring sustainable use of natural resources.⁵⁴ It has traditionally sought to fulfil its mandate through the development of freely accessible *ex situ* collections and the production of freely available improved varieties. However, in keeping with the progressive move towards the establishment of sovereign and private property rights over biological and genetic resources, the CGIAR has gradually modified its stance concerning real and intellectual property rights.⁵⁵

In the past decade, a number of important developments have taken place. Firstly, starting in 1994, the Centres have signed agreements that place their collections held in trust for humankind under the auspices of the FAO and that restrict them from claiming IPRs over designated germplasm or related information.⁵⁶ Secondly, the CGIAR and the IARCs progressively developed new guiding principles on intellectual property with a view to harmonise the CGIAR's core principles that designated germplasm is held in trust for the world community with the recognition of various forms of property rights, including sovereign rights, farmers' rights and IPRs.⁵⁷ To-date, the Centres do not normally apply intellectual property protection to their designated germplasm and require recipients to observe the same conditions. They also refrain from asserting IPRs over the products of their research. An exception to this rule is made in case the assertion of IPRs facilitates technology transfer or otherwise protects developing countries' interests. The CGIAR also imposes that any IPRs on the IARCs' output should be assigned to the Centre and not an individual. While the guiding principles on intellectual property

generally seek to contain to an extent the monopoly elements of IPRs such as patents, plant breeders' rights are specifically welcomed. Recipients of germplasm can apply for plant breeders' rights as long as this does not prevent others from using the original materials in their own breeding programmes.

Thirdly, the PGRFA Treaty will further change the conditions under which the CGIAR operates. In future, guidance concerning the management of CGIAR collections will come from the Treaty's Governing Body.⁵⁸ In fact, the Centres having signed agreements with the FAO are now invited to sign new agreements with the Treaty's Governing Body. These agreements will provide that the collections of the Centres that are part of the Annex I list will be governed by the access provisions of the PGRFA Treaty. This will, however, only cover materials collected after the entry into force of the Treaty and that fall within its scope. The Centres are also put under an obligation to provide preferential treatment to countries that provided material to their gene banks and are not to request any material transfer agreement if a country of origin wants to access its own material. Generally, the Centres will have to recognise the authority of the PGRFA Treaty's Governing Body to provide policy guidance relating to their *ex situ* collections. Overall, the PGRFA Treaty will foster more coordination between the FAO and the CGIAR. This will, in particular, have significant impacts in terms of their outlook on IPRs which will have to be broadly similar, at least with regard to the CGIAR collections falling in the scope of the PGRFA Treaty.

The CGIAR has long benefited from its hybrid institutional status among international institutions which contributed in part to making possible its contribution to the alleviation of food insecurity in developing countries. In recent times, however, the CGIAR has found it increasingly difficult to reconcile its original mission with the changing legal and policy framework in which it operates. Thus, the decision to accept the Syngenta Foundation for Sustainable Agriculture as a new CGIAR member has been criticised as sign that the CGIAR is moving away from its public sector research mission. Further, the CGIAR has also found it difficult to adjust to some of the challenges of biotechnology. The case of the controversy over the introduction of genetically modified maize in Mexico – the primary centre of diversity for maize – illustrates the challenges that lie ahead for an organisation which is striving to maintain its significant collections of germplasm while endorsing at the same time biotechnology as 'one of the critical tools for providing food security for the poor'.⁵⁹

B. Intellectual Property Rights Related Legal and Institutional Framework

Developments in the agricultural field are of central importance because they directly concern food security. However, with the large-scale development of genetic engineering, IPRs standards have become increasingly important in their own right and because they influence the development of the legal and policy framework in agriculture and other fields.

This section does not attempt to provide an exhaustive analysis of the IPRs framework in the field of food security but focuses on some of the most important treaties and institutions from the point of view of developing countries. Further, it only covers under the heading of IPRs, rights that have generally been considered as falling within the subject matter of intellectual property protection. *Sui generis* forms of intellectual property protection which could provide alternatives to the current model are considered in Section 4.

The TRIPS Agreement

The TRIPS Agreement is today the most important intellectual property treaty for all WTO member states. The TRIPS Agreement is only indirectly concerned with agriculture and environmental management but the IPRs standards it sets have wide-ranging impacts on agricultural management.

The TRIPS Agreement is a general treaty which covers different types of IPRs, such as patents, copyright and geographical indications. It seeks to introduce minimum standards of IPRs in all member states.⁶⁰ In practice, this generally has the effect of extending the application of IPRs standards already in use in most OECD countries to all WTO member states and thus imposes a significant burden of adjustment on developing country

member states. The framework provided by the TRIPS Agreement must be understood in the context of the interpretative clauses that are part of the treaty. Article 7 recalls that IPRs protection must both contribute to the promotion of technological innovation and at the same time to the transfer and dissemination of technology in a manner conducive to social and economic welfare, and to a balance of rights and obligations. Further, Article 8 concedes that in implementing TRIPS obligations at the domestic level, states have the possibility to adopt measures to protect nutrition and to promote the public interest in sectors of vital importance to their socio-economic and technological development.⁶¹

Among the types of IPRs protected under the TRIPS Agreement, patent rights stand out in the context of food security. The Agreement uniformly provides that patents must be available for inventions, whether products or processes, in all fields of technology.⁶² Some general exceptions are granted and states can, for instance, exclude patentability where this is necessary to protect human, animal or plant life or health, or to avoid serious prejudice to the environment. They can also exclude from patentability plants and animals other than micro-organisms.⁶³

Questions relating to patents in agro-biotechnology are dealt with in two ways. Firstly, the TRIPS Agreement imposes the patentability of micro-organisms. Secondly, it also requires all member states to introduce intellectual property protection for plant varieties. The question of plant variety protection is the object of a separate provision, Article 27(3)b framed as an exception to the general rule of Article 27(1). It provides that all member states 'shall provide for the protection of plant varieties either by patents or by an effective *sui generis* system or by any combination thereof'.⁶⁴ This provision will have significant repercussions because most developing countries have to reorient their policies in this field to comply with the TRIPS Agreement. This is due to the fact that most developing countries implemented until 1994 the principles upheld in the International Undertaking and favoured the sharing of resources and knowledge rather than the commercialisation of a sector mainly concerned with the satisfaction of basic food needs.⁶⁵

Article 27(3)b is, however, an interesting provision within the TRIPS context because it does not impose the patentability of plant varieties but gives member states significant liberty to introduce an alternative system. This reflects the continuing debates concerning the appropriateness of imposing patents on plant varieties and constitutes one of relatively few cases in TRIPS where protection is required but not necessarily through patents.⁶⁶ In other words, all states must introduce some form of intellectual property protection but are given a certain margin of appreciation to implement this obligation. The significance of this provision is that in the case of plant variety protection, member states which do not wish to introduce patent rights have the choice to provide an alternative protection regime. Article 27(3)b is of further significance in the context of the broader legal regime for food security, IPRs, environmental management and human rights. It provides member states an opportunity to introduce a form of plant variety protection which does not exclusively focus on TRIPS obligations but also takes into account their other obligations in this field, such as the fundamental right to food, their obligations under the PGRFA Treaty and their environmental management obligations under the Biodiversity Convention.

While issues concerning patentability have taken centre stage and include some of the most sensitive issues in the field of IPRs policy development for the South, geographical indications (GIs) constitute another type of IPRs that is also of interest in the context of food security. GIs were for a long time seen as a supplementary means of intellectual property protection for specific products, with a significant emphasis on wines and spirits. This perception has changed in the aftermath of the adoption of the TRIPS Agreement linked to the realisation by a number of countries that they have indications of geographical origin with commercial potential. Protection for GIs under TRIPS can be obtained for the specific quality of a good, its reputation or other characteristics of the good that is essentially attributable to its geographical origin.⁶⁷ At present, TRIPS offers a two-tier system of protection. All GIs are protected under the general regime whereby rights holders are protected against the use in the designation or presentation of a good which misleads the public as to the geographical origin of the good and are protected against unfair competition. A special, more stringent, regime was adopted for wine and spirits. This bars the use geographical names for products produced outside the specific region associated with a name even if the true origin of the product is indicated and even if it clearly indicates that it is only similar to the original or derives from it.

The International Convention for the Protection of New Varieties of Plants

The International Convention for the Protection of New Varieties of Plants (UPOV Convention) is the only intellectual property treaty which directly focuses on agriculture.⁶⁸ It was adopted in 1961 by a group of western European countries which sought to introduce IPRs in agriculture but were not prepared to accept the introduction of patents in this field. As a result, the UPOV Convention proposes the adoption of plant breeders' rights.⁶⁹ The UPOV Convention's main aim is to protect new varieties of plants in the interests of both agricultural development and commercial plant breeders.

Plant breeders' rights differ from patent rights but they also share a number of basic characteristics with them. Plant breeders' rights provide exclusive commercial rights to rights holders, reward an inventive process, and are granted for a limited period of time after which they pass into the public domain. More specifically, UPOV recognises the exclusive rights of individual plant breeders to produce or reproduce protected varieties, to condition them for the purpose of propagation, to offer them for sale, to commercialise them, including exporting and importing them, and to stock them for production or commercialisation.⁷⁰ Protection under UPOV is granted for developed or discovered plant varieties which are new, distinct, uniform and stable.⁷¹ While novelty is a criterion shared with patent law, UPOV adopts a different approach. Under UPOV, a variety is novel if it has not been sold or otherwise disposed of for purposes of exploitation of the variety. Novelty is thus defined in relation to commercialisation and not by the fact that the variety did not exist previously. UPOV gives a specific time frame for the application of novelty. To be novel, a variety must not have been commercialised in the country where the application is filed for more than a year before the application and in other member countries for more than four years.⁷² The criterion of distinctness requires that the protected variety should be clearly distinguishable from any other variety whose existence is a matter of common knowledge at the time of the filing of the application. Stability is obtained if the variety remains true to its description after repeated reproduction or propagation. Finally, uniformity implies that the variety remains true to the original in its relevant characteristics when propagated.⁷³

One of the main distinguishing features of the UPOV regime is that the recognition of plant breeders' rights is circumscribed by two main exceptions. Firstly, under the 1978 version of the Convention, the so-called 'farmer's privilege' allows farmers to re-use propagating material from the previous year's harvest and to freely exchange seeds of protected varieties with other farmers. Secondly, plant breeders' rights do not extend to acts done privately and for non-commercial purposes or for experimental purposes and do not extend to the use of the protected variety for the purpose of breeding other varieties and the right to commercialise such other varieties. The 1991 version of the Convention, by strengthening plant breeders' rights, has conversely limited existing exceptions. The remaining exceptions include acts done privately and for non-commercial purposes, experiments, and for the breeding and exploitation of other varieties. Breeders are now granted exclusive rights to harvested materials and the distinction between discovery and development of varieties has been eliminated.⁷⁴ Further, the right to save seed is no longer guaranteed as the farmer's privilege has been made optional.

UPOV provides that plant breeders' rights are time-bound IPRs. The period of protection has evolved over time: Under UPOV-1978, the period of protection is of a minimum of 15 years. For vines, forest trees, fruit trees and ornamental trees, the minimum is 18 years.⁷⁵ UPOV-1991 extends the minimum period from 15 to 20 years. For trees and vines, the minimum is 25 years.⁷⁶

As noted, plant breeders' rights were first conceived as an alternative to patent rights. As a result, UPOV originally provided that the two kinds of IPRs should be kept separate. Under UPOV-1978, member states can, for instance, only offer protection through one form of IPRs. The grant of a PBR on a given variety implies that no other IPRs can be granted to the same variety. This restriction has been eliminated under UPOV-1991 and double protection is now allowed.

C. Environment Related Legal Framework

International environmental legal instruments have increasingly taken a broad perspective of the environment over time. This is in keeping with the shift of international environmental law towards an international law of sustainable development. As a result of the broader perspective of environmental treaties, environmental management is seen in a broader light which includes for instance links with agricultural management, human rights and IPRs. Among the different treaties with food security links, the regime for biodiversity management is noteworthy because it provides the general legal framework for biological resource management.

The Convention on Biological Diversity (Biodiversity Convention) is a framework treaty which seeks to regulate the conservation and use of biological resources.⁷⁷ Its three main goals are the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits derived from the use of genetic resources.⁷⁸ In the context of food security and IPRs, the Biodiversity Convention makes several distinct contributions. Firstly, the specific role and importance of agro-biodiversity has been recognised by the Conference of the Parties and a special programme on agro-biodiversity was established in 1996.⁷⁹ It generally aims to promote the positive effects and mitigating the negative impacts of agricultural practices on biological diversity in agricultural ecosystems and their interface with other ecosystems. Further, it seeks to promote the conservation and sustainable use of genetic resources of actual or potential value for food and agriculture. Over time, the agro-biodiversity programme has taken up specific challenges, deepened its cooperation with the FAO and examined cross-sectoral issues such as the potential impacts of patented genetic use restriction technologies on farmers.⁸⁰

Secondly, the Biodiversity Convention provides one of the few existing statements on the relationship between the management of biological and genetic resources and IPRs. Article 16 clearly indicates that IPRs should not undermine the working of the Convention. The actual relationship of the Biodiversity Convention with the TRIPS Agreement is an issue which has not been solved. This is partly due to the fact that a clear statement on the matter would have significant repercussions for the development of international law in these two fields.

Thirdly, the Biodiversity Convention has also made its own contribution to the development of access and benefit sharing schemes, effort supplemented with the adoption by the Conference of the Parties of the Bonn Guidelines on access and benefit sharing.⁸¹ The Convention attempts to provide a framework which respects donor countries' sovereign rights over their biological and genetic resources while facilitating access by users. Access must therefore be provided on 'mutually agreed terms' and is subject to the 'prior informed consent' of the country of origin.⁸² Further, the Biodiversity Convention provides that donor countries of micro-organisms, plants or animals used commercially have the right to obtain a fair share of the benefits derived from use. Benefit sharing as conceived under the Convention and the Bonn Guidelines can take the form of monetary benefits or non-monetary benefits such as the sharing of research and development results, collaboration in scientific research and access to scientific information relevant to conservation and sustainable use of biological diversity. Overall, the contribution of the Biodiversity Convention and the PGRFA Treaty concerning access and benefit sharing are complementary even though the latter's framework goes further insofar as it constitutes an integral part of the treaty while the Bonn Guidelines remain at present purely voluntary.

Fourthly, the Biodiversity Convention also provides in general terms for the conservation of traditional knowledge, a question that is closely linked to the fulfilment of basic food needs and to the protection of agro-bio-technology through IPRs. The Convention provides under Article 8(j) a general duty for all member states to respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities pertaining to the management of biological resources, promote their wider application with prior informed consent and encourage the equitable sharing of the benefits arising from such utilisation. This provision has been supplemented with the setting up of a working group mandated with the task of giving advice on legal and other means of protection of traditional knowledge.⁸³ While the Convention has addressed the conservation of traditional knowledge and the issue of access and benefit sharing, it has not really tackled questions surrounding the ownership of biodiversity-related traditional knowledge, an area which remains generally unsettled in international law.

While the Biodiversity Convention plays a dominant role in the international environmental law field, a great number of other treaties are also significant in the context of this study. Of particular relevance is the Desertification Convention.⁸⁴ This Convention is noteworthy because it directly recognises the links between desertification as an environmental problem and socio-economic problems such as food security. It also specifically indicates that national action programmes to be developed by state parties must include among the measures to mitigate the effects of drought the establishment and strengthening of food security measures, including storage and marketing facilities.⁸⁵ Further, the Desertification Convention is more specific than most treaties with regard to the protection of traditional knowledge insofar as it directs states not only to respect it but also to provide ‘adequate protection’.⁸⁶

D. Human Rights Related Legal Framework

The realisation of food security at the level of each and every individual level can be broadly equated with the realisation of the human right to food. While the realisation of the right to food can be analysed separately from the concerns examined in this study, it provides the underlying guiding framework for analysing the relationship between IPRs and food security. Further, even though human rights and IPRs operate largely independently, some specific links need to be analysed.

The human right to food is recognised, for instance, in the Covenant on Economic Social and Cultural Rights (ESCR Covenant) which provides a right to adequate food and a right to be free from hunger.⁸⁷ The right to food, like other socio-economic requires the state to take measures to progressively realise this right through positive steps which include the improvement of production methods and output, the improvement of food distribution networks and at the international level a better distribution of world food supplies in relation to the needs of each country. In practical terms, the right to food is realised when all individuals have physical and economic access at all times to adequate food or means for its procurement. Adequate food under the Covenant does not just imply a minimum package of calories and nutrients but takes into account a much broader set of factors to determine whether particular foods or diets that are accessible can be considered the most appropriate under given circumstances. As expounded by the Committee on Economic Social and Cultural Rights, the realisation of the right to food requires the availability of food in a quantity and quality that is sufficient to satisfy the dietary needs of individuals and that is free from adverse substances. It also implies that the accessibility of food must be sustainable and should not interfere with the enjoyment of other human rights.⁸⁸

The link between IPRs and human rights surfaces at different levels. The ESCR Covenant recognises everyone’s right to take part in cultural life and the right ‘to enjoy the benefits of scientific progress and its application’.⁸⁹ This general entitlement promoting the sharing of knowledge is supplemented by another provision which recognises everyone’s right ‘to benefit from the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author’.⁹⁰ The interpretation of these two provisions together may be interpreted as indicating that the recognition of the material interests of an individual IPRs holder does not prevail over everyone’s right to the enjoyment of scientific and technological development.

IV. IPRs and Food Security: General Trends and Implementation

The international legal regime outlined above has evolved in response to different challenges and changes, such as the development of genetic engineering over the past couple of decades. In turn, the international legal regime has also had – and is having – a significant influence on the development of national legal frameworks in developing countries. This section first examines the broad trends that have marked the international legal regime in recent years and then goes on to analyse in more detail the situation in India, a country which has adopted significant changes in its domestic legal framework in recent years, partly with a view to implement its international obligations.

A. Law and Policy Trends

The legal regime for food security in the context of IPRs has evolved in different ways and in response to different developments. Firstly, the legal framework has evolved with regard to states' claims over their resources. On paper, the basic principle of state sovereignty over natural resources has been consistently upheld in relevant treaties. However, the scope of this principle has been qualified over time. Thus, while the Biodiversity Convention reiterates the basic assertion of sovereignty, it qualifies it by conceding that biological resources are a 'common concern of humankind', a notion which implies that sovereignty is maintained but with a duty of states to participate in the formulation and implementation of international legal instruments to foster the sustainable conservation and use of biological resources. While states have claimed for several decades absolute rights over their natural and biological resources, the situation was different in the case of PGRFA. In the latter case, the international community traditionally worked on the basis of the principle of 'common heritage of humankind'. This was enshrined in the 1983 International Undertaking.⁹¹ In the last twenty years, there has been a fast movement towards the assertion of claims over PGRFA which have resulted in the PGRFA Treaty conceding 'common concern' status to PGRFA. In other words, biological resources and genetic resources have the same status under international law, that of a common concern of humankind which gives full control to the state of origin but with an associated duty to participate in international law making towards the sustainable conservation and use for the benefit of the whole of humankind.

Secondly, the legal framework has also evolved rapidly with regard to the protection of human inventions. Intellectual property law – in particular patent rights – was first developed on the basis of a strict distinction between human inventions and products of nature. Only the former were deemed patentable because they were the product of human ingenuity whereas the latter could not be appropriated through IPRs and were part of the public domain, freely accessible. The basic distinction between what is in the public domain and can therefore be accessed and used freely and what can be protected through IPRs has been the object of ongoing debates for more than a century. Over time, there has been a progressive movement towards the blurring of this strict distinction. Historically, the United States and some European countries were the first to provide intellectual property protection for plant varieties. The United States introduced plant patents in 1930 to provide protection for certain asexually reproduced plants.⁹² This was supplemented by the 1970 Plant Variety Protection Act which grants protection to novel varieties of sexually reproduced plants.⁹³ European countries refrained from introducing patents but agreed on a common definition of plant breeders' rights which was enshrined in the UPOV Convention.⁹⁴

The law and policy situation has changed dramatically since the early 1960s when the UPOV Convention was adopted. In the 1960s, there was still a widespread consensus in favour of the free sharing of genetic resources and knowledge pertaining to plant germplasm. This constituted the basis for what came to be known as the Green Revolution. The high-yielding varieties developed in the 1960s were the product of research undertaken in international agricultural centres on material provided by individual states which had in turn access to the improved seeds. After genetic engineering started developing in earnest, a complete shift occurred in the approach towards genetic material and related knowledge. This occurred first in the United States which was the first country to accept the patentability of artificially created life forms. The decision of the US Supreme Court in *Diamond v. Chakrabarty* triggered one of the most significant changes in the patent regime in recent times.⁹⁵ The Court was presented with the novel case of the 'invention' of an artificially created life form. It analysed the case from the point of view of the distinction between an invention and a discovery. In the balancing act, the Court put more weight on the fact that the bacterium was made by human beings (manufacture) than on the principle that products of nature did not constitute patentable subject matter under US law. By 1985, the patentability of plants was accepted.⁹⁶ Finally, the US Patent and Trademark Office granted in 1998 the first patent for a transgenic animal.⁹⁷

Developments in the United States have been to a large extent mirrored at the international level. While intellectual property treaties viewed life patents with reluctance until the 1980s, the adoption of the TRIPS Agreement has seen the introduction of a requirement for all WTO member states to introduce life patents, for instance, on micro-organisms. Concurrently, the plant breeders' rights regime defined in the UPOV Convention has been strengthened to provide stronger incentives to commercial breeders. Among the important changes introduced in the 1991 version of the UPOV Convention is the removal of the provision barring the protec-

tion of a given variety by more than one type of intellectual property rights.⁹⁸ The progressive introduction of intellectual property rights in the field of agriculture has had important implications for international organisations working in this field as well as for developing countries which have to adapt themselves to the new legal regime. At the international level, the CGIAR has been among the institutions directly affected by recent law and policy changes. In the process of adapting itself to the increasing importance of intellectual property rights in agricultural research, the CGIAR has strived to strike a balance which is as favourable as possible for developing countries. As a result, while generally attempting to carry on promoting the free exchange of germplasm to foster food security, IARCs have also determined that there may be situations where they should protect the product of their own research so as to make sure that nobody appropriates the results. This is meant to foster access to research products, to avoid patents blocking further research and to facilitate the transfer of benefits to developing countries.⁹⁹ However, the efforts of the CGIAR to operate at the same time in two different systems is causing significant difficulties for itself and developing countries. Thus, it has been noted that the IARCs are likely to be increasingly wary of using technologies patented in donor nations for use in developing countries even if the patents are not operative in developing countries.¹⁰⁰

At the level of individual developing countries where no form of intellectual property protection in agro-biotechnology had been introduced before 1994, the TRIPS Agreement has been an important trigger – among a host of other factors – for the introduction of life patents in these countries.¹⁰¹ It is useful at this juncture to review the influence that the different recent relevant treaties have on law and policy development in the South in this field. Firstly, the TRIPS Agreement requires from developing countries the introduction of patents in all fields of technology, including, for instance, the patentability of micro-organisms and microbiological processes for the production of plants or animals. Secondly, the TRIPS Agreement imposes plant variety protection but specifically allows member states to devise a *sui generis* system, or in other words an alternative to patents. Thirdly, the plant breeders' rights model developed in the UPOV Convention has been seen as an acceptable *sui generis* system that fulfils the requirements of the TRIPS Agreement in this field. There have been attempts to interpret the *sui generis* option as being limited to the UPOV model but this is clearly not the case and developing countries have the possibility to devise an alternative model which, for instance, takes into account their other treaty obligations in this field and Articles 7 and 8 of the TRIPS Agreement which grant developing countries to a certain extent the possibility to implement the TRIPS Agreement in a manner which fits their specific situation and needs. Fourthly, most if not all developing country WTO member states have other international obligations in related fields. In the field of agriculture, these include the PGRFA Treaty which does not directly deal with IPRs but provides certain guidelines for their application and provides a relatively strict framework for benefit sharing. In the environmental field, these include a number of obligations arising from the Biodiversity Convention regarding the management of agro-biodiversity and the overall clause concerning the relationship between IPRs and sustainable biodiversity management. Finally, WTO member states also have treaty and customary obligations concerning the protection of fundamental human rights.

This indicates that even where developing countries seek to implement their TRIPS Agreement obligations, these obligations are part of a broader web of international obligations. Where different treaties address similar subject matters, the basic rule is that states must fulfil all their international commitments.¹⁰² As a result, the basic rule is that states should endeavour to implement all their obligations in such a way that they do not violate any of their international commitments. International treaties are often the product of negotiations among many states and the resulting wording is often relatively general in nature. There is therefore significant scope to interpret a given treaty in different ways that do not violate it. In cases where a given country finds it difficult to reconcile different treaty obligations, international treaty law provides some general rules of interpretation. In particular, when the basic rule of Article 31(1) of the Vienna Convention on the Law of Treaties is insufficient to solve a specific problem, Article 31(3) specifically indicates that other rules of international law applicable between the parties should also be taken into account.¹⁰³

The general rules of the Vienna Convention may, however, be insufficient in some situations. This includes, for instance, the case of a problem of interpretation between the TRIPS Agreement which provides specific rules in the field of intellectual property but does not directly acknowledge links with other fields of international law and the Biodiversity Convention which provides less specific rules but is the central treaty concerning the management of biodiversity and specifically considers the relationship between the two treaties. Given the increasingly contentious nature of the relationship between environmental and trade-related treaties, the

Biosafety Protocol to the Biodiversity Convention explicitly addresses the question of hierarchy between the two fields. However, negotiating states were unable to agree on a clear formula and the Protocol only indicates that it neither modifies existing treaty obligations of member states nor is it subordinated to existing treaties.¹⁰⁴ The solution to a conflict between WTO rules and the Biosafety Protocol rules will remain a matter of speculation until such a conflict arises in practice.

A second situation which puts in perspective TRIPS obligations and human rights must be considered as well. In this case, the conceptual framework for understanding the relationship between the two treaties is different insofar as it involves fundamental rights on the one hand and IPRs on the other hand. In principle, international law is to a large extent based on the principle that there is no hierarchy between sources of law and different areas of the law.¹⁰⁵ However, prioritisation exists in some cases. Firstly, the UN Charter prevails over all other treaties.¹⁰⁶ Beyond this clear hierarchy, it is today largely agreed that there are some fundamental principles and norms that states are not free to modify or abrogate (*ius cogens*).¹⁰⁷ However, it is not yet possible to argue in general international law that all human rights are peremptory norms. Even if rights like the right to food are not generally recognised as peremptory norms, there is recognition that human rights are different in nature from other norms of international law.¹⁰⁸ As a result, if a prioritisation has to be effected, between the human right to food and agro-biotechnology related IPRs, human rights should take precedence. This concurs with the conclusions of the UN Sub-Commission on Human Rights in its resolution on intellectual property and human rights which notes ‘the primacy of human rights obligations under international law over economic policies and agreements’ and calls on states to ensure that the implementation of TRIPS should not negatively impact on the enjoyment of human rights.¹⁰⁹ It is possible that the question of a hierarchy between IPRs and human rights will not have to be solved in practice because of the different techniques that can be used to resolve tensions between treaties. Thus, in this case, reliance on Articles 7 and 8 of the TRIPS Agreement in interpreting its substantive provisions could provide an alternative way to expand the boundaries of the TRIPS Agreement without having to formally consider the question of a conflict with human rights.¹¹⁰ Prioritisation should remain a last resort instrument but the special place of human rights in international law should not be overlooked.

Most developing countries that are WTO member states are also parties to the most important treaties in the field of agriculture, environment and human rights. This has two important consequences. Firstly, they must implement all their international obligations in a coherent manner at the national level even if coherence is not provided by a largely decentralised international legal regime. Secondly, the TRIPS Agreement is not the most important agreement in the context of food security related intellectual property issues. It is only one of the several important treaties which must be concurrently implemented with all others. In case of conflicts between different treaties, the best strategy in practice is to try and use the broadest possible interpretation to provide a coherent law and policy framework at the national level which suits the needs and the specific situation of each country. If in specific cases, a conflict cannot be solved in this way, general trends in international law indicate that more weight should be given to human rights even though they have not attained the status of peremptory rules of international law that prevail in all cases over other international rules and obligations.

B. Food Security and Intellectual Property Rights in the South: Lessons from Recent Developments in India

A number of countries have attempted or are in the process of implementing their different international obligations concerning both IPRs and food security. In nearly all cases and even in the case of India which has moved far towards the implementation of its international commitments, there remain a number of areas that have not yet been addressed. Further, the adoption of the PGRFA Treaty in 2001 has added a new layer of international obligations which will have to be taken into account by all PGRFA Treaty member states.

Given that a number of developed countries introduced IPRs in agriculture a long time before developing countries, it may seem appropriate to examine the impacts that this had had to understand the likely impacts of the introduction of agriculture-related IPRs in the South. This comparison would not yield significant insights, in part because the socio-economic conditions of developing countries are too different from the situation of developed countries, even a few decades ago. To take but one example, while the percentage of people engaged in the agricultural sector in the European Union in 1961 was 20% when the UPOV Convention was adopted,

the population active in the agricultural sector in developing countries today amounts to 86 per cent of the rural population and 52 per cent of the total population in developing countries.¹¹¹

The Indian situation

India is an interesting case study because it has been through different shifts in policy over food security policies in the context of IPRs since independence. India inherited at independence a patent law which was deemed inappropriate to realise the economic development goals of the country because the colonial act had failed to stimulate invention by Indian citizens and to encourage the development and exploitation of new inventions for industrial purposes in the country so as to secure benefits to the largest section of the people.¹¹² Patent law was thus overhauled in the decades following independence in an attempt to make it fit the developmental priorities of the country.¹¹³ The resulting Patents Act, 1970 retained the western model of intellectual property but provided a number of exceptions with a view to foster the fulfilment of basic needs. In particular, the Act excluded the patentability of life forms and specifically precluded the patentability of methods of agriculture or horticulture.¹¹⁴ Further, while allowing process patents on substances intended for use as food, medicine or drug, the Act rejected the possibility of granting patents in respect of the substances themselves.¹¹⁵ Insofar as the duration of the rights conferred was concerned, the normal 14-year term was reduced to 7 years with respect to processes of manufacture for substances intended for use as food, medicine or drug.¹¹⁶ The Patents Act, 1970 also introduced a series of measures restricting the rights of patent holders, in particular to encourage use of the invention in India.¹¹⁷ The rationale for the introduction of limiting clauses in the Act was in part to foster the growth of local industries and in part to foster the availability of essential items such as food and medicine by keeping the prices as low as possible in areas related to the fulfilment of basic needs.¹¹⁸

The absence of patents in agriculture contributed to the development of a system of agricultural management based on the sharing of genetic material and related knowledge. At the same time, it did not provide significant incentives for the development of a private seed industry. As a result of these policies, the public sector has until recently been a major force in agricultural management.

The ratification of the TRIPS Agreement by India has been the trigger for significant changes in the IPRs related national legal framework. This has included in particular the adoption of a Plant Variety Act, a series of significant changes to the Patents Act, 1970 and the adoption of IPRs-related clauses in the recently adopted Biodiversity Act. These three main legislative instruments are examined in turn.

Historically, the protection of plant varieties through IPRs was barred, as reflected in the Patents Act, 1970. The introduction of plant variety protection thus constitutes a step in a completely different direction. As noted, TRIPS imposes the introduction of plant variety protection but leaves member states to choose the specific form of protection they want to adopt (*sui generis* option). It does not privilege plant breeders' rights (or in other words, the UPOV Convention) over alternatives such as farmers' rights. The Indian legislation was first introduced in Parliament in December 1999, just before the TRIPS Agreement's compliance deadline. The main characteristic of the first draft was to propose a plant variety protection model largely fashioned after the UPOV Convention. This first draft was referred to a Parliamentary Committee which conducted further hearings in 2000 and put forward a substantially revised Bill.¹¹⁹ This second draft was adopted by Parliament in 2001 and is now the Protection of Plant Varieties and Farmers' Rights Act (Plant Variety Act).¹²⁰ Generally, the Act differs from the first draft of the bill insofar as it clearly seeks to establish both plant breeders' rights and farmers' rights. The proposed regime for plant breeders' rights largely follows the model provided by the UPOV Convention. It introduces rights which are meant to provide incentives for the further development of a commercial seed industry in the country. The criteria for registration are thus the same as those found in UPOV, namely novelty, distinctiveness, uniformity and stability.¹²¹ The Act incorporates a number of elements from the 1978 version of UPOV and also includes some elements of the more stringent 1991 version, like the possibility of registering essentially derived varieties. The section on farmers' rights constitutes the most interesting part of the legislation from the point of view of the development of *sui generis* regimes. This part was completely changed by the Parliamentary Committee which added a whole chapter on farmers' rights where the first draft dealt with the issue in a single short provision.¹²² The Act now seeks to put farmers' rights on par with breeders' rights. It provides, for instance, that farmers are entitled, like commercial breeders, to apply to have a variety registered.¹²³ Farmers are generally to be treated like commercial breeders and are to receive the

same kind of protection for the varieties they develop. However, it is unsure whether these provisions will have a significant impact in practice since the Act accepts the registration criteria of the UPOV Convention which cannot easily be used for the registration of farmers' varieties. The Act incorporates other provisions which are directly related to food security concerns. These include, for instance, a section which specifically bars the registration of plant varieties with genetic restriction use technologies.¹²⁴

The Act further seeks to foster benefit sharing in the interest of farmers in cases where registered plant varieties are commercialised. Two different channels for claiming financial compensation are provided for under Section 26 and Section 41. The main difference between the two is that Section 41 specifically targets village communities and provides less stringent procedural conditions. Thus, it neither provides a time frame nor specifies that claimants should pay a fee. In both cases, the Plant Varieties and Farmers' Rights Authority has significant discretion in disposing of the benefit sharing claims. Interestingly, Section 41 comes closer to recognizing the intellectual contribution of the benefit claimers than Section 26. The former provides that claims can be made concerning the contribution to the evolution of a variety by a group while the latter only mentions the use of genetic material from the claimant variety as a basis for a claim. Further, while Section 26 requires the commercial utility and the demand for the variety in the market to be taken into account in the assessment of the claims, there is no such requirement under Section 41. The last major distinction is that Section 41 only provides for compensation to a community of individuals whereas a single person may benefit under Section 26.

Overall, the Act is noteworthy for making a real attempt at balancing breeders' and farmers' rights. However, two main facts are likely to hamper the effectiveness of the provisions for farmers' rights. Firstly, since farmers' rights were only added as an afterthought without changing the criteria for registration of varieties, the existing regime exclusively reflect the registration needs of commercial breeders and is therefore heavily tilted against farmers. Secondly, even though India intended to provide a *sui generis* response to the need to provide plant variety protection under the TRIPS Agreement, it is now in the process of formally joining UPOV, a move which will tilt the balance further away from farmers.¹²⁵

Apart from adopting plant variety legislation, India has passed substantial amendments to its patent legislation. The modifications to the Patents Act required to fulfil TRIPS obligations have resulted in the dismantling of most of the specificities that were introduced by the 1970 Act in view of the explicit recommendations concerning the working of the earlier colonial patent act.¹²⁶ Among the major changes required is an increase in the general patent term from 14 years to 20 years, and from 7 years to 20 years in the case of process patents on food related inventions. Certain control mechanisms restricting the scope of the rights granted to patent holders such as the existence of licences of right, and more specifically automatic licences of right in the case of process patents relating to substances used as food, have been removed from the Act.¹²⁷ In general, the 2002 amendments to the Patents Act, 1970 will contribute to the development of agro-biotechnology. However, the Amendment Act takes into account some of the concerns that have been voiced in recent times, in particular with regard to 'biopiracy' or the unwarranted use of traditional knowledge. It now obliges inventors to disclose the geographical origin of any biological material used in an invention. Further, there is a specific exclusion on patents that are anticipated in traditional knowledge.¹²⁸

Besides the plant variety and patents legislation, the Biodiversity Act is also important because the regulation of biodiversity management has direct impacts on food security and because the Act directly links biodiversity management and IPRs. The main focus of the Act is on the question of access to resources.¹²⁹ Its response to current challenges is to assert the country's sovereign rights over natural resources. It therefore proposes to put stringent limits on access to biological resources or related knowledge for all foreigners. The Act's insistence on sovereign rights reflects current attempts by various countries to assert control over the resources or knowledge they control. While the Act focuses on preserving India's interests vis-à-vis other states in rather strong terms, its main impact within the country will be to concentrate power in the hands of the government. Indeed, Indian citizens and legal persons must give prior intimation of their intention to obtain biological resources to the state biodiversity boards.¹³⁰ The Act is even more stringent in terms of IPRs since it requires that all inventors obtain the consent of the National Biodiversity Authority before applying for such rights.¹³¹ The impact of this clause is, however, likely to be limited since patent applications are covered by a separate clause.¹³² Further, the Authority has no extra-territorial authority.

The Biodiversity Act implicitly takes the position that India cannot do more than regulate access by foreigners to its knowledge base. It does, however, attempt to discipline the IPRs system in some respects. As noted, it requires inventors who want to apply for IPRs to seek the National Biodiversity Authority's permission. It also authorizes the Authority to allocate a monopoly right to more than one actor. Further the Authority is also entitled to oppose the grant of intellectual property rights outside India.¹³³ The Act also seeks to address the question of the rights of holders of local knowledge by setting up a system of benefit sharing. The benefit sharing scheme is innovative insofar as it provides that the Authority can decide to grant joint ownership of a monopoly intellectual right to the inventor and the Authority or the actual contributors if they can be identified.¹³⁴ However, the sharing of IPRs is only one of the avenues that the Authority can choose to fulfil its obligation to determine benefit sharing. It is also in the Authority's power to allocate rights solely to itself or a contributor such as a farmer contributor. Other forms of benefit sharing include technology transfers, the association of benefit claimers in research and development or the location of production, research and development units in areas where this will facilitate better living standards to the benefit claimers.¹³⁵ On the whole, the Biodiversity Act effectively condones the introduction of IPRs in the management of biological resources provided for in the TRIPS Agreement but does not specifically seek to ensure that IPRs are supportive of the goals of the Biodiversity Convention.¹³⁶

The different legislative changes introduced in India will have profound impacts on the development of IPRs based industries such as agro-biotechnology and on food security. From a legal point of view, the adopted regime is noteworthy for attempting to reconcile to a certain extent India's international obligations with its domestic priorities. However, on the whole, it is unsure whether India has managed to provide a balance which puts food security concerns at the forefront and serves its interests. This is, for instance, illustrated by the apparent tension in the Biodiversity Act between the emphasis on India's claim over its biological resources and an acknowledgment that India cannot control the use that is made of related knowledge because it cannot control patent applications in other parts of the world. Further, with regard to the development of agro-biotechnology, existing studies seem to indicate that neither the public nor the private domestic sector have been until now in a position to take advantage of the opportunities to appropriate benefits of the new IPRs regime.¹³⁷ With regard to food security at the individual level, the Plant Variety Act makes a determined attempt to adopt a balanced legal regime which gives incentives to the private sector seed industry but also protects individual farmers and farming communities. In practice, however, the proposed farmers' rights regime is unlikely to be effective. Further, the effectiveness of the adopted regime is likely to be hampered by the lack of coordination between the three acts. Potential problems range from the lack of institutional coordination to the definition of different benefit sharing schemes under the Plant Variety and Biodiversity Acts. Finally, the adopted legal regime fails to take into account a significant proposal by the Indian Law Commission linking biodiversity management, food security and plant variety protection. The Commission proposed its own draft Biodiversity Bill in which it introduced a provision which stated that no IPRs should be granted on species used for alimentary or medicinal purposes.¹³⁸ This was meant as an attempt to integrate the right to food with the exceptions allowed in the TRIPS Agreement, a proposal which was not maintained subsequently.

On the whole, the Indian legal framework constitutes a good starting point for a regime seeking to comply with all relevant international obligations in the field of food security and IPRs. However, it remains inadequate in important areas like farmers' rights and the protection of traditional knowledge. This may be explained to an extent by the fact that these are new areas and that the development of appropriate legal frameworks is a lengthy exercise. In the context of long-term policy objectives, including the ratification of the PGRFA Treaty and discussions taking place in WIPO on the protection of traditional knowledge, it seems important to further pursue the development of the legal framework even in a country like India which has gone through substantial legislative effort in recent years. In any case, the current legal regime needs at the very least adjustments to make the different pieces of the puzzle work together harmoniously. This is a challenge that many other countries face because most countries tend to give authority for the implementation of different acts with different focuses to different ministries even if there are strong links between them, such as in the case of the Biodiversity Act, the Plant Variety Act and the Patents Act in India.

Finally, the capacity of the Indian legal regime to provide a model for other developing countries is limited. Even though many countries face a number of similar structural constraints and similar socio-economic conditions, the protection of farmers' rights and traditional knowledge should be tailored to the specific conditions of individual countries. The last section of this study examines some of the general options that developing countries may consider to implement their international obligations. It also examines some avenues that may go beyond the generally accepted interpretation of existing treaties but could nevertheless be considered to foster individual countries' food security, environmental and economic interests.

V. Fostering Food Security in Developing Countries Through Intellectual Property Protection

The current international legal regime imposes a significant burden of adjustment on developing countries which had for the most part not introduced IPRs in agriculture before 1994 and generally managed their agriculture in ways that were different if not opposed to the system proposed at the international level. The introduction of IPRs in agriculture is an important question because it touches directly on questions of economic development, agricultural management, environmental management and the fulfilment of basic food needs. As a result, significant attention should be given to the development of legal frameworks that take into account all these dimensions together.

The international legal system, in particular the TRIPS Agreement, gives significant guidance to states on the ways in which they must re-orient their IPRs policies in the field of agriculture. However, in some areas that are of more importance to developing countries, such as farmers' rights and the protection of traditional knowledge, the international legal framework remains dramatically underdeveloped. As a result, developing countries have the twin burden to adapt themselves to their existing international obligations and to adopt legal frameworks in areas that matter to them even if international law is not developed concerning these issues.

This section first considers some of the options that developing countries have within the context of the TRIPS Agreement to adopt legal frameworks suited to their needs. It then moves on to consider some further options which may or may not be deemed acceptable under TRIPS but which may constitute reasonable options if all the relevant aspects of the food security issue are taken into account. This study does not examine the situation of countries which are not bound by the TRIPS Agreement. This is due to the fact that there are increasingly fewer states that have not joined the WTO. Further, from a broader perspective, it is apparent that, in practice, states do not seem to have the option to avoid the consequences of commodification in agriculture. In other words, even for states that are not bound by the TRIPS Agreement, it has become very difficult to envisage basing agricultural policies on the principle of free sharing of knowledge and resources (common heritage of humankind) because throughout the world, there is a very firm trend towards commodification in the form of sovereign appropriation over biological and plant genetic resources, and private appropriation in the form of IPRs. As a result, even countries that may benefit from an open system whereby exchange is favoured need to consider the introduction of property rights frameworks. This study also ignores the broader debate concerning the relevance and appropriateness of commodification in areas concerned with basic needs. It only considers a number of selected options which constitute potential responses by developing countries to the current challenges posed by the evolving international legal system.

Before turning to the specific analysis of options, it is appropriate to briefly consider basic premises that inform the implementation of food security and IPRs legal frameworks. Firstly, the progressive commodification taking place in this field is not limited to IPRs. In fact, the assertion of property claims over knowledge has been matched in recent years by the (re)assertion of states' sovereign claims over biological and genetic resources.

Secondly, the introduction of IPRs in agriculture is intended to foster development related goals. These include at the domestic level the strengthening of private sector seed industries and stronger incentives for researchers to foster the development of R&D in the field of agro-biotechnology. From a North-South perspective, the introduction of IPRs in developing countries is premised on the need to provide an appropriate framework for technology transfer in cases where technologies are protected by IPRs in developed countries.¹³⁹

Thirdly, today's IPRs system is highly developed in areas such as patent rights. However, other areas such as farmers' rights and the protection of traditional knowledge are comparatively underdeveloped, partly because the IPRs system only protects state-of-the-art inventions and partly because these areas have not been the focus of much interest until recently. The lack of consensus at the international level concerning farmers' rights and traditional knowledge has meant that the PGRFA Treaty does not include an internationally-agreed definition of farmers' rights and delegates the task of defining and implementing farmers' rights to member states. With regard to traditional knowledge, WIPO has started considering some of the relevant issues but no international legal framework has emerged yet.

In implementing legal and policy frameworks in the context of food security and IPRs, developing countries face a number of legal and other constraints. An easy route to compliance with international obligations is to follow existing and proposed models but these may not be adapted to specific needs and conditions of individual countries. In attempting to devise a regime which is tailored to their specific needs and conditions, developing countries should consider at least the following elements which have generally not been given much emphasis: the interests and rights of farmers, the conservation and sustainable use of biological and genetic resources, the prevention of biopiracy, the protection of traditional knowledge, the fair and equitable sharing of benefits arising from the exploitation of resources and the realisation of the human right to food.

A. TRIPS Flexibility and Beyond

As noted above, the TRIPS Agreement provides a legal framework for IPRs which provides rather strict obligations for member states but at the same time affords certain exceptions and flexibilities. In principle, the TRIPS Agreement requires the implementation of similar minimum standards of intellectual property protection in all member states. In this sense, the implementation of the TRIPS Agreement for most developing countries implies significant changes in their domestic legal regime, especially in cases where these countries did not provide any form of IPRs protection in the field of agro-biotechnology before 1994. The full implementation of the TRIPS Agreement generally puts developing countries' legal frameworks on a par with the average position of most OECD countries. Given that their socio-economic conditions are significantly different from that of OECD countries, it is not surprising that most developing countries feel the need to explore avenues to avoid some of the consequences that the TRIPS Agreement can impose on lesser economically developed countries.

The TRIPS Agreement differs from a number of other international treaties, in particular in the fields of environment, agriculture or human rights insofar as the latter treaties tend to provide broad obligations while the TRIPS Agreement includes much more focused commitments. As a result, member states have less freedom to interpret the treaty to fit their needs while implementing it at the local level than is the case of many other international treaties. The general qualifying clauses of the TRIPS Agreement are therefore of great importance since they provide an important avenue for countries to bring in flexibility at the level of the implementation of the TRIPS Agreement.

The first important provision is the objectives' clause which provides that

*[t]he protection and enforcement of intellectual property rights should 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.*¹⁴⁰

This article recalls one of the basic principles of intellectual property law which seeks to provide a balance between the rights provided to IPRs holders and broader social welfare. In the case of the TRIPS Agreement, Article 7 indicates that there must be a balance between the gains brought about by technological innovation to some parts of the world or some segments of a given population and the need for technological innovation to trickle down and have positive impacts for the majority of the population. In situations where IPRs are introduced in fields which contribute to the fulfilment of basic needs such as food needs, the balancing act concerning the introduction of IPRs in agriculture must include not only aggregate food security at the national level but also individual food security.

Article 8 provides a more specific acknowledgement that in implementing the TRIPS Agreement, member states can take measures to protect nutrition and to promote the public interest in sectors of vital importance to their socio-economic and technological development. This provision recognises the special case of basic needs. However, the measures which can be taken under this provision are strictly limited since they must be consistent with the provisions of the treaty.

Together, Articles 7 and 8 authorise member states to take a broad view of substantive provisions. In fact, under Article 7, it might be possible to argue that a lesser duration for patents in fields concerned with the fulfilment of basic needs could be based on the need to achieve a broader balance between the interests of different actors in the field.¹⁴¹ This runs directly contrary to the text of Article 33 but might constitute an acceptable broader interpretation of this provision in the light of Article 7 in the context of concerns over food security in specific developing countries.¹⁴²

Another avenue to create more scope for broader interpretations of the TRIPS Agreement is to follow the same route that was adopted with regard to health. The Doha Declaration on Public Health, while not changing the Agreement provided the basis for the adoption of negotiated broader interpretations that would strengthen the hand of countries trying to lessen the impact of medical patents on access to drugs within their borders.¹⁴³ This approach has, however, not proved very effective since WTO member states failed to find a compromise solution within the stipulated time frame.¹⁴⁴

At the level of specific sections of the TRIPS Agreement, specific flexibility is also available. These include clear-cut cases like Article 27(2) which provide for specific exclusion to the scope of patentability provided for under Article 27(1). Similarly, Article 27(3) authorises member states to exclude the patentability of plants and animals. At the level of the implementation of patent rights, a number of limited exceptions are also available. These include the narrowly drafted Article 30 which provides that limited exceptions may be provided as long as they do not 'unreasonably conflict' with the normal exploitation of the patent. The TRIPS Agreement also offers states a limited framework for compulsory licences which provide, for instance, a way to increase the manufacture of a given invention should the patent holder be unable or unwilling to produce bigger quantities of the product.¹⁴⁵ Food security concerns constitute a valid ground under the TRIPS Agreement for compulsory licensing an invention.

In the context of food security, one of the most interesting provisions is Article 27(3)b which imposes the introduction of a form of intellectual property protection for plant varieties but does not impose the introduction of a specific rights framework (*sui generis* option). As a result, member states have significant flexibility in implementing their obligations and can take advantage of this provision to introduce a regime which takes into account their different international commitments in this field and their specific needs. In practice, developing countries have been rather conservative in their approach to the introduction of *sui generis* protection regimes. This is due in part to the fact that the development of a *sui generis* regime constitutes a cumbersome procedure whose immediate benefits may not necessarily be apparent, in particular where the adoption of the UPOV regime constitutes an existing alternative that is not contentious.¹⁴⁶ In practice, the *sui generis* option is an important provision which could provide a model for other areas where the interests and needs of developed and developing countries significantly differ. It allows developing countries the possibility not to implement legal frameworks developed by other countries for their own interests and instead develop frameworks which,

while in compliance with their different legal obligations, are geared towards their own needs. In other words, developing countries get an opportunity within the TRIPS framework to develop new forms of intellectual property protection which also take into account food security objectives as well as other social and environmental objectives, something that the existing patent system is ill-equipped to achieve. A number of alternative approaches can be envisaged, some of which are outlined in the next section.¹⁴⁷

Overall, the TRIPS Agreement provides a number of general and specific exceptions to the standards it sets. These provide developing countries with limited scope to implement this treaty in a manner which fits their needs and priorities. Some provisions like Article 7 and Article 27(3)b concerning plant variety protection also provide a framework allowing developing countries to take into account their other international obligations in implementing IPRs commitments. The scope provided by the TRIPS Agreement can be further exploited in different ways. Firstly, some modifications of existing IPRs could be proposed to alleviate some specific issues concerning food security. Secondly, the flexibility provided constitutes an opportunity to go slightly beyond the TRIPS Agreement by bringing in other important issues, such as the protection of farmer's rights and the protection of traditional knowledge, elements which are in no way part of the TRIPS Agreement but called for by other treaties in the field.

With regard to specific modifications to existing IPRs, some possible changes can be suggested at this juncture. One of the problems that some developing countries have been facing is the patenting of knowledge available in the public domain in foreign jurisdictions. A requirement to examine prior art in all parts of the world would constitute an important step towards eliminating this specific form of biopiracy. One of the ways to stop biopiracy is to improve access to data concerning public domain knowledge, something which can be solved relatively easily through the documentation of such knowledge in forms and formats that are accessible to patent offices around the world.¹⁴⁸ A related and more intricate problem surfaces in cases where existing knowledge is used as the source or inspiration for an invention, the holder of which seeks protection through IPRs. In this situation, if the transformation is sufficient to satisfy a patent office of the novelty of the claim, the issue that concerns developing countries directly is the acknowledgement of the source of the knowledge and biological/genetic material used. This acknowledgement can in turn form the basis for benefit sharing claims. The most effective way to introduce such a requirement would be to do so in an international treaty, such as in the proposed Substantive Patent Law Treaty.¹⁴⁹ Such a disclosure requirement in patent applications would have the advantage of legally forcing patent applicants to double check prior art in their field before applying for a patent. It would also provide an avenue for claims of benefit sharing or for claims of joint ownership and would provide a legally binding mechanism forcing patent applicants to show that the resources or knowledge they used as a basis for their invention was acquired with the consent of the individual or group concerned. One of the important impacts of the introduction of a disclosure requirement is that it shifts the burden of proof from the party opposing the grant of a patent to the patent applicant. Further, a disclosure requirement could be used to require that permission to use specific knowledge should be granted by traditional knowledge holders and also by the State of origin, as provided for under the Biodiversity Convention and the PGRFA Treaty.

Requirements of prior informed consent and disclosure have already been incorporated by some developing countries. The Costa Rican Biodiversity Law provides, for instance, that IPRs on inventions using biological resources can only be granted if the certificate of origin and a statement on prior informed consent are provided to the organs instituted under the Biodiversity Law.¹⁵⁰ Similarly, the amended Indian Patents Act includes a new requirement concerning the disclosure of the geographical origin of biological materials used in the invention. This requirement is limited to the physical resources and does not specifically involve a prior informed consent requirement.¹⁵¹ The Philippines have adopted an even stricter framework in their Indigenous Peoples Rights Act.¹⁵² The Act provides that access to biological resources or associated knowledge is only allowed with prior and free consent from the communities. The Act specifically indicates that free and prior consent involves a consensus of the indigenous peoples concerned which must be 'free from any external manipulation, interference coercion, and obtained after fully disclosing the intent and scope of the activity, in a language and process understandable to the community'.¹⁵³ Further, the Act also recognizes the rights of indigenous peoples to the restitution of their intellectual property in case it has been acquired without prior informed consent or in violation of local laws or customs.¹⁵⁴ In practice, these clauses are important because they should be available in all individual countries but a disclosure requirement will only be fully effective if it is extended to the international level.

Developing countries can explore further avenues to make use of TRIPS flexibility. Firstly, in the context of the introduction or revision of patent laws, developing country governments could attempt to favour their own research communities by providing broad exemptions for the use of a patented invention for experimental purposes.¹⁵⁵

Secondly, as noted above, one of the important problems that developing countries face is the overall lack of R&D in areas that are of specific interest to them, with the result that there are for the time being few genetically modified crops that have been engineered with the needs of poor people in developing countries in mind. Governments should therefore endeavour to make sure that the introduction of IPRs in agriculture at least contributes to the socio-economic goals promoted by IPRs treaties themselves. The introduction of IPRs in agriculture should, for instance, contribute to increasing technology transfers from developed countries, one of the recognised goals of the TRIPS Agreement.¹⁵⁶ Governments should also make sure that the introduction of IPRs leads to stronger incentives for researchers to foster the development of R&D in the field of agrobiotechnology. This could be done among other ways by specifically promoting research in crops that are not usually the focus of attention of the private sector even though they are important crops, for instance, from a nutritional point of view. This has in fact already been attempted in some developed countries in what is known as incentives for the development of ‘orphan drugs’.¹⁵⁷ The orphan drug model constitutes an attempt by governments to give the private sector specific incentives to invest in the development of drugs for diseases that are not particularly common or attractive from a commercial point of view. The model developed in the United States offers attractive incentives such as grants, tax credits, regulatory assistance, subsidies, preferential access to public sector research funding and fast track regulatory trials.¹⁵⁸ While the orphan drugs model is not a panacea for all IPRs related problems, it could be usefully adapted to the case of ‘orphan crops’ to draw attention to the need to provide specific incentives to the private sector, the public sector and relevant international organisations such as IARCs to undertake more research in crops and traits that are of specific relevance to small farmers and the poor in general.

Thirdly, developing countries can to varying degrees exploit the territoriality of the patents system to their own advantage. Since TRIPS only requires minimum levels of protection, some countries may go further than the required minimums. This implies that even after all developing countries implement all their TRIPS obligations, there may remain differences in the scope of patentability in different countries. Developing countries can take advantage of the fact that some inventions that may be patentable in some developed countries are not patentable in their own jurisdiction. These inventions can therefore be used at the national level without infringing the patent holder’s rights. Similarly, there may situations where a given invention is patentable in all countries but the patent holder decides not to seek protection in certain countries which are not important enough markets to warrant the expense. Least developed or other countries where specific patents are not requested should take advantage of the scope that this gives them. One of the levels at which this ‘freedom to operate’ may have implications is in the context of relations between IARCs and specific developing countries. While IARCs may feel constrained to uphold patents granted only in developed countries, developing countries should lobby the IARCs to adapt their attitude to IPRs to the specific legal provisions in force in developing countries that seek access to plant varieties that may, for instance, include patented genes.

Fourthly, developing countries should use IPRs frameworks and other relevant tools to promote the development of biotechnology industries at the national level that genuinely contribute to national development and food security. Developing countries could, for instance, decide only to promote and allow ‘appropriate biotechnologies’. The concept of appropriate biotechnologies implies that biotechnology must be environmentally safe as well as socio-economically and culturally acceptable. Interestingly, this concept was already adopted a decade ago in the Preliminary Draft International Code of Conduct on Plant Biotechnology as it Affects the Conservation and Utilization of Plant Genetic Resources which defines appropriate biotechnologies as technologies which promote the development of a sustainable agriculture through the rational use of plant genetic resources while properly considering local culture and techniques.¹⁵⁹ To achieve the goal of promoting appropriate biotechnology, measures must be taken in different fields, including laws on biotechnology and biosafety but also at the level of the incentives that are given for the development of biotechnology, among which IPRs figure prominently.

B. Towards Sui Generis Intellectual Property Protection

As noted above, Article 27(3)b of the TRIPS Agreement provides an opportunity for developing states to develop their own IPRs framework in the field of plant varieties, taking into account such concerns as food security at the individual and national levels. This flexibility can be used in the narrow context of an intellectual property treaty such as the TRIPS Agreement. However, given that the introduction of IPRs in agriculture has broader implications beyond the strict field of intellectual property, it appears opportune to pursue a broader strategy whereby the legal framework introduced in the context of plant variety takes into account a number of other goals. These include elements covered by other international treaties such as the introduction of farmers' rights, the protection of traditional knowledge and benefit-sharing regimes. It also includes other links such as the relationship between the introduction of IPRs in agriculture and the realisation of the human right to food, a dimension which is often unjustifiably sidelined.

There are further reasons for developing countries to devise their own legal framework in the area of food security and IPRs. The current and evolving international legal regime in relevant areas increasingly promotes the appropriation of biological and genetic resources, the appropriation of knowledge related to biological and genetic resources, and trade in resources and knowledge. The international legal system has until now generally protected developing countries' interests in this area by constantly reaffirming their sovereignty over their natural resources. New developments in genetic engineering are increasingly making access to physical resources much less important than the control over knowledge. At present, the IPRs system only offers one type of protection, namely protection for state-of-the-art inventions granted in exclusivity to the rights holders. In general, the existing system has not been conceived with the situation of developing countries in mind. As a result, while developing countries can benefit to a certain extent from the existing system, this must be supplemented with other measures destined to take into account their specificities. This includes, for instance, the need to provide legal frameworks which provide strong property rights to all relevant actors in the field. This is not due to the fact that property rights are better able to promote food security than existing systems based on exchange and free flows of information but to the fact that in a world where the scope of appropriation is rapidly increasing, it is especially important to make sure the weaker actors such as farmers and traditional knowledge holders are well protected.

Developing countries face the general challenge of adapting to the international legal framework. More specific challenges may surface in the future, such as the need to respond to the possible commercialisation of Genetic Use Restriction Technologies (GURTs). V-GURTs refer to plant varieties that have been engineered so that the seeds do not germinate if farmers replant them after the first harvest. V-GURTs have the potential to provide by themselves the enforcement of relevant IPRs since they completely restrict the potential for copying, or in the context of agriculture, the rights of farmers to reuse seeds they have planted. V-GURTs present a direct socio-economic challenge for developing countries and India has, for instance, introduced an outright ban on plant varieties with V-GURTs.¹⁶⁰ The introduction of GURTs is a concern at the international level as well and it has been taken up by various institutions.¹⁶¹ The debate over GURTs has become increasingly controversial over time as witnessed by the recent about-face of UPOV on this issue. UPOV issued a memorandum in early 2003 which was severely critical of GURTs and highlighted in particular that disadvantages of GURTs for society outweigh benefits, that GURTs do not allow any exception for farmer saving seeds, do not allow research exemptions for breeders and may never become freely available for reproduction and breeding. Following criticism from the United States, UPOV replaced this memorandum with a position paper on GURTs which does not any more discuss GURTs.¹⁶² The increasingly controversial nature of GURTs together with increasing concerns over the safety of genetically modified plant varieties in general has led to the development of arguments seeking to justify GURTs as a tool to ensure the safety of genetically modified varieties. In other words, it has been suggested that the possibility to restrict specific traits in plants could be used to chemically remove the foreign DNA from the fruit of a plant before harvesting.¹⁶³ On the whole, the possible introduction of GURTs is an element that developing countries must take into account while devising IPRs frameworks.

Generally, a number of objectives can be pursued through *sui generis* protection regimes. Firstly, *sui generis* regimes offer an opportunity to focus not only on the benefits that can be derived from the commercialisation of new plants but also on more important goals such as the fulfilment of food security at the individual, local and national levels through an increase in food production and diversity where necessary and improvements in food distribution systems where required. Secondly, *sui generis* regimes provide an opportunity to integrate

concerns and commitments under different treaties such as the Biodiversity Convention, the PGRFA Treaty and the Desertification Convention. These include, for instance, the promotion of plant varieties adapted to local climatic conditions, soils and local tastes. Thirdly, *sui generis* options provide an opportunity to go beyond the patent and plant breeders' model. Even though the latter provides certain exceptions not available under patent law, it appears justified to go beyond this rights framework. This is exemplified, for instance, in the case of Kenya where the introduction of plant breeders' rights has been used to a large extent to protect varieties such as flower varieties which have no impact on meeting food needs.¹⁶⁴ The two main directions that *sui generis* regimes can take are the introduction of fully-fledged farmers' rights as proposed under the PGRFA Treaty or more generally the introduction of rights frameworks to protect traditional knowledge.

On the whole, the development of a *sui generis* regime is considered as an extension of states' obligations under the TRIPS Agreement which allows them to fulfil not only their IPRs commitments but also their agricultural, environment and human rights commitments in a way which takes into account their specific needs. A *sui generis* regime is therefore envisaged as one which includes the protection of commercially relevant knowledge; the conservation and management of biological resources and plant genetic resources; the protection through property rights of traditional knowledge; and the recognition that plant variety management and protection is intrinsically linked to the fundamental human right to food.¹⁶⁵ In other words, a legal regime concerning plant varieties should not stop at what is commercially useful today but should incorporate, for instance, human rights considerations linked to food security.

Different options for *sui generis* protection exist. Options range from extensive protection of farmers' rights and traditional knowledge which may include like in the case of the African Model Legislation a complete prohibition on life patenting,¹⁶⁶ to much more modest proposals which focus only on a defensive mechanisms to avoid undue appropriation by foreign actors.

Farmers' rights and traditional knowledge

Developing countries need to put significant emphasis on the development of legal frameworks for farmers' rights and the protection of traditional knowledge because the international system does not provide useful models. As a result, the task is more challenging but also affords more leeway to introduce legal frameworks specifically devised by the South for the South.

Given that the emphasis at the international level has generally been on defining and strengthening the rights of exclusively commercially minded actors through patents and plant breeders' rights, the definition of a broader regime need not add much to existing and well-developed rights. It should rather focus on farmers' rights and the mainstreaming of biodiversity management and traditional knowledge protection. Starting with international legal obligations, the necessity to redraft farmers' rights to make them effective has been made more pressing following the adoption of the PGRFA Treaty. While the TRIPS agreement makes no mention of the necessity to protect farmers' rights, the PGRFA Treaty – while not defining farmers' rights at the international level – puts the onus on member states to make farmers' rights a reality.¹⁶⁷ A few of the substantive elements that make up farmers' rights are indicated in the Treaty. These include, the protection of traditional knowledge, equitable benefit sharing, and the right to participate in decisions concerning the management of plant genetic resources. In other words, the Treaty steers countries towards the recognition of the need to give farmers control over their knowledge for reasons of justice as well as to foster sustainable use and conservation of plant genetic resources. However, it leaves member states free to decide on the most appropriate framework for the same.

Some indications of the possible shape of a comprehensive farmers' rights regime at the domestic level can be given but the actual regime should be determined according to the specific needs of individual countries.

Firstly, farmers' rights can be conceived as a 'defensive' or 'positive' mechanism. Under the defensive role, farmers' rights help farmers and their governments fight the appropriation of their resources and knowledge with legal tools. Today, within the context of the existing IPRs system traditional knowledge is deemed to be in the public domain because it cannot be assigned through patents or plant breeders' rights. As a result, defensive avenues include secrecy or documentation. In cases where traditional knowledge is not known to outsiders,

holders still have the choice to protect their knowledge through trade secrets. In cases where traditional knowledge is already in the public domain, holders can only work towards ensuring that their knowledge is sufficiently well documented to prevent its patentability in their jurisdiction or in a foreign jurisdiction.¹⁶⁸ Some countries have adopted both strategies at the same time. Thus, in Venezuela, a traditional knowledge database has been developed but the government has decided to keep it secret until an international legal framework for the protection of traditional knowledge is developed.¹⁶⁹ Similarly, the development of benefit-sharing schemes constitutes a defensive use of farmers' rights. Benefit-sharing is the logical extension of traditional knowledge documentation and constitutes an attempt to provide some form of compensation to traditional knowledge holders for the loss of control over their knowledge they suffer when this knowledge is transferred and used outside of its original context.¹⁷⁰ Defensive strategies can also be used in conjunction with the introduction of disclosure and prior informed consent requirements which provide further avenues to ensure that knowledge is not unduly integrated in patented inventions.¹⁷¹

The other conception of farmers' rights focuses on 'positive' characteristics, or in other words on the definition of property rights for traditional knowledge holders that give them control over their knowledge. The introduction of property rights can be justified by the need to give farmers the right to commercialise their own knowledge rather than simply stop others from commercialising it. In this sense, farmers' rights are based on the recognition that all economic actors should have commercial rights over their knowledge. The introduction of such farmers' rights is also justified by the role that property rights play in fostering the sustainable use and the conservation of resources due to the intrinsic link between the knowledge and the resource and the requirement of ownership of both to foster their conservation. In other words, farmers' rights can play multiple roles in granting full property rights to farmers which allow commercialisation if desired, in contributing to agrobiodiversity conservation, and simultaneously in fostering food security at the local level.

The introduction of positive farmers' rights is likely to have impacts on the scope of other IPRs. This is linked to the fact that the delimitation of farmers' rights should imply limitations on patents or plant breeders' rights. Thus, reasons of public interest, food security or environmental conservation constitute possible grounds for restricting the rights of existing IPRs holders with a view to strengthen farmers' control over their knowledge. Some countries have already introduced provisions along these lines. In Thailand, for instance, the maintenance of public welfare and the protection of the environment constitute grounds which empower the minister in charge to prohibit the commercial breeder from exercising the rights granted under the Plant Variety Act.¹⁷² The African Model Legislation is even more specific and provides that where food security or nutritional or health needs are adversely affected, governments are allowed in the public interest to restrict the realisation of the rights of breeders.¹⁷³ Countries can also attempt to favour farmers by attempting to regulate access to traditional knowledge and genetic resources that are used in inventions protected by IPRs abroad even if they cannot influence the legal system abroad. Possibilities include the already mentioned disclosure and prior informed consent requirement as well as the possibility to restrict access in situations where it can be foreseen that this will lead to adverse impacts from a public interest perspective or from the perspective of the protection of the environment.

The rights that can be conferred include the right to develop, produce, sell and export the protected variety.¹⁷⁴ While these rights closely mirror rights obtained under IPRs treaties, one of the major distinguishing features of farmers' rights could be their non-exclusivity.¹⁷⁵ In other words, while farmers' rights seek to give control to individuals and local communities over their knowledge and resources, these rights do not exclude similar rights elsewhere.¹⁷⁶ This is due to the close link between food security and plant variety protection as well as to the fact that exclusivity in this context may be inappropriate where varieties exist in similar forms in different localities within the same country or in different countries. In practice, this implies that in terms of commercialisation, all rights holders are entitled to separately produce and commercialise their own products. Another possibility is to provide for market segmentation whereby different rights holders have exclusive or dominant rights in specific markets. The concept of non-exclusivity constitutes one way to deal with the problem of exhaustion of rights. While monopoly rights theoretically grant a farmer or a CGIAR centre the right to stop others from seeking IPRs on the material or knowledge transferred, it would be much more difficult for them to impose conditions and control what happens in subsequent transactions. In fact, in the context of the PGREF Treaty, this impossibility has now been officially recognised.¹⁷⁷ With regard to the duration of the right, given that innovation in farming communities can take place over long periods of time, it does not seem appropriate to impose a priori a temporal limitation on the scope of the rights granted.¹⁷⁸

Secondly, the introduction of farmers' rights includes important issues concerning the determination of the rights holders. IPRs such as patents are often conceived as purely individual rights even though in practice, they can be shared among several individuals or entities. IPRs lend themselves less easily to shared management in the case of an unidentifiable number of rights holders. Farmers' rights present specific problems in this field. In some instances, specific individuals may make individual contributions to the development of a new or improved plant variety. In this situation, the model provided by individual rights can be applied in the case of farmers' rights.¹⁷⁹ This case is, however, likely to be at most infrequent given that novelty is often the product of direct or indirect collaboration between different individuals and/or communities. Farmers' rights are thus likely to be of a communal nature. The usual IPRs model is not well suited to the recognition of common property rights over knowledge because it generally seeks to individualise contributions to the development of science and technology. As a result, it will be necessary to develop new tools to take into account the special nature of knowledge pertaining to plant genetic resources. This may include the vesting of property rights in legal entities such as democratically elected local bodies.¹⁸⁰ Even in cases where contributions by specific individuals can be identified, it may not be appropriate to assign rights to specific individuals because the subject matter of farmers' rights is closely linked to food security which is of direct interest to each and every individual in the local community and beyond, whether landowners, farmers, manual labour and individuals not directly involved in agricultural production.

The implementation of farmers' rights in practice can be done through a registration system. While registering claims fosters better clarity, it is important that the recognition of farmers' rights should not be conditional upon registration. In other words, registration may act as a tool to ascertain existing claims but it should not constitute a condition for the recognition of the rights.¹⁸¹

Thirdly, as noted above, the introduction of farmers' rights constitutes an appropriate entry point to consider issues beyond the field of intellectual property. In fact, farmers' rights cannot be dissociated from concerns over agro-biodiversity management and biosafety. The management of agro-biodiversity presents specific difficulties insofar as diversity has historically been conserved and enhanced by farmers. The contribution of farmers in this context will therefore remain fundamental in the future as widely acknowledged in legal and policy documents.¹⁸² In the context of property rights, the question of agro-biodiversity management must be understood in a broader context. While farmers directly benefit from agro-biodiversity conservation, national governments and the global community also benefit in direct and indirect ways. This calls for a sharing of conservation obligations on an equitable basis between all actors benefiting from the exploitation of agro-biodiversity. This burden should not only be imposed on farmers and local firms marketing seeds, foodstuffs and other crops but also shared with international actors such as states, research institutions and private seed companies that benefit from these conservation activities. This has impacts on farmers' rights and farmers' agricultural management insofar as farmers cannot be expected at the same time to carry the burden of conserving diversity, enhance agro-biodiversity and produce more food by adopting transgenic plant varieties.¹⁸³ This tends to reinforce the importance of farmers' rights giving farmers control over their resources and knowledge with added incentives to conserve and enhance agro-biodiversity. Another environmental dimension to farmers' rights is the biosafety angle. In a situation where the potential impacts of transgenic plant varieties is not fully ascertained, the international community and a number of states have promoted reliance on the precautionary principle with regard to the introduction of genetically modified plant varieties.¹⁸⁴ This indicates that there may be some environmental reasons, whether linked to concerns over loss of diversity in general or biosafety specifically, which may require the introduction of supplementary conditions to the granting of IPRs on genetically modified plant varieties or specific restrictions with regard to their use in specific localities or environments.¹⁸⁵

Fourthly, while farmers' rights and the protection of traditional knowledge remain new areas that the current IPRs system has not previously explored, some specific links between the two can be found. One of the most interesting aspects of the existing IPRs system in this context is the protection of geographical indications (GIs).¹⁸⁶ GIs are of interest for several reasons: No monopoly control over the knowledge is embedded in the protected indication and this knowledge remains in the public domain. Further, the rights conferred can theoretically be held in perpetuity, as long as the link between the geographical place and the good is maintained and the indication is not rendered generic.¹⁸⁷ Another significant characteristic is that the rights attached to GIs cannot be transferred to non-local producers. In effect, this implies that anyone within the region of protection can theoretically produce the protected good while nobody outside this zone can acquire these rights. In the context of farmers' rights and traditional knowledge, GIs are of interest because they differ from other types

of IPRs insofar as they are collective in scope. GIs offer an exclusive protection against outsiders to an indeterminate number of people within the region of protection. Protection through GIs may therefore provide an interesting avenue to foster protection for products manufactured within a specific area while not restricting the number of rights holders within the area. Further, GIs do not impose any novelty tests like the patent system. In fact, they can specifically be used to protect traditional products as long as the particular characteristics of these products can be attributed to a specific geographical origin.¹⁸⁸ Another advantage of GIs is that they are not limited to a given method of production for a given product. This allows not only for different production methods to be covered under a given indication but also for changes in production methods over time.¹⁸⁹

VII. Conclusions

The challenge of enhancing food security for each individual and each country around the world will require tremendous efforts on the part of all actors involved if malnutrition is ever to be eradicated. Food insecurity in developing countries has been a concern for long and is associated with a number of general and specific policy challenges. The development of genetically modified plant varieties and the introduction of IPRs in agriculture constitute two related and significant changes in the policy environment for addressing food security.

The actual implications of the introduction of IPRs in the agricultural sector in developing countries are yet to be ascertained given that legal frameworks are in many cases still in the process of being adopted and implemented. However, a number of points can already be made in the context of food security. Potential benefits of agro-biotechnology include the development of plant varieties that help meeting some of the challenges linked to existing food insecurity. Potential concerns include a number of socio-economic impacts as well as some environmental impacts, in particular with regard to the loss of agro-biodiversity and biosafety.

In practice, the TRIPS Agreement does not give developing countries the possibility to avoid the introduction of plant variety protection. However, the *sui generis* option constitute an opportunity that developing countries can use to develop an IPRs regime which suits their specific needs and which takes into account all their international obligations, such as commitments in environmental treaties, in agricultural treaties and in human rights treaties.

The main challenge for developing countries is to develop legal frameworks which go beyond existing IPRs models that have generally not been developed with a view to ensure that the introduction of IPRs in new areas of technology does not have negative impacts on the realisation of basic needs, such as basic food needs. In practice, developing countries are under significant pressure within and without the WTO to introduce forms of IPRs generally modelled after existing models developed in the North. Thus, the UPOV Convention has been promoted as an appropriate model for a *sui generis* plant variety protection regime. Even if an UPOV style system is adopted, as has been the case in a number of countries over the past few years, developing countries should not stop there. The protection of traditional knowledge in general – and in this specific case the traditional knowledge of farming communities – must be enshrined in legal instruments. This constitutes a significant challenge because there is little by way of models that can be used to develop such frameworks but the protection of traditional knowledge is probably the most important part of a plant variety regime for most developing countries.

Overall, the need to develop a legal framework that goes beyond traditionally recognised IPRs regimes is based on a number of reasons. At a basic level, the introduction of IPRs in agriculture can only be justified if IPRs foster food security, or in other words the realisation of the human right to food. There are a number of ways to foster food security. One of them includes the appropriation of knowledge related to plant varieties through property rights. In this scheme which is promoted today at the international level, control over knowledge is

only offered to state-of-the-art inventions. In fact, the introduction of property rights in agriculture should benefit all actors involved in agricultural management. This is the gap that developing countries must fill given that their agricultural systems are often overwhelmingly dependent on the contributions of a significant number of small individual farmers, local farming communities and public sector institutions rather than private actors. In this situation, the development of positive farmers' rights is necessary not only for the benefit of farmers but also their countries. In fact, appropriately designed farmers' rights should provide benefits to farmers and farming communities, should foster sustainable agro-biodiversity management, should provide tools for governments to fight biopiracy and overall should provide a set of incentives to tackle food insecurity. Such farmers' rights need not be envisaged as opposed to existing IPRs. They should be complementary, possibly overlapping forms of property rights, and on the whole they should foster, like patents and plant breeders' rights, further incentives towards the realisation of the human right to food.

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Endnotes

- ¹ Overall 17% of the total population of developing countries remain undernourished. This figure includes countries with no or hardly any prevalence of hunger such as South Korea or Turkey. This study examines developing countries in general. However, the main focus is on countries where food insecurity is prevalent and not on countries where undernourishment is virtually non-existent.
- ² *The State of Food Insecurity in the World 2002* (Rome: FAO, 2002).
- ³ See, e.g., Mahbub ul Haq Human Development Centre, *Human Development in South Asia 2002 – Agriculture and Rural Development* 98 (Karachi: Oxford University Press, 2003).
- ⁴ Jacques Diouf, 'Vaincre la faim', *Le Monde diplomatique* (June 2002), p. 23.
- ⁵ On food security in the context of agricultural biotechnology, see generally Ian Scoones, *Agricultural Biotechnology and Food Security: Exploring the Debate* (Brighton: Institute of Development Studies, Working Paper 145, 2002).
- ⁶ See, e.g., Carl F. Jordan, 'Genetic Engineering, the Farm Crisis and World Hunger', 52 *Bioscience* 523, 526 (2002).

- ⁷ Jose Falck-Zepeda et al., *Biotechnology and Sustainable Livelihoods – Findings and Recommendations of an International Consultation* (ISNAR, Briefing Paper No. 54, September 2002).
- ⁸ See, e.g., FAO, *The State of Food Insecurity in the World 2002* (Rome: FAO, 2002).
- ⁹ See, e.g., Mahbub ul Haq Human Development Centre, *supra* note 3 at 96.
- ¹⁰ Concerning the link between food security and land tenure, see, e.g., Bina Agarwal, *A Field of one's Own – Gender and Land Rights in South Asia* (Cambridge: Cambridge University Press, 1994).
- ¹¹ The FAO estimates that 80% of crop production increases will come from this intensification of crop production. The 20% remaining will be initiated the expansion of arable land. See FAO, *World Agriculture – Towards 2015/2030* (London: Earthscan, 2003).
- ¹² Charles Spillane, 'Agricultural Biotechnology and Developing Countries: Proprietary Knowledge and Diffusion of Benefits', in Timothy Swanson ed., *Biotechnology, Agriculture and the Developing World – The Distributional Implications of Technological Change* 67, 72 (Cheltenham: Edward Elgar, 2002).
- ¹³ See, e.g., Per Pinstrup-Andersen, Rajul Pandya-Lorch & Mark W. Rosegrant, *World Food Prospects: Critical Issues for the Early Twenty First Century* (Washington, DC: International Food Policy Research Institute, 1999).
- ¹⁴ Eugenio Díaz-Bonilla & Sherman Robinson, 'Biotechnology, Trade and Hunger', in Philip G. Pardey & Bonwoo Koo eds, *Biotechnology and Genetic Resource Policies* (Washington, DC: IFPRI, 2003).
- ¹⁵ FAO, *supra* note 11 at 322-327.
- ¹⁶ World Food Summit, Plan of Action, Rome, 17 Nov. 1996 [hereafter Rome Plan of Action].
- ¹⁷ Para 2 of the Rome Plan of Action, *supra* note 16.
- ¹⁸ Rome Plan of Action, *supra* note 16.
- ¹⁹ WTO, Ministerial Declaration, Ministerial Conference – Fourth Session, WTO Doc. WT/MIN(01)/DEC/1 (2001).
- ²⁰ World Summit on Sustainable Development – Plan of Implementation, 4 Sept. 2002, UN Doc. A/CONF.199/20.
- ²¹ Article 11 of the International Covenant on Economic, Social and Cultural Rights, New York, 16 Dec. 1966, 6 *International Legal Materials* 360 (1967) [hereafter ESCR Covenant].
- ²² Paragraph 15, Committee on Economic, Social and Cultural Rights, General Comment No. 12 – The Right to Adequate Food (Art. 11), UN Doc. E/C.12/1999/5 (1999) [hereafter General Comment on Article 11].
- ²³ See PAN AP/IBON, *Convention on Food Sovereignty – A Discussion Paper* (2002).
- ²⁴ Agreement on Trade-Related Aspects of Intellectual Property Rights, Marrakech, 15 Apr. 1994, 33 *International Legal Materials* 1197 (1994) [hereafter TRIPS Agreement].
- ²⁵ J.E.M. AG Supply v. Pioneer Hi-Bred International, 10 Dec. 2001, Supreme Court of the United States, 122 S.Ct. 593.
- ²⁶ See, e.g., Neil D. Hamilton, 'Legal Issues Shaping Society's Acceptance of Biotechnology and Genetically Modified Organisms', 6 *Drake Journal of Agricultural Law* 81 (2001).
- ²⁷ Sachin Chaturvedi, 'Agricultural Biotechnology and New Trends in IPRs Regime – Challenges before Developing Countries', 37 *Economic & Political Weekly* 1212 (30 March 2002).
- ²⁸ See, e.g., R. David Kryder et al., *The Intellectual and Technical Property Components of pro-Vitamin A Rice (Golden Rice™): A Preliminary Freedom-to-Operate Review* (Ithaca,

- NY: ISAAA, Brief No. 20, 2000). On Vitamin A deficiency, *see, e.g.*, WHO, Micronutrient Deficiencies – Combating Vitamin A Deficiency, available at <http://www.who.int/nut/vad.htm>.
- 29 *See, e.g.*, concerning India, Anitha Ramanna, ‘Policy Implications of India’s Patent Reforms – Patent Applications in the Post-1995 Era’, XXXVII *Economic & Political Weekly* 2065 (2001).
- 30 Land rights are of central importance in the overall management of agricultural systems. This dimension is, however, not considered in this study insofar as it can be considered separately from IPRs issues.
- 31 *See, e.g.*, Objectives 3(1) and 3(4)d of the Rome Plan of Action, *supra* note 16.
- 32 *See, e.g.*, Hamilton, *supra* note 26. The far-reaching consequences of the system currently in place in North America for farmers is well illustrated in the case of the dispute between Monsanto and Percy Schmeiser. *See Schmeiser v. Monsanto*, Federal Court of Canada, 4 Sept. 2002 (leave to appeal to the Supreme Court granted in May 2003).
- 33 *Cf.* Derek Byerlee & Ken Fischer, ‘Accessing Modern Science: Policy and Institutional Options for Agricultural Biotechnology in Developing Countries’, 30 *World Development* 931 (2002).
- 34 CDC Statement to ICW2000 on the Need to Resolve Outstanding Issues Concerning Intellectual Property Protection Relating to Plant Genetic Resources, CGIAR International Centres Week (Oct. 2000).
- 35 FAO, *supra* note 11 at 296, 265.
- 36 John H. Barton & Peter Berger, ‘Patenting Agriculture’, *Issues in Science and Technology Online* (Summer 2001, available at http://www.nap.edu/issues/17.4/p_barton.htm).
- 37 In practice, until now, the private sector which is a major player in biotechnology research globally has only invested a small share of its R&D in products directly aimed at developing countries. This has occurred mainly through direct investment by global life science companies, acquisition by these companies of seed companies in developing countries and through alliances between global and local companies. *See, e.g.*, Byerlee & Fischer, *supra* note 33.
- 38 FAO, *supra* note 11.
- 39 FAO, *supra* note 11.
- 40 *See, e.g.*, Lori Ann Thrupp, ‘Linking Agricultural biodiversity and food security: The Valuable Role of Agrobiodiversity for Sustainable Agriculture’, 76 *International Affairs* 265 (2000).
- 41 *See, e.g.*, J.I. Cohen & C.S. Potter, ‘Conservation of Biodiversity in Natural Habitats and the Concept of Genetic Potential’, in Christopher S. Potter et al. eds, *Perspectives on Biodiversity: Case Studies of Genetic Resource Conservation and Development* xix (Washington, DC: AAAS, 1993).
- 42 *Cf.* Thrupp, *supra* note 40.
- 43 *See, e.g.*, M.S. Swaminathan, ‘Ethics and Equity in the Collection and Use of Plant Genetic Resources: Some Issues and Approaches’, in *Ethics and Equity in Conservation and Use of Genetic Resources for Sustainable Food Security* 7 (Rome: International Plant Genetic Resources Institute, 1997).
- 44 *See, e.g.*, Hamilton, *supra* note 26.
- 45 *Note* that this section does not analyse the Codex Alimentarius which focuses mainly on food safety and trade facilitation. Food safety is relevant in an overall study on food security but is less central in the case of the link between food security and IPRs.
- 46 International Undertaking for Plant Genetic Resource, Res. 8/83, *Report of the Conference of FAO*, 22nd Session, Rome, 5-23 Nov. 1983, Doc. C83/REP [hereafter International Undertaking].
- 47 Res. 4/89, Agreed Interpretation of the International Undertaking, *Report of the Conference of FAO*, 25th Session, Rome, 11-29 Nov. 1989, Doc. C89/REP and Res. 5/89, Farmers’ Rights,

- Report of the Conference of FAO, 25th Session, Rome, 11-29 Nov. 1989, Doc. C89/REP.*
- 48 Chapter 14 of Agenda 21, *Report of the United Nations Conference on Environment and Development*, Rio de Janeiro, 3-14 June 1992, UN Doc. A/CONF.151/26/Rev.1 (Vol. 1), Annex II.
 - 49 International Treaty on Plant Genetic Resources for Food and Agriculture, Rome, 3 Nov. 2001 [hereafter PGRFA Treaty].
 - 50 Note that the central concern of the United States in 2001 was the protection of the 'integrity of intellectual property rights'. See FAO Conference, Thirty-first Session, Fourth Plenary Meeting, 3 Nov. 2001, Doc. C 2001/PV/4. In the meantime, the United States changed its position and signed the treaty in November 2002.
 - 51 On the relationship between the Treaty and intellectual property right instruments, see, e.g., Article 12(3)f of the PGRFA Treaty, *supra* note 49.
 - 52 Article 9(3) of the PGRFA Treaty, *supra* note 49.
 - 53 In fact, the Treaty goes one step further in asserting that benefit sharing is premised on the fact that access to PGRFA constitutes in itself an important benefit for countries that are recipients of PGRFA. See Article 13(1) of the PGRFA Treaty, *supra* note 49.
 - 54 See, e.g., Declaration and Plan of Action for Global Partnership in Agricultural Research adopted by the Consultative Group on International Agricultural Research, 31 Oct. 1996, available at <http://www.cgiar.org/gforum/globfor.htm>.
 - 55 See, e.g., Consultative Group on International Agricultural Research, Progress Report on IPRs Matters and Proposal for Review of Plant Breeding, Mid-Term Meeting, Beijing, CGIAR Doc. MTM/99/20 (1999).
 - 56 See, e.g., Agreement between the IPGRI/INIBAP and the FAO Placing Collections of Plant Germplasm under the Auspices of FAO, 26 Oct. 1994.
 - 57 Consultative Group on International Agricultural Research, CGIAR Center Statements on Genetic Resources, Intellectual Property Rights, and Biotechnology (Washington, DC: CGIAR, 1999).
 - 58 See Article 15 of the PGRFA Treaty, *supra* note 49.
 - 59 Consultative Group on International Agricultural Research, Centres' Position Statement on Biotechnology (1998). On genetically modified maize in Mexico, see, e.g., David Quist & Ignacio H. Chapela, 'Transgenic DNA Introgressed into Traditional Maize Landraces in Oaxaca, Mexico', 414 *Nature* 541 (2001) and ETC Group, 'Genetic Pollution in Mexico's Center of Maize Diversity' (ETC, Backgrounder Vol. 8/2, 2002).
 - 60 See Article 1 of the TRIPS Agreement, *supra* note 24.
 - 61 Article 8 only allows states to take advantage of flexibility that can be read within the TRIPS Agreement but does not allow them to go beyond TRIPS as it requires that the measures that are adopted should be consistent with the other provisions of the TRIPS Agreement.
 - 62 Article 27(1) of the TRIPS Agreement, *supra* note 24.
 - 63 Article 27(2) and 27(3) of the TRIPS Agreement, *supra* note 24.
 - 64 Article 27(3)b of the TRIPS Agreement, *supra* note 24.
 - 65 On the International Undertaking, see *above* at p. 1.
 - 66 Cf. Susan H. Bragdon and David R. Downes, *Recent Policy Trends and Developments Related to the Conservation, Use and Development of Genetic Resources* (Rome: International Plant Genetic Resources Institute, 1998).
 - 67 Article 22 of the TRIPS Agreement, *supra* note 24.

- 68 International Convention for the Protection of New Varieties of Plants, Paris, 2 Dec. 1961, as revised at Geneva on 19 Mar. 1991 (UPOV Doc. 221(E), 1996) [hereafter UPOV-1991].
- 69 Note that the UPOV Convention was revised in 1978 and 1991. Some UPOV member states are bound by the 1978 Act while some other members are bound by the 1991 Act. Following the entry into force of the 1991 Act, states that wish to join UPOV can only join the 1991 Act.
- 70 Article 14(1) of UPOV-1991, *supra* note 68.
- 71 Article 5 of UPOV-1991, *supra* note 68.
- 72 Article 6 of UPOV-1991, *supra* note 68. In the case of other member countries, the relevant timeline is six years for trees and vines.
- 73 For further details, *see, e.g.*, Barry Greengrass, 'The 1991 Act of the UPOV Convention', 13 *European Intellectual Property Review* 466 (1991).
- 74 *See e.g.*, Gurdial Singh Nijar & Chee Yoke Ling, 'The Implications of the Intellectual Property Rights Regime of the Convention on Biological Diversity and GATT on Biodiversity Conservation: A Third World Perspective', in Anatole F. Krattiger et al. eds, *Widening Perspectives on Biodiversity* 277 (Geneva: International Academy of the Environment, 1994).
- 75 Article 8 of the International Convention for the Protection of New Varieties of Plants, Geneva, 23 Oct. 1978.
- 76 Article 19 of UPOV-1991, *supra* note 68.
- 77 Convention on Biological Diversity, Rio de Janeiro, 5 June 1992, 31 *International Legal Materials* 818 (1992) [hereafter Biodiversity Convention].
- 78 Article 1 of the Biodiversity Convention, *supra* note 77.
- 79 *See* Decision III/11, 'Conservation and Sustainable Use of Agricultural Biological Diversity', *Report of the Third Meeting of Conference of the Parties to the Convention on Biological Diversity*, Buenos Aires, 4-15 Nov. 1996, UN Doc. UNEP/CBD/COP/3/38.
- 80 On genetic use restriction technologies, *see* below at p. 1.
- 81 Bonn Guidelines on Access to Genetic Resources and Fair and Equitable Sharing of the Benefits Arising out of their Utilization, in Decision VI/24, 'Access and Benefit-Sharing as Related to Genetic Resources', *Report of the Sixth Meeting of the Conference of the Parties to the Convention on Biological Diversity*, The Hague, 7-19 April 2002, UN Doc. UNEP/CBD/COP/6/20 [hereafter Bonn Guidelines].
- 82 Article 15 of the Biodiversity Convention, *supra* note 77.
- 83 Decision IV/9, Implementation of Article 8(j) and related provisions, *Decisions Adopted by the Conference of the Parties to the Convention on Biological Diversity at its Fourth Meeting*, Bratislava, 4-15 May 1998, UN Doc. UNEP/CBD/COP/4/27 (1998).
- 84 Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, Paris, 17 June 1994, 33 *International Legal Materials* 1328 (1994).
- 85 Article 10 of the Desertification Convention, *supra* note 84.
- 86 Articles 16 and 18 of the Desertification Convention, *supra* note 84.
- 87 ESCR Covenant, *supra* note 21.
- 88 General Comment on Article 11, *supra* note 22 at §8.
- 89 Draft Covenant on Economic, Social and Cultural Rights, Commission on Human Rights, Report of the 10th Session, ECOSOC, 18th Session, Supp. 7, Doc E/2573 – E/CN.4/705 (1954).
- 90 Article 15(1)c of the ESCR Covenant, *supra* note 21.

- 91 *See above* at p. 1.
- 92 Plant Patent Act of 1930, 35 *United States Code* 161 et seq.
- 93 Plant Variety Protection Act of 1970, 7 *United States Code* 2321 et seq.
- 94 *See above* at p. 1.
- 95 *Diamond v. Chakrabarty*, 16 June 1980, Supreme Court, 447 U.S. 303.
- 96 *Ex parte Hibberd, et al.*, 18 Sept. 1985, Patent and Trademark Office Board of Patent Appeals and Interferences, 227 U.S.P.Q. 443.
- 97 United States Patent No. 4,736,866, Transgenic Non-Human Mammals, 12 Apr. 1988.
- 98 For the 1978 status, *see* Article 2 of the International Convention for the Protection of New Varieties of Plants, Geneva, 23 Oct. 1978.
- 99 *See, e.g.*, Policy on Intellectual Property of the International Maize and Wheat Improvement Center (2001).
- 100 Barton & Berger, *supra* note 36.
- 101 Note however that while international law is one important factor influencing developing countries policy making in these areas, it is by far not the only important trigger for change. Concerning plant variety protection in India, *see, e.g.*, Shaila Seshia, 'Plant Variety Protection and Farmers' Rights – Law-Making and Cultivation of Varietal Control', 37 *Economic & Political Weekly* (6 July 2002).
- 102 Article 26 of the Convention on the Law of Treaties, Vienna, 23 May 1969, 8 *International Legal Materials* 679 (1969) [hereafter Vienna Convention 1969].
- 103 *See* Vienna Convention 1969, *supra* note 102.
- 104 Preamble of the Cartagena Protocol on Biosafety to the Convention on Biological Diversity, Montreal, 20 Jan. 2000, 39 *International Legal Materials* 1027 (2000) [hereafter Biosafety Protocol].
- 105 *See, e.g.*, Dominique Carreau, *Droit international* (Paris: Pedone, 7th ed. 2001).
- 106 *See* Article 103 of the UN Charter.
- 107 Article 53 of the Vienna Convention 1969, *supra* note 102.
- 108 In fact, some authors consider that human rights are *ius cogens*. *See, e.g.*, Lauri Hannikainen, *Peremptory Norms (Jus Cogens) in International Law – Historical Development, Criteria, Present Status* (Helsinki: Finnish Lawyers' Publishing, 1989) at 429 noting that '[i]n my view there is no doubt that contemporary international law has reached a stage in which it has the prerequisites for the existence of peremptory obligations upon States to respect basic human rights'.
- 109 Para. 3 and 5 of Resolution 2001/21, 'Intellectual Property and Human Rights', United Nations Sub-Commission on Human Rights, UN Doc. E/CN.4/Sub.2/RES/2001/21 (2001).
- 110 In the context of Canada – Patent Protection of Pharmaceutical Products, WTO Doc. WT/DS114/R (2000), § 7(26), the Panel argued that Article 30 should be read as providing in itself a recognition that the rights provided in Article 28 might need adjustments. The Panel argued that this should not be construed as granting states the right to effect what could be seen as a renegotiation of the basic balance of rights and obligations under TRIPS. This seems to severely constrain the possibilities offered by Articles 7 and 8. However, Articles 7 and 8 also have a specific dimension of differential treatment which was not taken into account in the Canada case because no developing country was involved. It is to be expected that the Panel would interpret Articles 7 and 8 in a broader way in the case of a dispute involving developing countries.
- 111 FAOSTAT at <http://apps.fao.org>. *Note* that the total rural population amounts to 60 per cent of

the total population in developing countries and 72 per cent in least developed countries.

- 112 Rajeev Dhavan et al. 'Power without Responsibility on Aspects of the Indian Patents Legislation', 33 *Journal Indian Law Institute* 1 (1991).
- 113 See generally Justice N. Rajagopala Ayyangar, Report on the Revision of the Patents Law (September 1959).
- 114 Section 3 of the Patents Act, 1970, Act 39 of 1970. [hereafter, reference to the Patents Act, 1970 indicates a reference to the Act as it was until the adoption of the 2002 amendments]. See also, C.S. Srinivasan, 'Current Status of Plant Variety Protection in India', in M.S. Swaminathan ed., *Agrobiodiversity and Farmers' Rights* 77 (Delhi: Konark, 1996).
- 115 Section 5 of the Patents Act, 1970, *supra* note 114. Under the 1970 Act, drugs included insecticides, germicides, fungicides, weedicides and herbicides and all other substances intended to be used for the protection or preservation of plants. Section 2 of the Patents Act, 1970, *supra* note 114.
- 116 Section 53 of the Patents Act, 1970, *supra* note 114.
- 117 Chapter XVI of the Patents Act, 1970, *supra* note 114 concerning compulsory licences and licences of right.
- 118 Suman Sahai, 'Indian Patents Act and TRIPS', 28 *Economic & Political Weekly* 1495 (1993).
- 119 Joint Committee on the Protection of Plant Varieties and Farmers' Rights Bill, 1999, Report of the Joint Committee (2000).
- 120 Protection of Plant Varieties and Farmers' Rights Act, 2001, Act No. 53 of 2001 [hereafter PPVFR Act].
- 121 Section 15(1) of the PPVFR Act, *supra* note 120.
- 122 The Committee specifically indicated that it felt the first bill had very inadequate provisions for protecting the interests of farmers. Joint Committee, *supra* note 119 at p. x.
- 123 Section 16(1)d of the PPVFR Act, *supra* note 120.
- 124 This follows significant controversies concerning the potential impacts on Indian agriculture of genetic use restriction technology (specifically, V-GURT) or terminator technology.
- 125 Anonymous, 'India to Accede to Plants Convention', *The Hindu*, 1 June 2002, available at <http://www.hindu.com>.
- 126 Patents Act, 1970 as amended by the Patents (Amendment) Act, 2002 [hereafter Patents Act, 1970/2002].
- 127 On licences of right, sections 86-88 of the Patents Act, 1970, *supra* note 114.
- 128 *Note* however that these two provisions only constitute grounds for opposing the grant of a patent or for revocation of a patent. Sections 25(1)j and k and 64(1)p and q of the Patents Act, 1970/2002, *supra* note 126.
- 129 Chapter II of the Biological Diversity Act, 2002 is entitled Regulation of Access to Biological Diversity.
- 130 Section 7 of the Biological Diversity Act, 2002.
- 131 Section 6 of the Biological Diversity Act, 2002.
- 132 Permission of the National Biodiversity Authority must be obtained before the sealing of the patent but can be obtained after the acceptance of the patent by the patent authority. *See* Section 6(1) of the Biological Diversity Act, 2002.
- 133 Section 18(4) of the Biological Diversity Act, 2002.
- 134 Section 21(2)a of the Biological Diversity Act, 2002.

- 135 Section 21(2)b-f of the Biological Diversity Act, 2002.
- 136 As directed in Article 16 of the Biodiversity Convention, *supra* note 77.
- 137 Ramanna, *supra* note 29.
- 138 See Law Commission of India, Biodiversity Bill (One Hundred Seventy First Report on Biodiversity Bill, January 2000), at Section 9(i)c.
- 139 The need for the transfer of technologies appropriate to the food security needs of developing countries is, for instance, recognised by the Rome Plan of Action, *supra* note 16.
- 140 Article 7 of the TRIPS Agreement, *supra* note 24.
- 141 See, e.g., Parliament of India, The Patents (Second Amendment) Bill, 1999 – Report of the Joint Committee, Notes of dissent (2001).
- 142 Concerning the interpretation of Articles 7 and 8 that has been given in recent disputes, see *supra* note 110.
- 143 See Paragraph 6 of the Declaration on the TRIPS Agreement and Public Health, WTO, Ministerial Conference – Fourth Session, WTO Doc. WT/MIN(01)/DEC/2 (2001).
- 144 See Implementation of Paragraph 6 of the Doha Declaration on the TRIPS Agreement and Public Health – Draft, Council for TRIPS, 16 Dec. 2002, Doc. JOB(02)/217 and WTO Press Release, ‘Supachai Disappointed over Governments’ Failure to Agree on Health and Development Issues’, Press/329, 20 Dec. 2002.
- 145 Article 31 of the TRIPS Agreement, *supra* note 24.
- 146 The conservative position of developing countries towards the development of *sui generis* legal frameworks is also explained in part by the fact that the WTO system does not reward regulatory innovation in this field. On this ‘chilling effect’, see, e.g., Urs P. Thomas, ‘The CBD, the WTO, and the FAO: The Emergence of Phytogenetic Governance’, in Philippe G. Le Prestre ed., *Governing Global Biodiversity – The Evolution and Implementation of the Convention on Biological Diversity* 177 (Aldershot: Ashgate, 2002).
- 147 See p. 1 below.
- 148 An effort in this direction has, for instance, been initiated by the World Intellectual Property Organization. For further information, see WIPO, Intellectual Property and Genetic Resources, Traditional Knowledge, and Folklore – Traditional Knowledge Databases and Prior Art, <http://www.wipo.int/globalissues/databases/tk/index.html>.
- 149 See Draft Substantive Patent Law Treaty, WIPO Doc. SCP/7/3 (2002).
- 150 Costa Rica, Biodiversity Law, 1998.
- 151 Patents Act, 1970/2002, *supra* note 126.
- 152 Philippines, The Indigenous Peoples Rights Act of 1997.
- 153 Section 3(g) of the Indigenous Peoples Rights Act, *supra* note 152.
- 154 Section 32 of the Indigenous Peoples Rights Act, *supra* note 152.
- 155 See, e.g., John H. Barton, ‘International Intellectual Property and Genetic Resource Issues Affecting Agricultural Biotechnology’, in C.L. Ives & B.M. Bedford eds, *Agricultural Biotechnology in International Development* 273 (Wallingford: CABI, 1998).
- 156 Note also that the need for the transfer of technologies appropriate to the food security needs of developing countries is, for instance, recognised by the Rome Plan of Action, *supra* note 16.
- 157 For the United States, see 21 *United States Code* 360bb.
- 158 See, e.g., Spillane, *supra* note 12.

- 159 See Article 3 of the Preliminary Draft International Code of Conduct on Plant Biotechnology as it Affects the Conservation and Utilization of Plant Genetic Resources, *in* Commission on Genetic Resources for Food and Agriculture, Towards a Code of Conduct for Plant Biotechnology as it Affects the Conservation and Utilization of Plant Genetic Resources, Ninth Session, Rome, 14-18 Oct. 2002, Doc. CGRFA-9/02/18/Annex.
- 160 See above Section III(B)1.
- 161 See, e.g., Decision VI/5, 'Agricultural Biological Diversity', *Report of the Sixth Meeting of the Conference of the Parties to the Convention on Biological Diversity*, The Hague, 7-19 April 2002, UN Doc. UNEP/CBD/COP/6/20.
- 162 See International Union for the Protection of New Varieties of Plants, Memorandum Prepared by the Office of UPOV on the Genetic Use Restriction Technologies, UPOV Doc. CAJ/47/7 (10 Jan. 2003) and Position of the International Union for the Protection of New Varieties of Plants Concerning Decision VI/5 of the Conference of the Parties to the Convention on Biological Diversity (11 Apr. 2003, superseding UPOV Doc. CAJ/47/7).
- 163 See, e.g., US Patent Application No 09/970004, Methods and Compositions Relating to the Generation of Partially Transgenic Organisms (20 June 2002).
- 164 See, e.g., Hannington Odame et al., 'Innovation and Policy Process: Case of Transgenic Sweet Potato in Kenya', *37/27 Economic & Political Weekly* 2770 (2002) and World Trade Organization, 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, WTO Doc. IP/C/W/175 (2000).
- 165 Note that the Desertification Convention includes most of these elements in a direct or indirect way. See in particular Article 18 of the Desertification Convention, *supra* note 84.
- 166 The provisions on access to biological resources highlight that the recipients of biological resources or related knowledge cannot apply for any intellectual property right of exclusionary nature. See Article 8(5), Organization of African Unity, African Model Legislation for the Protection of the Rights of Local Communities, Farmers and Breeders, and for the Regulation of Access to Biological Resources, 2000 [hereafter African Model Legislation].
- 167 Article 9(2) of the PGRFA Treaty, *supra* note 49.
- 168 An example of current efforts at documenting traditional knowledge at the international level is the World Bank's IK Practices Database Search. For further information, visit <http://www4.worldbank.org/afr/ikdb/search.cfm>.
- 169 Nuno Pires de Carvalho, 'From the Shaman's Hut to the Patent Office – In Search of Effective Protection for Traditional Knowledge', *Washington University Journal of Law & Policy* (forthcoming 2003).
- 170 While the international legal regime remains quite underdeveloped in this area, some countries have adopted rather strict frameworks. Thus, the Thai Plant Varieties Protection Act, B.E. 2542 (1999) provides that twenty percent of the profits derived from authorising another person to use the rights in a local domestic plant variety must be allocated to the persons who conserve or develop the plant variety, and sixty percent thereof to the community as its common revenue and twenty percent thereof to the local government organisation, the farmer's group or the cooperative that makes the agreement (Section 49).
- 171 For further details on prior informed consent and the disclosure requirement, see *above* at p. 1.
- 172 Section 36, Thailand, Plant Varieties Protection Act, B.E. 2542 (1999).
- 173 Article 45 of the African Model Legislation, *supra* note 166.
- 174 Note that Thailand has, for instance, adopted a farmers' rights regime which entitles the local legal entity to 'have the exclusive right to develop, study, conduct an experiment or research in,

- produce, sell, export or distribute by any means the propagating material thereof'. *See* Section 47 of the Plant Varieties Protection Act, B.E. 2542 (1999).
- 175 This is similar to the solution found by Panama with regard to the grant of licences for the use of collective rights. *See* Article 21, Panama, Ministerio Comercio e Industrias, Decreto ejecutivo No. 12 Por la cual se Reglamenta la Ley No. 20 de 26 de junio de 2000, 20 March 2001.
- 176 *Cf.* Article 5(2) of the Draft Traditional Knowledge (Preservation and Protection) Bill, 2000 (proposed by Dr. N.S. Gopalakrishnan, School of Legal Studies, Cochin) providing that if traditional knowledge has been used in more than one panchayat, the rights to manage this traditional knowledge vest at the District level.
- 177 *See* Article 12(3)d of the PGRFA Treaty, *supra* note 49.
- 178 *Cf.* Article 7(3), Panama, Ley No. 20 (del régimen especial de propiedad intelectual sobre los derechos colectivos de los pueblos indígenas), 26 June 2000.
- 179 The identification of eligible farmers should not be unduly cumbersome. As identified by the Crucible Group, farmers' rights could be restricted to small-scale farmers defined according to criteria which include the percentage of their annual harvest in a particular crop which is consumed, the number of acres of land cultivated and the tonnes of agricultural goods produced. *See* Crucible II Group, *Seeding Solutions – Volume 2* (Ottawa: International Development Research Centre, 2001).
- 180 *Cf.* Section 5 of the Draft Traditional Knowledge (Preservation and Protection) Bill, *supra* note 176 which proposes the setting up of a Traditional Knowledge Trust in each panchayat in India.
- 181 This is the approach taken by the Costa Rica, Biodiversity Law, 1998 at Section 82.
- 182 *See, e.g.*, Article 9 of the PGRFA Treaty, *supra* note 49. *See also*, Martin A. Girsberger, *Biodiversity and the Concept of Farmers' Rights in International Law – Factual Background and Legal Analysis* 233 (Bern: Peter Lang, 1999).
- 183 *Cf.* FAO Commission on Plant Genetic Resources, Revision of the International Undertaking – Analysis of Some Technical, Economic and Legal Aspects for Consideration in Stage II: Access to Plant Genetic Resources, and Farmers' Rights, Doc. CPGR-6/95/8 Supp.
- 184 *See, e.g.*, Biosafety Protocol, *supra* note 104.
- 185 *Cf.* Section 36 of the Thai Plant Varieties Protection Act, B.E. 2542 (1999).
- 186 *See* Section 3 of the TRIPS Agreement, *supra* note 24.
- 187 Dwijen Rangnekar, Geographical Indications: A Review of Proposals at the TRIPS Council (Geneva: UNCTAD/ICTSD Capacity Building Project on Intellectual Property Rights and Sustainable Development, 2002).
- 188 *See, e.g.*, Commission on Intellectual Property Rights, *Integrating Intellectual Property Rights and Development Policy* (London: CIPR, 2002).
- 189 David R. Downes, 'How Intellectual Property could be a Tool to Protect Traditional Knowledge', 25 *Columbia Journal of Environmental Law* 253 (2000).

