

Chapter 3

Food security and intellectual property rights

Finding the linkages

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Introduction

There is no easy way to identify the policy, economic and legal linkages between food security as a goal and intellectual property rights (IPRs) as an instrument to promote and enhance human creativity and overall social well-being. But connections do exist. Food security is part of the basic human right to food, broadly defined as timely access to sufficient and nutritious food.² It is inextricably linked to the right to health, discussed in an earlier chapter.³ It is linked to intellectual property (IP) inasmuch as plant variety protection (PVP; also known as plant breeders' rights) and patents, as applied to genetic resources, biodiversity components and biotechnological processes, may be limiting the possibilities of cultivators to freely grow certain crops, and of people to consume resulting agricultural products.

Linkages may also be found in the overall social goals of distinct, long-established legal regimes including those protecting human rights – specifically in regard to the right to food – and IPRs. While pursuing different specific objectives, these regimes should, in theory, be complementary in advancing human welfare and development (Okediji 2007). From a strict legal perspective, IPRs should in no way undermine a very basic human right on which life – literally – depends. When applied not just to whole plants and animals but also to reproductive material including seeds, and to genetic resources in general, IPRs may affect the accessibility and availability of a large number of agricultural products. This is especially the case with IPRs such as patents which allow the rights holder to prevent third parties from commercial exploitation of the exclusive rights as defined in the patent claims.

Food security is also inextricably linked to poverty, as it is mostly poor people who suffer from limited access to appropriate food sources. Curiously, a considerable portion of the world's poor are farmers, which again raises issues associated with seeds and their protection through IP, including the consequences of restrictions on the use of seeds for these farmers. This is one of the themes explored in this chapter.

Intellectual property protection of technologies including biotechnology may also signify that countries and their communities (especially those of technologically disadvantaged nations) are unable to enhance their agricultural processes through appropriate application of these technologies. Private and public research sectors may meanwhile be affected by legal restrictions on the use of certain technologies, thus reducing options for agricultural development. This is even more serious in a context where, increasingly, the relationship between appropriate food intake and health has become apparent in both developed and developing countries (see example in Box 3.1).⁴

This chapter seeks to identify some of the connections and linkages between food security and IP, particularly in terms of how the right to food as a human right may become affected through policy and legal restrictions and limitations imposed by the very nature of IP. Section 1 undertakes an overview of some of the legal and conceptual foundations for the right to food. It looks at some of the key international instruments recognizing the right to food and food security. Section 2 presents and reflects upon some of the trends in technological innovation as it relates to agriculture, highlighting both social and environmental impacts. Section 3 analyses the impacts of patents and PVP, addressing also the flexibilities inherent in the TRIPS Agreement for countries to customize their PVP to local needs.⁵ Section 4 highlights some concerns regarding enclosure of the commons in relation to seeds and biodiversity components under the 1992 Convention on Biological Diversity (CBD),⁶ before moving on to discuss the implications of the International Treaty on Plant Genetic Resources for Food and Agriculture of 2001 (ITPGRFA).⁷ This is followed by Section 5 which explores options for developing countries to ensure better use of genetic resources and strategies for research and development (R&D) more targeted towards local needs.

Box 3.1. Promoting healthy, culturally appropriate diets through local knowledge and biodiversity

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In its General Comment No. 12 on ‘*The right to adequate food?*’, the Committee on Economic, Social and Cultural Rights (CESCR) recognizes that the ‘core content of the right to adequate food’ implies, among other things, ‘the availability of food in a quantity and quality sufficient to satisfy the dietary needs of individuals, free from adverse substances, and acceptable within a given culture’ (CESCR 1999, para. 8). The Committee furthermore clarifies that the ‘*cultural and consumer acceptability*’ of food implies ‘the need also to take into account, as far as possible, perceived non nutrient-based values attached to food and food consumption and informed consumer concerns regarding the nature of accessible food supplies’ (ibid., para. 11; see further Rajotte 2008, p. 163).

Many people around the world are experiencing a nutritional transition as traditional foods are progressively replaced by less healthy modern diets. Sedentary lifestyles, an increase in the consumption of refined carbohydrates and fats, and a decrease in dietary diversity are contributing to the prevalence of lifestyle diseases such as cancer, diabetes, heart disease and obesity. Doctors and nutritionists advocate a return to traditional food-ways, which are characterized by diets high in fibre, fruits, vegetables, spices and wild foods. Ironically, many of the cultural groups who developed these traditional culinary practices are adopting Westernized diets. In some cases, because of a genetic predisposition to obesity and diabetes, they are bearing the brunt of the nutritional transition.

Among the ethnic groups affected by this global trend are Southern Africa’s oldest inhabitants, the San. They live mostly in the arid zones of Botswana, Namibia, South Africa, Angola and Zambia. Once numbering several million, their present population is estimated to be 100,000.

Buffering nutritional transitions in San communities

Accessing a reliable and nutritious food supply is a major concern for the San, who were formerly nomadic. Unable to sustain their traditional hunting-foraging subsistence due to dispossession and

marginalization, they have become impoverished and largely reliant on food aid and welfare for their survival. They are eating more processed foods, in part because their access to nutritious wild foods is threatened by deforestation, overgrazing and competition for limited natural resources.

The effects of poverty and displacement have reduced the variety of food types available. Families often lack the income to supplement this loss. This leads to vitamin and mineral deficiencies, which can have a significant impact on people who have special dietary needs, especially children, and pregnant and lactating mothers.

Despite the lifestyle changes experienced over the last century, many San maintain an intimate knowledge of desert ecology and the natural resources on which they still depend. This knowledge is threatened by acculturation, formal schooling (which does not integrate local knowledge) and limited access to edible wild plants. The loss of this plant lore leads to greater dependency on fewer food types, most of which are provided by government food aid, thereby further diminishing the San potential for maintaining or re-establishing self-reliance.

Projects which assist communities like the San of Southern Africa to maintain their biological and cultural diversity pay dividends in health, nutrition and the transmission of ecological knowledge. For example, in response to a request from San families living in the Omaheke region of Namibia, the Global Diversity Foundation is working with local organizations and communities through the Kalahari Garden Project to develop 60 household gardens as well as a local primary school garden. The horticultural plots are intended to enhance the diets of approximately 800 people and to promote agricultural, nutritional and ecological education within the community. They will also encourage the exchange of knowledge on edible and medicinal plants that were formerly a part of the San's traditional diet and reinforce the value of these plants among the younger generation.

1. The right to food: A conceptual and legal background

The tragedy of hunger in many parts of the world is incomprehensible alongside the affluence and overconsumption in other parts.⁹ The Food and Agriculture Organization of the United Nations (FAO) estimated in June 2009 that 1.02 billion persons were hungry, an increase of more than 150 million people in just two years.¹⁰ Increasing food prices represent a crucial part of the explanation, and the poorest, landless and female-headed households are the hardest hit (FAO 2008, pp. 1, 22–27).

Poverty is still the main explanation for hunger. Significantly, 70% of the world's hungry are involved in agriculture themselves, either as smallholders or as landless labourers. These simple truths show that something is clearly wrong in how agriculture and the food system are organized, both worldwide and nationally. To ensure food security and reduce poverty levels, urgent changes and responses are needed from governments, the research community including the international agricultural research centres, the private sector, the international financial community, international cooperation agencies, the retail business and society at large.

In 1996, the Heads of State and Government present at the World Food Summit defined food security as a situation that 'exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life'.¹¹

Three elements are important in this definition: first, its emphasis on physical, social and economic access to food; second, its emphasis on the quality of the food; third, the emphasis that the intake of food must enable everyone to live an active and healthy life, not merely surviving.

Even more noteworthy is the first introductory paragraph of the Rome Declaration on World Food Security, which recognizes ‘the right of everyone to have access to safe and nutritious food, consistent with the right to adequate food and the fundamental right of everyone to be free from hunger’ (ibid., para. 1). The leaders also committed themselves to ‘reducing the number of undernourished people to half their present level no later than 2015’ (ibid., para. 2). In contrast, the term used to quantify hunger levels in the 2000 UN Millennium Declaration is ‘proportion’ (para. 19(1)).¹² The Millennium Declaration resolves ‘to halve, by the year 2015,...the *proportion* of [the world’s] people who suffer from hunger’ (ibid., emphasis added). Hence, the 1996 Summit was considerably more ambitious than the 2000 Summit, as the former is committed to a real halving from the 800 million hungry persons in 1996 to 400 million, while the latter is committed to a reduction to approximately 500 million, based on demographic trends towards 2015.

While the concept of ‘food security’ might still be more frequently used among decision makers, it is more relevant to analyse the relationship between IPRs and food by applying the right to food. As both human rights and IPRs are widely recognized legal regimes, any comparison between them should be done from their respective objectives and means for achieving these objectives, formulated in legal terms. Compliance with the legal obligations that States assume by ratifying international treaties and adopting legislation in the realm of human rights and IPRs is sought through the implementation of both global and national strategies.

States are responsible for ensuring an appropriate balancing between these rights. In this context of balancing between rights, it is relevant to quote in full a paragraph from the UK Commission on Intellectual Property Rights (CIPR):

We therefore consider that an IP right is best viewed as one of the means by which nations and societies can help to promote the fulfilment of human economic and social rights. In particular, there are no circumstances in which the most fundamental human rights should be subordinated to the requirements of IP protection. IP rights are granted by states for limited times (at least in the case of patents and copyrights) whereas human rights are inalienable and universal.¹³ (CIPR 2002, p. 6)

A similar emphasis on the relationship between IPRs and economic, social and cultural rights is expressed by the United Nations Committee on Economic, Social and Cultural Rights (CESCR) in its General Comment No. 17 (2005, para. 35).¹⁴ The General Comments are not legally binding, but are frequently referred to in resolutions adopted by intergovernmental bodies, and in national strategies. A more precise understanding of human rights, in particular the right to food, is, however, needed before moving towards the linkages between IPRs and food.

The right to food in an international instrument was first formally recognized in the 1948 Universal Declaration of Human Rights.¹⁵ At the time, it was expressed as: ‘Everyone has the

right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control’.

The right to food is also explicitly recognized in the International Covenant on Economic, Social and Cultural Rights of 1966 (ICESCR).¹⁶ The Covenant establishes that: ‘The State parties to the present Covenant recognize the right of everyone to an adequate standard of living for himself and his family, including adequate food, clothing and housing...’ Furthermore, it also recognizes ‘the fundamental right of everyone to be free from hunger...’. The right to be free from hunger is actually the only human right recognized in either of the two Covenants from 1966 which is explicitly termed ‘fundamental’.¹⁷

Moreover, unlike other human rights, the recognition of the right to be free from hunger is followed by a relatively specified list of objectives and measures. Article 11.2(a) of the ICESCR reads: ‘The States Parties...shall take, individually and through international co-operation, the measures...which are needed: (a) To improve methods of production, conservation and distribution of food by making full use of technical and scientific knowledge, by disseminating knowledge of the principles of nutrition and by developing or reforming agrarian systems in such a way as to achieve the most efficient development and utilization of natural resources’.

This listing of measures cannot be considered to be exhaustive (Alston 1984, p. 34; Craven 1995, p. 316). This is also confirmed by Article 2(1) of the Covenant – which is the Covenant’s ‘general obligations’ provision – using the phrase ‘all appropriate means’.

When paragraph 11.2(a) of the Covenant was formulated, technology was seen as a panacea, and the awareness of power asymmetries inherent in technology was not as clearly understood as today. Moreover, the awareness of environmental constraints was not as strong as it is presently. The emphasis on ‘production, conservation and distribution of food’ is, however, still both valid and relevant. If these three objectives are understood as closely interlinked, any strategy which impedes food distribution should be avoided (Haugen 2007b, pp. 142–146, 412–417). Moreover, an effective distribution strategy also implies that food-producing resources, such as seeds, should be made adequately available for farmers. The State should ‘facilitate the production process so that the production of food is shared more equally...’ (ibid., p. 145).

We will now analyse the implementation of the human right to food in more detail. The Committee on Economic, Social and Cultural Rights has identified two ‘obligations of immediate effect’ in its General Comment No. 3 (CESCR 1991, paras. 1 and 2):¹⁸

- The obligation to take measures or steps, both on a national and an international level (Article 2(1) of the Covenant).
- The obligation to guarantee that these rights will be exercised without discrimination of any kind (Article 2(2) of the Covenant).

The progressive realization of economic, social and cultural human rights does not imply that there ought to be any delay in the taking of appropriate measures for ensuring this realization. Many States have limited resources, however, and might have to give priority to compliance with other international treaties to which they are parties, and which might have more robust sanctions mechanisms for non-compliance.¹⁹

As discussed earlier, access to food is considered a crucial element in defining food security. This is further elaborated in General Comment No. 12, in which both *accessibility* and *availability* of food is emphasized as ‘core content’ of the right to food (CESCR 1999, para. 8).²⁰ The content of these two terms are elaborated upon in paragraphs 12 and 13, with the former emphasizing physical distribution of food and the latter emphasizing physical and economic accessibility. Notably, there are also paragraphs within General Comment No. 12 which clarify that the available food must be culturally acceptable (paras. 8, 11; see Box 3.1). On the face of it, the right to food conflicts with IPRs. The former emphasizes accessibility and affordability. The latter emphasizes the possibility of the right holder to restrict access to those products containing protected biological material over which the right holder exercises exclusive rights. If this were the whole story, the conclusion would be easy to make. As stated by economist Joan Robinson, however, if new technology has restrictions on its dissemination, the end result will be more technology to disseminate, because the private sector has increased stimulus to invest in new research (Robinson 1971). The costs of developing a new product to the stage of commercialization are considerable. It is, however, not always possible to monitor the actual research costs through the financial reports by the corporations themselves. Hence, the numbers presented by the corporations should be treated with caution.

The balance between controlled access and free access is at the core of the IP system. There are strong voices saying that the balance has shifted too much towards protection, effectively undermining the dissemination of new, applicable knowledge (see International Expert Group on Biotechnology, Innovation and Intellectual Property [IEGBIIP] 2008). The General Comment No. 17 (CESCR 2005) provides an interpretation of Article 15, paragraph 1 (c) of the International Covenant on Economic, Social and Cultural Rights. Even if there are problematic paragraphs in General Comment No. 17 (Haugen 2007a, p. 60; Helfer 2007, p. 994), paragraph 35 establishes a general requirement to ensure an appropriate balance between human rights, by stating: ‘States parties should therefore ensure that their legal or other regimes for the protection of the moral and material interests resulting from one’s scientific, literary or artistic productions constitute no impediment to their ability to comply with their core obligations in relation to the rights to food, health and education, as well as to take part in cultural life and to enjoy the benefits of scientific progress and its applications, or any other right enshrined in the Covenant’.

The General Comment No. 12 on the right to adequate food, however, does not say anything explicit about IPRs. A relevant paragraph reads: ‘As part of their obligations to protect people’s resource base for food, States parties should take appropriate steps to ensure that activities of the private business sector and civil society are in conformity with the right to food’ (CESCR 1999, para. 27; see also paras. 25–26). Moreover, the emphasis on distribution of food-producing resources, which was said earlier to be crucial, is not explicitly acknowledged in General Comment No. 12. There are, however, paragraphs in General Comment No. 12 that

address restricted access to food (*ibid.*, paras. 15, 20), which implicitly might encompass concerns relating to IPRs (Haugen 2007b, pp. 377–393).

Another important document relevant to the implementation of the right to adequate food is the ‘Voluntary Guidelines to Support the Progressive Realization of the Right to Adequate Food in the Context of National Food Security’ (‘Voluntary Guidelines’; FAO 2004b). Under the heading ‘Access to resources and assets’, the following is emphasized: access to research results enhancing food security, within the framework of intellectual property rights (Guideline 8.5), ensure the conservation and sustainable use of genetic resources for food and agriculture (Guideline 8.12) and promote more appropriate technologies to enable more efficient food production (Guideline 8.14). Guideline 2 is on ‘Economic development policies’ and emphasizes appropriate and affordable technologies (Guideline 2.6). Therefore, the Voluntary Guidelines do not give specific advice on how to reconcile the right to food and IPRs, as they only state that the policies should be ‘within the framework of relevant international agreements...’ (Guideline 8.5).

The strong support for the human right to adequate food can be discerned from the number of States voting for the annual resolutions in the General Assembly. For example, the adoption of the resolution on the right to adequate food in 2008 occurred by 184 votes to one, with no abstentions.²¹ The report on which the latter resolution was based did address IP in a separate section (UN 2008, paras. 24–28; see also UN 2003, para. 29). Paragraph 28 of the 2008 report reads: ‘Clearly, the privatization of genetic resources for agriculture resulting from the extension of intellectual property rights to plant varieties, plants or seeds may put this balance [between private and social interests] in jeopardy’. The report then outlines a process involving consultations with relevant international governmental organizations, concluding: ‘Concrete recommendations will follow these consultations’. The 2008 resolution on the right to food highlights that implementation of the TRIPS Agreement should be supportive of food security (para. 25). The 2009 report promotes agricultural innovation and recommends detailed approaches for ensuring that IPRs are compatible with the human right to adequate food (UN 2009).

The issue will therefore continue to be on the UN agenda. To enrich these processes, three approaches might be relevant. First, an appropriate understanding of human rights realization is gained by elaborating on the human rights principles. Simply stated, these provide the guidance for public conduct relating to the implementation of the strategies for ensuring realization of human rights. The following human rights principles are recognized: human dignity, non-discrimination, transparency, accountability, participation, empowerment and the rule of law (FAO 2007, p. 2). These seven principles – if properly observed – would ensure a quality of public policy, based on an adequate involvement of all interested parties and based on international conventions and national law. There is a presumption that the efforts by the involved actors would both strengthen the implementation process itself and also make these actors more able to contribute in subsequent processes and decisions. It is hence reasonable to state that public policy would improve if the seven human rights principles were adequately observed.

Second, there is room for exploring how different provisions within human rights instruments must be balanced and reconciled with one another. It is an established principle of human rights that the enjoyment of one human right shall not negatively affect the enjoyment of other human rights (Haugen 2005a, p. 453). While not attempting to build a hierarchy among different human rights, a distinction must be made between rights linked directly to the human person and rights which contribute to the realization of other human rights (*ibid.*, p. 452). Authors' rights as recognized in Article 15(1)(c) of the Covenant belong to the latter category (*ibid.*). It is essential that social human rights, such as the right to food or health, are not impeded as a result of the enjoyment of authors' rights. The rights which are related to the protection of the human person per se must be considered more important than the rights which are related to the moral and material interests of that person (*ibid.*, p. 454). At the same time, it has to be qualified that any restriction of the author's rights should be made only after careful consideration of other principles, including the basic principle of non-discrimination, as well as the principles of participation, transparency and accountability (*ibid.*).

Third, specifically applied to the right to food, we have seen earlier that a policy objective should be that the production of food is shared more equally. In this context, it is relevant to recall one of the phrases introduced in the first UN report on the right to adequate food. In this report, UN Special Rapporteur Asbjørn Eide emphasized the 'command over food' as crucial for ensuring the realization of the right to food (Eide 1987, p. 27). However, this does not imply that one should seek to keep one's food and food-producing resources for oneself, not sharing it with others. Being involved in local networks or cooperatives for the purpose of saving, exchanging and developing new seeds will be of great importance. What it does mean is that one should not be made dependent on the provision of food-producing resources in an asymmetrical relationship, where the provider could set the prices and the conditions, as they consider appropriate. In Section 3, we assess in more detail what choices the farmers actually have. Before this discussion, there is a need to have a better understanding of recent developments in agricultural research.

2. Trends in agricultural innovation and technology: The impact on farming communities in developing countries

In most developing nations, farmers select, save and use shared seeds that form the basis for consecutive harvests, while developing new methodologies to create better quality harvests. This practice of informal exchange of knowledge and farm-saved seeds is atypical in the industrial farming model that is spreading from the industrialized world to other countries. Industrial farming companies rely on exclusive, monopolistic rights granted for the development of seeds and plant varieties, through modern forms of biotechnology and plant breeding. Business models in industrial crop improvement usually depend on patents and PVP, purportedly to provide incentives to innovate.

Meanwhile, in most developing nations innovation in agriculture has advanced through evolving customary practices based mainly on the sharing of knowledge and seeds. In many parts of the world, where small farming is linked to ancestral culture and traditions,²² local innovation systems exist which continually evolve and adapt to new ecological conditions. Whether through participatory plant breeding initiatives or through the formal recognition of

‘conservationist farmers’ (as in Peru), there are many examples of dynamic intellectual outputs by small farming communities, which are far detached from IPR incentives or other compensation mechanisms. Rather, culture and social recognition offer the strongest incentives in this regard (Vernooy 2003; In Situ Conservation Project – Peru; Smale 2006). A farming community that finds a new way to keep plants safe from rodents is no less innovative than an employee of a company that invents a new strain of rice in a company lab. But not all parties stand to benefit from the exclusive monopoly protection granted by patents for an invention (Kuyek 2002). In fact, IPRs in various forms, such as patents and PVP regimes that favour industrial breeders are largely irrelevant to, and might diminish, the work and the ingenuity of farming communities whose practices are essential for maintenance of biodiversity and ensuring food security for a broad population.

The extension of IPRs – specifically patents – towards rewarding innovation in the area of living organisms was only developed in the 1970s and the ‘real’ repercussions have yet to be fully understood. The push to extend patents has not only come from commercial interests in biology but also from developments in information science and the ability to digitally encode and manipulate all kinds of information (Tansey 2008; Biber-Klemm & Cottier 2006). Additionally, legal systems that established breeders’ rights (systems favouring industrial breeders) largely reflected the economic and regulatory structures and circumstances of agriculture prevailing in developed countries (with patent systems pushed by US farming industries and plant variety laws promoted in Europe) around the second half of the twentieth century (Dutfield 2003).

Considering the short history of the use of IPRs in agriculture, even in developed countries, there is still much that we do not know about their long-term impacts over biodiversity, food security and public health. While a few studies have explored some potential implications (see e.g. CIPR 2002; FAO 2003; ICTSD/UNCTAD 2003; Cullet 2004; Srinivasan 2004; Louwaars et al. 2005; UPOV 2005; Tansey & Rajotte (eds.) 2008), more research is needed. One important question from a human development viewpoint in relation to IPRs is whether the latter create incentives for agricultural research and technology transfer which support a diversity of farming models and are relevant to the situation of poor farmers, who need to improve their harvests but cannot afford huge investments. The industrial farming model prevalent in many developed countries has steadily been transposed to developing countries and LDCs. Emphasizing the important linkages among food security, diversity of farming models and biodiversity, Tansey (2008, p. 3) observes that:

Serious doubts have been raised about the long-term viability of the industrial farming model that is spreading from the industrialized world to other countries. Yet the long-term viability of farming is central to ensuring food security for everyone on this planet...Many now call for more ecologically sustainable approaches to farming built around biodiversity and ecology. Yet others, sure of humankind’s inventive capacity or responding to their industry’s interests, promote further intensification and industrial approaches to farming as the way forward. Thus the future direction of farming is highly contested. (Citations omitted)

The social and environmental impacts of intensive agriculture need to be further evaluated. While these impacts are interconnected, some social concerns are highlighted here, whereas

environmental dimensions are further explored in Box 3.2. There are those who argue that the introduction of transgenic crops can have a negative impact on the poor, particularly in developing countries (Lipton 2001, p. 842; Paarlberg 2001, pp. 13–14; Shoemaker 2001, p. 50). The asymmetrical power relationships that exist in most developing countries imply that while many richer farmers might benefit, this is often at the expense of the poor. Moreover, there are also findings that the social benefits of the Green Revolution are not as positive as originally envisaged, even if an overall increase in productivity is documented (Evenson 2003). The Green Revolution, unlike the present ‘gene revolution’, was initiated by benevolent foundations, governments and international agricultural research centres, not private corporations. As with the Green Revolution, it seems reasonable to suggest that the positive effect of the introduction of new ‘gene’ technology in agriculture will be limited unless the underlying social structures are addressed. For example, a farmer who pays more for seed expects, in exchange for her or his additional money, to enjoy an increased reliance on very good harvests. If the harvests fail or are otherwise insufficient to justify the additional outlay, this will have particularly serious effects for those who have taken out loans to buy seeds and expects to have their costs reimbursed through substantial harvest increases.

Box 3.2. Intellectual property and the environment: Some issues and debates relating to agriculture

A clean environment is integral to all aspects of human development (see UNDP 2007) and is a precious public good. There is little consensus on how the environment is affected by the exercise of IPRs. While the present discussion focuses on patent protection of transgenic plants, the relationship between IP and the environment can be approached from many angles. Climate change, for example, will likely accentuate many existing issues and tensions relating to IPRs, food security and the environment. Whether access to new clean energy technology is facilitated or impeded by IPRs is another important topic (see Chapter 9), now on the agenda of the WIPO Committee on Development and Intellectual Property (see WIPO 2007, pp. 153–157, in particular, recommendations 22 and 25–31). The Intergovernmental Panel on Climate Change has also regularly addressed how IP and climate change relate in terms of the positive and negative externalities connected with the protection of clean-energy technologies and innovations.²³

A distinction must be made between ‘old’ and ‘new’ biotechnology (Haugen 2007b, pp. 19–27). Since the early Neolithic revolution, there have been efforts to improve the qualities and yields of plants. Plant breeding has resulted in plants with substantially higher yields. From the 1970s, modern biotechnology was introduced by the means of transgenic technology, allowing for the alteration of the genetic structure of the plant through the insertion of DNA from other species. Some seek to identify the positive aspects of genetic technology in terms of reduced use of pesticides. This reduction is said to result from the use of seeds which have a Bt gene inserted (bacillus thuringiensis – a bacterium producing proteins which are toxic to many insects). It is further claimed that the reduced spraying of pesticides will lead to reduced pollution. While there has been some evidence of reduced use of pesticides when using seeds with Bt genes inserted (Frisvold & Tronstad 1999; Ishmael et al. 2002), recent reports suggest that pesticide use might actually increase, as plants are increasingly tolerant or resistant to herbicides (Friends of the Earth International 2008). There are also other concerns, such as the dominance of transgenic plants over other plants, which will be analysed later.

It is more common for so-called life science companies to provide packages which include both strong pesticides and seeds resistant to the provided pesticide, rather than to only offer seeds.

Sometimes, highly restrictive technology use agreements are employed by the business, the terms of which may be strictly enforced against farmers alleged to violate them. In some cases, the products have been found not to be degradable (Agence France Presse 2007).

Other serious environmental concerns include the risk that transgenic plants are spreading onto farmers' fields and into the wild. Two cases have gained international attention. First, in the *Schmeiser* case, the Supreme Court of Canada held that farmer Percy Schmeiser had infringed Monsanto's patent on genes and plant cells found in canola growing in Mr. Schmeiser's fields.²⁴ The trial judge had dismissed the suggestion that the crop was the product of seed blown or inadvertently carried onto the appellants' land.²⁵ The majority in the Supreme Court held that the farmer's conduct in saving and planting the seed, and in harvesting and selling the plants, constituted an infringing 'use' of the patented genes and plant cells.²⁶ Some issues raised by the decision include the extent of the farmers' privilege, their 'classic' property rights in seeds, and the effects of genetic contamination or gene flows over legitimate farming practices (see Phillips 2007, pp. 49–64; de Beer 2005). A Canadian report points toward the risks of herbicide-resistance becoming a 'weed problem' (Royal Society of Canada 2000, p. 129).

Second, there are published studies on the alleged spread of transgenic maize in the Mexican state of Oaxaca (see Quist & Chapela 2001, 2002; Piñeyro-Nelson et al. 2008), although another study in the same Mexican state found that 'transgenic maize seeds were absent or extremely rare in the sampled fields' (Ortiz-García et al. 2005, p. 1; see GMO Safety 2005).

Debates over GM crops and the long-term viability of the industrial farming model – where a majority of crops are now controlled by a few corporations – will no doubt be further heated by considerations of climate change. The UNDP *Human Development Report 2007/08* observes that 'climate shocks...wipe out crops, reduce opportunities for employment, push up food prices and destroy property, confronting people with stark choices' (UNDP 2007, p. 83). Further research is needed to address the specific linkages between IP, food security and climate change (see discussion in Chapter 9). On the one hand, there is increasing recognition of the role of small, diverse indigenous and local farmers in biodiversity preservation and climate change adaptation (IIED 2008), and the need for a diversity of farming models to ensure food security. On the other hand, there are those who argue that the answer is in more GM crops incentivized by IP – in this case crops genetically modified to withstand climate change effects.

The impacts of IPRs on farmers' rights and practices have been well documented.²⁷ It is essential that developing countries, whose agricultural structures vary from those prevailing in the developed countries, tread carefully before providing for IPRs in plant varieties, plants and other organisms. While the TRIPS Agreement does oblige countries to specifically provide some form of protection for plant varieties and patents for microorganisms, the objective of establishing a patent or other system directed at agricultural innovation must go beyond merely fulfilling a country's obligation under a multilateral trade agreement. The objective must be to establish a legal regime that includes and supports the interests of all affected groups including farmers, consumers, indigenous communities and local industries, as the obligations that countries sign into should be of benefit to all. The extension of IPRs in their current form (private, exclusive monopolistic rights for a certain period) to agriculture-related innovations is likely to cause a shift in the balance of power over food and to have effects over food security and livelihoods in developing nations, as is already becoming apparent in developed nations. Furthermore, it has been repeatedly noted that IP regimes need to be constructed based on specific social, economic and technological development indicators of countries and not based on general approaches or approximations (CIPR 2002; ICTSD/UNCTAD 2003).

One of the key trends in the food system has been a growing concentration of economic power in sectors involving farm input suppliers (agrochemical, energy or equipment companies), traders, retailers and caterers (Tansey 2008, p. 8). This means that ‘fewer and fewer firms control more and more of the market’ (ibid.). Tansey suggests that ‘changing intellectual property rules have been important in fuelling this trend’ (ibid.).²⁸ According to Falcon and Fowler (2002, pp. 204–206):

[T]he plant genetics industry is now heavily concentrated in a half-dozen major firms that hold substantial numbers of key patents on germplasm. They also have IP coverage of the related enabling technologies....[T]he control of patents and seed distribution networks exercised by these companies has substantially increased the barriers to entry for new firms in the field of germplasm development.

According to a study by the United Nations Conference on Trade and Development (UNCTAD 2006), the need to consolidate patent portfolios and thus ensure freedom to operate appears, on the one hand, to have created incentives for the extensive mergers and acquisitions that have occurred between agricultural biotechnology and seed businesses, and for other cooperative responses short of full integration (such as cross-licensing). On the other hand, because of the breadth of protection accorded to the patent holder (the seed or biotechnology company), concentration in agricultural biotechnology is giving the largest corporations unprecedented power vis-à-vis growers and other stakeholders (ibid.). The study also states that the privatization and patenting of agricultural innovation (gene traits, transformation technologies and seed germplasm) have supplanted the traditional agricultural understanding on seeds and farmers’ rights, such as the right to save and replant seeds harvested from the former crop. In some jurisdictions, the privatization and patenting of agricultural innovation has resulted in a drastic erosion of these traditional farmers’ rights, and the assertion of proprietary lines on seed technologies and genetic contents has changed farmers from ‘seed owners’ to mere ‘licensees’ of a patented product. Is it becoming an exception for farmers to freely reuse seeds (as traditionally asserted by small farmers in particular)? There are general allegations that farmers in some developed countries have ever-decreasing practical options other than to choose protected seeds. They then come into a relationship where they are dependent on the corporate providers of seed.

At the same time, statements to the effect that farmers have ‘no option but protected seeds’ need to be qualified. An important consideration is the diminished role of public sector R&D in agriculture. In many countries, the government has reduced its role in the provision of seeds and left it to the private sector to provide the seeds. This will often be achieved at the price and the conditions that the private sector demands.²⁹ Private firms are continuously looking for tools to help create a more secure market position, reduce risks and gain maximum benefits; one of the tools is the use and spread of IP laws into new potential markets so as to help them consolidate global positions. Global structures, including the international IP and trade frameworks, reinforce these trends in privatization. The TRIPS Agreement is only one such means towards achieving this goal. Bilateral and regional trade agreements with TRIPS-plus provisions that dilute flexibilities available under TRIPS, and investment treaties with IP provisions, are now being used as a carrot towards increased foreign direct investment (FDI) and technology transfer to the signatories.

3. Intellectual property rights in agriculture

Agricultural innovations may be protected by two different types of IPRs – by grant of a patent and/or by grant of a plant variety right through a *sui generis* law (also known as PVP). Specifically in the case of plant varieties, the TRIPS Agreement allows member countries the option of granting protection via patents or a *sui generis* form of protection or both. The option of a ‘*sui generis*’ system is a TRIPS flexibility. Other flexibilities include permitting the use of a compulsory licence in a number of circumstances. These so-called flexibilities have been considerably diluted in bilateral trade agreements, with potential adverse effects over farmers’ rights and food security.

3.1. Patents

Under Article 27.3(b) of the TRIPS Agreement, members may exclude plants and animals from patentability, but must grant patents on microorganisms and processes for non-biologically or microbiologically developing plants and animals. In addition to this, members must grant some form of protection towards plant varieties by either patents or a *sui generis* system or a combination of the two. The TRIPS Agreement allows for the exclusion from patentability of ‘plants and animals’ in general. Consequently, WTO members may exclude plants as such (including transgenic plants), plant varieties (including hybrids), as well as plant cells, seeds, and other plant materials. They may also exclude animals (including transgenic animals) and animal breeds.

The standards of protection set by the TRIPS Agreement operate on a minimum standards principle, and all member countries must provide for the provisions in their national regimes within certain time periods. It has been argued that the minimum standards laid down by the TRIPS Agreement are highly substantive and do not apply to the socio-economic or cultural status and structures of most developing countries (see UNDP 2001, pp. 102–109).

Countries may meanwhile adopt higher standards than those provided for in the TRIPS Agreement. Indeed, there has been a trend for national political authorities to extend the scope of the IP system, so that more inventions are eligible for patent protection, while reducing their public research efforts. In the US and Europe, this has taken place in the following ways. First, the US and Europe have been limiting the list of non-patentable products. For example, decisions to grant patents on animals were first taken in the US in the late 1980s and Europe in the early 1990s, with a European appeal regarding a patent for a transgenic mouse (oncomouse) going on until 2004.³⁰ A similar oncomouse application was rejected in Canada in 2002.³¹ Another example is that double protection – both patent and PVP for the same plant – was first granted by the EPO in 1999.³² Before this decision, PVP and patent protection could not both be granted on the same plant.³³ Second, these countries allow patent protection to be extended to all plants where the patented material is found. Third, the European patent system has been lowering the threshold for inventiveness, so that naturally occurring substances are patentable.³⁴ Inventiveness is one of three basic requirements of patent protection, the other two being novelty and industrial applicability.

While most developed nations (specifically the US) provide for patents for all innovations relating to agriculture and the food sector, including plants and animals, developing countries have been increasingly pressured in bilateral trade agreements to sign away the flexibilities made available under TRIPS. The impact of FTAs on TRIPS flexibilities are discussed in a 2008 document published by UNDP entitled *Towards a Balanced 'Sui Generis' Plant Variety Regime: Guidelines to Establish a National PVP Law and an Understanding of TRIPS-Plus Aspects of Plant Rights* ('UNDP Guidelines').³⁵ The document provides examples of FTAs said to contain provisions either requiring patents on plants, accession to UPOV, the implementation of IPRs with the highest international standards, or a combination of these requirements (see UNDP 2008, p. 25). According to the document: 'Along with extended patent life TRIPS-plus agreements generally include longer protection periods for [agrochemical and pharmaceutical test] data of the protected innovation' (ibid., p. 26). It is suggested that this 'data exclusivity' creates a 'monopoly over the data and test trials that led to the successful innovation' and potentially 'excludes other researchers from creating generic versions, for example, generics of agricultural pesticides' (ibid.). Without generic competition agricultural input costs are likely to remain high, and this is said to leave 'little choice for impoverished farmers to lift themselves from subsistence levels' (ibid.). The UNDP Guidelines add that FTAs 'could further reduce or eliminate tariffs on certain imported technologies and facilitate an influx of monopolistically priced seeds and other farming inputs' (ibid.).³⁶

The UNDP Guidelines suggest, moreover, that some requirements in investment treaties could reduce manoeuvring room for countries to make use of flexibilities granted under the TRIPS Agreement (ibid., p. 27). Noting arguments that TRIPS-plus regulations in bilateral investment treaties or investment chapters might increase FDI and technology transfer to the signatories, the UNDP Guidelines state that: 'In some ways, this investment could be targeted to developing plant and [traditional medicinal knowledge]-related industries, which could encourage the growth of small and medium enterprises (SMEs) and gain market access for small-scale producers' (ibid.).³⁷ The UNDP Guidelines suggest, however, some likelihood that the investment treaties do not translate into affordable technology transfer for developing countries (see also CIPR 2002, pp. 23–24). Adding that the reliance of developing countries on importing the monopoly-priced technologies 'could further prevent the building of capacity for innovation and new technologies', the UNDP Guidelines observe:

Foreign direct investment does not rely solely on high levels of IP protection; rather concomitant macroeconomic conditions and human capital are said to be determinants for driving FDI...There are clear human development implications for countries that continually pay out large sums to, often foreign, patent holders; these payments...could detract from state revenue that is crucial for providing essential services. A cut in essential services may have distinct gendered consequences; user fees may increase. As gender norms shape how women and men access these services, increased fees or limited availability of health, water, sanitation [etc.] services would contribute to a drop in women as consumers. (UNDP 2008, p. 27; citations omitted)

The threat of lawsuits may also curtail farming practices and local or traditional innovation. The case of *Monsanto Co. v. McFarling*³⁸ illustrates how (under US law) a farmer that saves a seed with patented genetic sequence faces patent infringement (the case was also

about contract breach). In a North–South FTA, this has critical implications for impoverished farmers who cannot afford the legal expenses or compensation to companies (Spellman 2008). The sustainable benefits of patented agricultural technologies such as seeds, fertilizers, and pesticides have been questioned. While there are arguments that these technologies are more resilient with a faster and more abundant crop yield, some researchers assert that traditional and indigenous seeds are more sustainable (Kwa 2008). Meanwhile, most farmers in the developing South are subsistence farmers; paying for patented seeds at each harvest and not being able to communally share them could compound poverty in certain contexts. Price hikes on the latest, most resilient strains could result in the reallocation of farmers’ expenses (potentially cutting into household expenditure) in order to finance agricultural livelihoods. It could also mean price hikes for consumers of a specific food variety – simply put, this could further jeopardize food security in parts of the Global South. Cuts in household expenditure also have gendered effects, often with the women of the households bearing the brunt.

3.2. Plant variety protection

The TRIPS Agreement allows member countries to develop a ‘*sui generis*’ form of protection for plant varieties. *Sui generis* literally means of its own kind, which indicates that countries have the flexibility to put in place a protection regime appropriate to its local context and needs. The phrase ‘effective *sui generis* system’ of Article 27.3(b) TRIPS, which is the only reference to PVP in TRIPS, implies that the rights shall be enforceable by administrative and/or juridical procedures (UNDP 2008, p. 5). Hence, PVP legislation can be tailored to the specific needs of the respective countries. The UNDP Guidelines observe that:

Most countries have implemented Article 27.3 (b) by enacting some form of plant variety protection (PVP) law. While most countries are members of UPOV 1978 or 1991, very few countries have attempted to establish balanced national laws that are customized and take into account interests of various stakeholders such as Indigenous Peoples, farmers and environmentalists.³⁹ (Ibid., p. 6)

The International Union for the Protection of New Varieties of Plants (UPOV) is an independent intergovernmental organization with legal personality which administers the Convention for the Protection of New Varieties of Plants (‘UPOV Convention’).⁴⁰ Pursuant to an agreement concluded between WIPO and UPOV, WIPO provides administrative services to UPOV (UNDP 2008; see also Dutfield & Suthersanen 2008, p. 186). The UNDP Guidelines note that ‘there has been a significant culmination of analysis and literature indicating that UPOV may not serve as the best available option for countries where a significant proportion of the population depends on an informal seed supply system of agriculture for their daily needs and sustenance’ (UNDP 2008, p. 10). It adds that:

As more developing nations become parties to UPOV, the flexibility of having considerable room to develop an independent and customized ‘*sui generis*’ system awarded by TRIPS is undermined and UPOV may become a norm. In the Uruguay Round negotiations, there were suggestions by the GATT Secretariat that UPOV may be accepted as the framework for PVP which suggests that industrialized nations may push for UPOV to be recognized as the only *sui generis* system by WTO in the context of review of Article 27.3(b). Though this review has been inconclusive thus far, its eventual

outcome may well depend on the existence of different *sui generis* systems already in place. A large number of developing countries if signatories to UPOV may make it a de facto minimum standard having possible wide range impacts over farmers, women, food security and rural livelihoods in developing countries. (Ibid., pp. 9–10)

Notably, three states – India, Malaysia and Thailand – have adopted their own specific legislation (ibid., p. 6). None of these has had their plant variety legislation challenged before the Trade Policy Review Body (see WTO 2007a, 2007b, 2006b and 2003, respectively). This Body oversees the overall trade policies, including compatibility with TRIPS, of the various WTO member states. India, Malaysia and Thailand are not members of UPOV. For those states that currently approach UPOV, the only version of the UPOV convention that is available is UPOV 1991, which is the most ‘patent-like’ of the various versions of the UPOV Convention.

Space does not allow a detailed assessment of the various elements of UPOV 1991 or the respective legislations (see UNDP 2008, pp. 7–9; see also Chapter 4). It must be stressed, however, that WTO member states can comply with the WTO requirements on PVP without having to comply with the more detailed requirements of the UPOV Convention. The UNDP Guidelines provide some key considerations and parameters for designing alternative *sui generis* systems, while noting how the flexibilities and ‘policy space’ under the TRIPS Agreement for WTO member countries to design *sui generis* laws according to local needs are being curtailed by FTAs:

The TRIPS Agreement provides the flexibility to member countries to design *sui generis* laws for protecting plant varieties...This policy space is threatened by...bilateral and regional trade agreements that are negotiated outside the WTO. These free trade agreements (FTAs), typically between the US, EU, Japan and developing countries often include provisions that go beyond TRIPS (TRIPS-plus). Increasingly, countries are being pressured to adopt patent laws or UPOV 1991...diluting the flexibility under TRIPS which provides an alternative for countries to develop a tailored protection system for plant variety rights. The TRIPS-plus provisions...have particular implications for human development and policy space to protect plant varieties in developing countries. (Ibid., p. 24; citations omitted)

Guidance in the process of establishing a TRIPS-compatible legislation scheme can furthermore be sought through the Indian, Malaysian or Thai legislation. Moreover, several guidelines and options exist to assist states in the process of identifying an appropriate balance between breeders’ rights and farmers’ rights.⁴¹ This includes the possibility to redefine the criteria for protection (novelty, distinctness, uniformity and stability). It is notable that in the Malaysian Protection of New Plant Varieties Act 2004⁴² the term ‘identifiable’ replaces the two latter requirements for those varieties that are ‘bred, or discovered and developed by a farmer, local community or indigenous people...’ (section 14(2)).

A plant variety law should also include an appropriate understanding of the term ‘essentially derived varieties’ (EDV). This term is applied in Article 14(5) of UPOV 1991. Dutfield and Suthersanen (2008, p. 189) note that:

One difference between UPOV 1978 and UPOV 1991 is that the latter extends rights to varieties which are essentially derived from the protected variety. So the breeder of PVP-protected variety A has the right to demand that the breeder of variety B secure his or her authorization to commercialize B if it was essentially derived from A. The main idea here is that breeders should not be able to acquire protection too easily for minor modifications of extant varieties produced perhaps through cosmetic breeding or genetic engineering, or free-ride without doing any breeding of their own, problems that the increased application of biotechnology in this field appeared likely to exacerbate. Beyond resolving these particular issues, but related to them, the provision was also intended to ensure that patent rights and PVP rights operate in a harmonious fashion in jurisdictions where plants and their parts, seeds and genes are patentable and access to these could be blocked by patent holders. Such a practice would undermine one of the main justifications for PVP protection, which is that breeders should be able to secure returns on their investments but without preventing competitors from being able freely to access breeding material.

The 2008 UNDP Guidelines suggest that ‘EDVs are somewhat controversial because there is little consensus over the genetic conformity threshold required for the identification of EDVs from initial varieties of crops’ (UNDP 2008, p. 8).⁴³ Legislators need to be aware of the scope of the term EDV in the process of drafting their legislation, even if they do not seek UPOV membership and compliance with UPOV 1991 (ibid.). Moreover, states should consider whether their plant variety legislation should only apply to certain plant varieties, to ensure that only plant varieties with the ability to reproduce are covered. There is a basis for such restrictions in Article 2(2) of UPOV 1978:

Each member State of the Union may limit the application of this Convention within a genus or species to varieties with a particular manner of reproduction or multiplication, or a certain end-use.

The authors encourage that the limitation in Article 2(2) of UPOV 1978 be included in any ‘effective *sui generis* system’ of PVP, in one form or another. This could provide an exclusion from protection for those varieties which do not reproduce. The present authors are not aware of any legislation which has included this provision explicitly. However, the Thailand Plant Varieties Protection Act of 1999⁴⁴ reads in section 13 (extract):

No registration under this Act shall be made of a new plant variety having a severely adverse impact, directly or indirectly, on environment, health or public welfare.

Finally, the term *sui generis* has also been understood to allow for IP systems beyond PVP (see van Overwalle 2008, p. 83). This possibility might apply to various forms of traditional IPRs. Yet, the term ‘effective’ preceding the term ‘*sui generis*’ must be understood not as allowing for just any system of PVP in order to comply with TRIPS Article 27.3(b) but as requiring a system which specifies the rights and obligations of plant breeders, and enables them to enforce their rights by administrative and/or juridical procedures. The authors would on the same basis caution against accepting ratification of UPOV 1991 as a provision in any bilateral trade negotiation, and suggest that a more tailor-made legislation should be enacted instead to serve the interests of

both the breeding sector and the overall agricultural sector, including the situation of female farmers, in developing countries.

4. Enclosure of the commons and some reactions

The overall global trend seems to be for genetic resources, critically important to supporting food security and the realization of the right to food, increasingly to become subject to private and sovereign rights as part of a general global movement towards strengthening IP and re-affirming state control over natural resources.

Some commentators caution that the extended scope of IPRs applied to biological resources may have undesirable social and environmental consequences. As Brush (1996, p. 18) put it: ‘Privatization of biological resources could result in greater poverty and exploitation without achieving conservation or equity’.

Meanwhile, sovereign claims over genetic resources as effected through access and benefit-sharing (ABS) regulatory regimes are also undermining the biological commons. Roa-Rodríguez and van Dooren (2008, p. 188) note that: ‘By the late 1990s, access and use of plant genetic resources for food and agriculture had been limited by both sovereignty and IP claims’. This section first examines some relevant developments under the Convention on Biological Diversity (CBD), before moving on to discuss the FAO International Treaty for Plant Genetic Resources for Food and Agriculture (ITPGRFA) as a possible countervailing influence on the enclosure trends.

4.1. The Convention on Biological Diversity

In the specific context of genetic resources, the CBD has dramatically changed the policy and legal framework under which biological materials can be accessed and used. Developing countries now have the expressly recognized right of regulating by whom, and under what conditions, these resources can be used and how benefits will be shared (between users and providers). As a result, countries have since 1993 embarked on a series of processes which have resulted in ABS and traditional knowledge (TK) protection laws being passed (Carrizosa et al. 2004). The latter topics are discussed in detail in Chapter 4 of this book. To an extent, developing countries are given a tool with which to balance an inherent imbalance of power with industrial and developed countries that have been historically in the position to technologically transform these resources and seek relevant IP protection. In this sense, there is certainly a tension between biodiversity-endowed countries and those supporting stronger IP mechanisms. It should be noted, however, that in most cases, implementation of these ABS policies and laws has been problematic.⁴⁵ The ongoing negotiations of an International Regime on Access to Genetic Resources and Benefit Sharing (as part of the CBD implementation process; see Cabrera 2006) is a reflection of continued efforts by biodiversity-endowed countries to control how genetic resources are accessed and utilized – including through the use of IP.

There is meanwhile some evidence of the challenges scientists around the world are facing in terms of timely access to genetic resources for non-commercial research purposes (Grajal 1999; Mansur & Cavalcanti 1999). Scientists in both developing and developed countries

are experiencing these challenges, as most research in biodiversity, throughout the world, involves collaborative action and activities between a wide range of institutions and organizations from developing and developed countries alike. Collaborative efforts to undertake research in the areas of food and health (including in the improvement of native seeds and plants, generation of biodiversity-derived medicinal products for local consumption, development of nutritional supplements for poverty stricken areas, etc.) could be negatively affected by both restrictive access regimes and strong IP legislation. Ultimately, national research agendas will be the most affected.

Within this context, small communities and farmers constantly come up with innovative and creative ways to confront and address problems, whether because of cultural factors which guide their conservation and survival strategies (including food security and health needs) or in response to geographical isolation. While in many countries IP concerns are still far removed from indigenous communities' reality and social contexts, their voices are increasingly being heard in opposition to potentially disruptive and culturally insensitive IP regimes. In some countries, such as Peru, Ecuador and Bolivia, small farming communities have started to express their concerns regarding recent changes in IP legislation which seek to allow for patenting of genes and isolated biological components. Furthermore, there has been express opposition by local communities to obligations under FTAs, especially with the US, for UPOV-type regimes.⁴⁶

4.2. The FAO International Treaty for Plant Genetic Resources for Food and Agriculture (ITPGRFA)

A possible exception to the enclosure of the biological commons discussed so far is the establishment of ITPGRFA (see Cullet 2004, p. 265). This treaty provides a mechanism for access to plant genetic resources for food and agriculture and the sharing of benefits resulting from such access for sixty-four important crops and forage species as listed in Annex 1 of the Treaty (see Gerstetter et al. 2007, p. 263). It is notable, however, that the Multilateral System only covers the crops listed in Annex 1 to the extent that they are 'under the management and control of the Contracting Parties and in the public domain' (Article 11.2). It is further suggested in Article 11.2 of the Treaty that the 'Contracting Parties invite all other holders of the plant genetic resources for food and agriculture listed in Annex I' to include these in the system 'with a view to achieving the fullest possible coverage of the Multilateral System'. In other words, the Treaty does not cover plant genetic resources for food and agriculture held by private owners, even though private holders are to be encouraged to include them in the system (see Gerstetter et al. 2007, pp. 263, 279).

Importantly, Article 9 of the ITPGRFA recognizes the responsibilities of national governments to promote and protect 'Farmers' Rights'. Article 9 of the ITPGRFA has been described as the 'first legally binding recognition of farmers' rights in public international law' (ibid., p. 263). This Article recognizes the 'enormous contribution that the local and indigenous communities and farmers of all regions of the world, particularly those in the centres of origin and crop diversity, have made and will continue to make for the conservation and development of plant genetic resources which constitute the basis of food and agriculture production throughout the world'. The rights under Article 9 include rights to the protection of TK relevant to plant genetic resources for food and agriculture; to equitably participate in sharing benefits

arising from the utilization of such resources; as well as to participate in decision making at the national level on matters related to their conservation and sustainable use. Gerstetter et al. suggest, however, that the significance of the article ‘should not be over-estimated’ since ‘the responsibility for realizing farmers’ rights is, under article 9.2, assigned to national governments, which are given broad discretion if and how they want to promote and protect farmers’ rights’ (ibid.).

According to Article 13.3 of the ITPGRFA, the ‘benefits arising from the use of plant genetic resources for food and agriculture that are shared under the Multilateral System should flow primarily...to farmers in all countries, especially in developing countries, and countries with economies in transition, who conserve and sustainably utilize plant genetic resources for food and agriculture’.

Meanwhile, the Standard Material Transfer Agreements (SMTAs) used under the ITPGRFA multilateral system for ex situ collections have come under significant scrutiny (Gerstetter et al. 2007; Chiarolla 2008; Roa-Rodríguez & van Dooren 2008).⁴⁷ Roa-Rodríguez and van Dooren (2008, p. 191) note two main areas of controversy in relation to SMTAs, namely, ‘the voluntary and compulsory schemes proposed for monetary benefits to be paid to the Multilateral System, and the possibility of recipients making IP claims over materials derived from those acquired from the Multilateral System’. They highlight the possibility that materials provided through the Multilateral System ‘might find their way into patents in countries that allow the patenting of isolated and unmodified genetic sequences’ (ibid.). While Article 12.3(d) of the ITPGRFA provides that ‘recipients shall not claim any intellectual property or other rights that limit the facilitated access to the plant genetic resources for food and agriculture, or their genetic parts or components, in the form received from the Multilateral System’, other commentators have noted the significant ambiguities retained by this paragraph. Gerstetter et al. (2007, p. 264) suggest that ‘in particular, the terms “genetic parts or components” and “in the form received” remain undefined and open to interpretation’.

In relation to the benefit-sharing requirement under Article 13.2(d) of the ITPGRFA,⁴⁸ Rajotte (2008, p. 153) suggests that: ‘[A] recipient that sells a PGRFA [plant genetic resources for food and agriculture] product incorporating material from the multilateral system *must* pay monetary benefits from commercialization under the following circumstances: either he/she owns a patent on the product and – as is normally the case – there is no exemption in the patent law of the relevant jurisdiction that would freely allow others to use it for further research and breeding, or if access to using the new PGRFA product for research or breeding is blocked through technological means and/or by restrictive contractual provisions’ (original emphasis). Rajotte (2008, p. 153) furthermore notes that:

PGRFA products protected under UPOV Convention-compliant laws (or more flexible *sui generis* models) which include research and breeding exemptions would not trigger the benefit-sharing mechanism. This reflects the political nature of the balance that was struck during negotiations – (i.e. what kind of protection would trigger mandatory benefit sharing and what would not; the dissatisfaction of companies that depend on patents) – and to a large degree the bargaining power (or savvy) of the players at that point in history. Definitions in international forums about where the public domain starts and stops will be a key point to watch in the future.

5. The challenges ahead for developing countries: Ensuring better use of genetic resources and more targeted research and development

As discussed in earlier sections, enclosure of previously free resources appears to be a recurring tendency, in terms of both the increasing privatization of genetic resources and the assertion of sovereign rights over resources under international frameworks including the CBD (and restrictive access laws as a result). While the ITPGRFA perhaps represents a counter-trend in its endeavour ‘to maintain a level of openness for crops listed in its Annex 1 which are covered by the Multilateral System’ (Cullet 2004, p. 265), commentators suggest it is still too soon to say whether the protected ‘commons’ within the ITPGRFA will deliver the desired benefits and help to increase R&D (Roa-Rodríguez & van Dooren 2008).⁴⁹ To reclaim ‘common heritage’ in the ‘plant genetic resources regime complex’, some commentators have meanwhile suggested exploring open source solutions to R&D in agriculture (see Aoki & Luvai 2007; Box 3.3).

Meanwhile, Maskus and Reichman (2005) raise very pertinent issues on international IP standard setting and implementation. Pointing to the wording of the preamble and Article 8(1) of the TRIPS Agreement, they note that: ‘[T]he implementation of international IP standards is necessarily limited by criteria of reasonableness. These standards, as implemented, must not become disguised barriers to the exercise of those other police and welfare powers that are normally reserved to states’ (ibid., pp. 32–33). Moreover, they hold that ‘states cannot be presumed to have surrendered sovereign police and welfare powers in the course of intellectual property standard setting...’ (ibid., p. 31). In relation to the present discussion, this must be understood to imply that the full obligations of a State must be taken into account when IP legislation is to be adopted or enforced. A WTO member state ought to make sure that the flexibilities provided for in the TRIPS Agreement are fully considered and appropriately reflected. Pressures to have higher IP protection standards than those required in the TRIPS Agreement – for example, in FTAs or investment treaties – should be resisted, and it should be possible to have a review of certain paragraphs in the TRIPS Agreement in order to better reconcile the Agreement to other treaties.⁵⁰ At this point, flexibilities in national IP *and* ABS policies may be required to:

- facilitate research and the development of national and community-based seed banks – these may be extremely critical for biodiversity-rich countries and centres of origin and diversification of crops, as a means to support local farmers and communities in a context of growing climate change problems;
- stimulate collective participatory breeding – this may become a good alternative to bridge TK and local farmers needs with the scientific potential of national and international institutions; collaborative research could be explored, for example, with research institutions;
- protect and promote the TK of indigenous communities – there is a sufficient basis in different human rights provisions in favour of a position that traditional communities and indigenous peoples who nurture and improve plants should enjoy human rights protection over their production (Haugen 2005b, pp. 676–677; Pires de Carvalho 2005, p. 242, arguing that plant breeders are included in the category ‘authors and inventors’); it remains to be seen whether certain forms of IP protection are appropriate and desired by these breeders;

- implement Farmers' Rights (as recognized in the FAO International Treaty), and ensure appropriate breeders' and farmers' exemptions – this may serve to support a continued availability of seeds and breeding materials for small farmers and developing country breeders in particular;
- explore open source or cross-licensing structures that may create a defined technology commons, as well as public-welfare-oriented licensing and pricing strategies, such as waiver of rights for certain users, humanitarian licensing, humanitarian and tiered pricing (see WIPO 2009, para. 288, pp. 79–80); and
- design inclusive development strategies (at the national and local levels) which effectively account for small farmers and poor farmers in particular – this calls for participatory planning processes which analyse future scenarios and assess national and local potential for contribution and involvement in these scenarios.

Box 3.3. An 'open source' model for plant genetic resources?

Aoki and Luvai (2007, pp. 61–64) suggest that lessons could be drawn for the future of plant genetic resources (PGRs) from the open source movement for software. In their opinion, the concepts of plant breeders' rights and patented seeds are analogous to copyrighted software, and some groups advocating farmers' rights have the potential to evolve into what the open source software movement has become – a commons-based peer production network that facilitates the sharing of information (ibid., p. 63). Based on the 'General Public License' (GPL) developed by Richard Stallman,⁵¹ the GPL open source model was driven by programmers' need to share source code (ibid., p. 60). The licence is 'viral' in the sense that a person downloading a program under the licence cannot make proprietary claims over any modifications made to the program, and shares the program with others under the same terms.⁵²

Aoki and Luvai note that there is yet to be a robust equivalent to the GPL for software in the PGRs arena (ibid.). Noting that a web of expanding proprietary rights have spawned over the past two decades to cover not only PCRs but also related breeding tools and technologies, they suggest that an adaptation of the GPL from the software context into the PGR context may be useful (ibid.).⁵³ Based on the idea of farmers as user-innovators, such an open source PGR model might not only be applied to the development of plant varieties via selective breeding, genomics, and genetic manipulation of PGRs, but might also be extended to the development of related machinery, technology, and the sharing of agricultural information and know-how (ibid., pp. 63–64). Aoki and Luvai suggest that new plant varieties and plant breeding research tools and technologies created using this participatory process could then be made available to farmers and plant breeders using a GPL-styled licence with the same 'viral' effect – any subsequent modifications must be openly accessible under the GPL terms (ibid.). Those receiving the plant materials and related technologies would be bound by a contractual promise not to impose downstream restrictions on the rights of others to experiment, innovate, share or exchange the PGRs (ibid., p. 64).⁵⁴

Source: Aoki and Luvai 2007

The examples of Brazil, China and India are quite illustrative of how public policies which provide appropriate incentives for research in biodiversity-related fields have resulted in the development of very strong national research capacities, including in biotechnology. These countries have been reluctant to modify their national IP policies and laws to a TRIPS-plus standard and, therefore, maintain appropriate flexibilities to protect certain types of innovation. At the same time, these countries have invested heavily in training and building the scientific

capacities of their human resources, with a focus on both basic *and* applied research. Finally, they have undertaken careful planning strategies based on an analysis of national and local needs, and an assessment of global markets.

Looking ahead, Tansey (2008) describes various ‘alternative futures’ relating to food systems and IP. These are addressed in the literature review of future scenarios in Chapter 9 of this book. The alternatives include, for example, a ‘future which is more monocultural, industrial, corporate-dominated and dependent on IP’ (ibid., p. 215). A contrasting scenario is described, with an ecologically integrated approach which builds on the ‘millennia of experimental empirical work by farmers in diverse environments that have led to a huge range of agricultural biodiversity’ (ibid.; see also the International Assessment of Agricultural Knowledge, Science and Technology for Development 2008). Open systems of exchange and skilled farming are promoted in this scenario where ‘the local goes first’ in a local to global hierarchy (ibid.). Tansey goes on to discuss a ‘technologically triumphalist’ scenario where food is synthesized and extreme genetic engineering, synthetic biology, and nanotechnology take centre stage. In this future scenario, the differences blur between biological and other systems and everything is treated as a ‘resource, able to be owned and patentable’ (ibid.). Also mentioned is a scenario of ‘collapse, be it economic, physical or a descent into violent conflict over resources or beliefs’ (ibid.). Tansey notes that: ‘The one vision of the future that is not being facilitated and encouraged by the way IP rules are developing and affecting the direction of R&D is the ecological approach; yet that is probably the one with the best chance of working in the long term’ (ibid.; see Chapter 9).

Meanwhile, relevant international developments in various forums will have significant impacts on the future of IP and food security. The WIPO Development Agenda, for example, presents an opportunity for countries to reassess IP policies as part of broader development strategies (see Chapter 9 for discussion). The shape of the international regime for access and benefit-sharing to be elaborated by 2010 under the CBD framework will have significant impacts on many areas discussed here (see further Chapter 4). There are also components of the UN Millennium Project which deal directly with IPRs and food security, including efforts to interweave traditional and modern knowledge systems in agriculture (see Box 3.4).

Box 3.4. Combining traditional and modern knowledge in agriculture

The traditional role of farmers as user-innovators of agricultural knowledge and technology is particularly relevant to ensuring food security for present and future generations. Strategies for enhancing food security in developing countries have to involve farmers in an appropriate manner, premised on the obvious fact that farmers are also plant breeders and local experts. At the same time, these strategies should seek to facilitate a process towards exchange of new and traditional knowledge. Concurrent efforts must be made with regard to storing and transport infrastructure, markets, land tenure, water accessibility, disease prevention and other areas. The basis for all this is that new knowledge must be made available to poor farmers – without their own knowledge being disregarded.

Two reports from the United Nations Millennium Project deserve mention here. One pertains to ‘Innovation’ (UN Millennium Project 2005a) and the other addresses ‘Halving Hunger’ (UN Millennium Project 2005b). The two Millennium Project reports are mutually reinforcing,

with the Halving Hunger report emphasizing technology for increased food production in developing countries (ibid., p. 65). According to this report, the CGIAR agricultural research centres (also known as ‘Future Harvest Centers’) must be able to play a more active role if this increased food production is to take place without too heavy dependency on corporations (ibid., p. 95). The Halving Hunger report generally recommends biotechnology (ibid., pp. 116–18).

In contrast, the Innovation report addresses the convergence between modern and traditional knowledge, which will demand ‘significant investment in coordination and management’ (UN Millennium Project 2005a, p. 43). This seems to be an appropriate strategy, provided that the strategy is fully participatory. Asbjørn Eide, who has played a crucial role in promoting the right to food for almost three decades, says that one should not ‘advocate a status quo concerning traditional production systems, but...when seeking to promote more effective methods [one] must take traditional knowledge and experience as the starting point, and translate it into approaches where modern science and traditionally adapted principles are combined in order to maximize the prospects for adequate food consumption, nutritionally balanced, and in respect of ecological constraints’ (Eide 1987, p. 35). A similar approach is promoted by the International Assessment of Agricultural Knowledge, Science and Technology (IAASTD 2008).

6. Conclusion

In this chapter, we addressed a number of key concerns relating to IP and food security. In Section 1, we emphasized the need for balance between IPRs and human rights in discussing the right to food. In Section 2, we discussed the interface between IPRs and recent agricultural trends, focusing on how the increasing reliance on the private sector for agricultural research impacts farming communities in developing countries and biodiversity more generally. We looked especially at the impacts of patents and plant variety rights in Section 3. Along with socio-economic concerns, we touched on the potential environmental effects of allowing patents on transgenic technology. Section 4 outlined international frameworks governing access to plant genetic resources, and how they further impact on the commons. We then explored in Section 5 potential strategies for developing countries in ensuring better use of their genetic resources and targeting R&D efforts towards priorities including food security.

The crucial balancing between access and incentives, as well as an acknowledgement of the various alternative options that should exist parallel to IPRs, is recognized in a recent report to the WIPO Standing Committee on the Law of Patents (WIPO 2009, paras. 286–288). Such recognition ought to provide an opening for different approaches to IP legislation which take into account national circumstances, and not uniform, harmonized models based on the laws of developed countries.

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Notes

- ¹ Note by the co-authors: In drawing out general trends for discussion, the authors acknowledge that there are country specificities which characterize different forms of agriculture and development. What is stated in one context may not be 100% valid in another context.
- ² See Article 25 of the Universal Declaration of Human Rights (Paris, 10 December 1948), G.A. Res. 217A (III), (1948), UN Doc. A/810 (1948), available at: <http://daccess-dds-ny.un.org/doc/RESOLUTION/GEN/NR0/043/88/IMG/NR004388.pdf?OpenElement> (accessed 3 February 2010).
- ³ The right to health is embodied in the 1946 Constitution of the World Health Organization (WHO) (New York, 22 July 1946), 14 U.N.T.S. 185, 62 Stat. 2679 (*entered into force* 7 April 1948). For information on human rights treaties pertaining to the right of health, see Chapter 2. See also UN Office of the High Commissioner for Human Rights (OHCHR) and WHO, *Fact Sheet No. 31: The Right to Health* (June 2008), available at: <http://www.ohchr.org/Documents/Publications/Factsheet31.pdf> (accessed 18 March 2010).
- ⁴ Tansey (2008, pp. 7–8) discusses the changing global food system and challenges for national food policies in terms of 'ensuring a sustainable, secure, safe, sufficient and nutritious (in other words healthy), equitable and culturally appropriate diet for all'.
- ⁵ Agreement on Trade-Related Aspects of Intellectual Property Rights (Marrakesh, 15 April 1994), Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 1869 U.N.T.S. 299, 33 I.L.M. 1197 (1994) (*entered into force* 1 January 1995) [hereinafter 'TRIPS Agreement'], available at: http://www.wto.org/english/tratop_e/trips_e/t_agm0_e.htm (accessed 3 February 2010).

- ⁶ Convention on Biological Diversity (Rio de Janeiro, 5 June 1992), 1760 U.N.T.S. 79, 31 I.L.M. 818 (1992) (*entered into force* 29 December 1993) [hereinafter ‘CBD’], available at: <http://www.cbd.int/doc/legal/cbd-un-en.pdf> (accessed 3 February 2010).
- ⁷ Food and Agriculture Organization (FAO) International Treaty on Plant Genetic Resources for Food and Agriculture (Rome, 3 November 2001), FAO Conference Res.3/2001, S. Treaty Doc. No. 110–19 (*entered into force* 29 June 2004) [hereinafter ‘ITPGRFA’], available at: http://www.planttreaty.org/texts_en.htm (accessed 16 March 2010).
- ⁸ Global Diversity Foundation, Southern Africa.
- ⁹ Tansey (2008, p. 3) suggests that: ‘What is clear is that there are serious flaws in a food system that globally leaves more than 850 million people undernourished and over 1 billion overweight (300 million of these obese)’. He adds that: ‘Some 2 billion people also suffer from vitamin and micronutrient shortages. Undernutrition in pregnant women and young babies can have irreversible effects for life, while obese people’s lives are threatened by diet-related non-communicable diseases such as diabetes and heart attacks’.
- ¹⁰ See World Food Program, ‘1.02 Billion People Hungry’, available at: <http://www.wfp.org/news/news-release/102-billion-people-hungry> (accessed 18 March 2010). For further details on specific figures and facts regarding world food and hunger, see the International Food Policy Research Institute (IFPRI) website, available at: <http://www.ifpri.org/> (accessed 18 March 2010).
- ¹¹ UN Food and Agriculture Organization (FAO), Rome Declaration on World Food Security and World Food Summit Plan of Action (Rome, 13 November 1996), UN Doc. WFS 96/3 (1996), para. 1, available at: <http://www.fao.org/docrep/003/w3613e/w3613e00.HTM> (accessed 2 April 2010).
- ¹² United Nations Millennium Declaration (8 September 2000), G.A. Res. 55/2, UN Doc. A/RES/55/2 (2000) [hereinafter ‘UN Millennium Declaration’], para. 19(1), available at: <http://www.un.org/millennium/> (accessed 22 June 2009).
- ¹³ The significance of this Commission being comprised of highly recognized IP law scholars and attorneys cannot be underestimated. For details of the Commission’s work, see the Commission for Intellectual Property Rights website, available at: <http://www.iprcommission.org> (accessed 18 March 2010).
- ¹⁴ Committee on Economic, Social and Cultural Rights (CESCR) 2005, General Comment No. 17: *The right of everyone to benefit from the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he or she is the author* (art. 15, para. 1 (c)), UN Doc. E/C.12/GC/17 (12 January 2006) [hereinafter ‘General Comment No. 17’], available at: [http://www.unhcr.ch/tbs/doc.nsf/7cec89369c43a6dfc1256a2a0027ba2a/03902145edbbe797c125711500584ea8/\\$FILE/G0640060.pdf](http://www.unhcr.ch/tbs/doc.nsf/7cec89369c43a6dfc1256a2a0027ba2a/03902145edbbe797c125711500584ea8/$FILE/G0640060.pdf) (accessed 3 February 2010).
- ¹⁵ Universal Declaration of Human Rights (Paris, 10 December 1948), G.A. Res. 217A (III), (1948), UN Doc. A/810 (1948), available at: <http://daccess-dds-ny.un.org/doc/RESOLUTION/GEN/NR0/043/88/IMG/NR004388.pdf?OpenElement> (accessed 3 February 2010).
- ¹⁶ International Covenant on Economic, Social and Cultural Rights (New York, 16 December 1966) 993 U.N.T.S. 3, 6 I.L.M. 360 (1967), G.A. Res. 2200A (XXI), UN Doc. A/6316 (1966) (*entered into force* 3 January 1976) [hereinafter ‘ICESCR’], available at: <http://www2.ohchr.org/english/law/cescr.htm> (accessed 3 February 2010).
- ¹⁷ See ICESCR; see also International Covenant on Civil and Political Rights (New York, 16 December 1966) 999 U.N.T.S. 171 and 1057 U.N.T.S. 407, 6 I.L.M. 368 (1967), G.A. Res. 2200A (XXI), UN Doc. A/6316 (1966) (*entered into force* 23 March 1976), available at: <http://www2.ohchr.org/english/law/ccpr.htm> (accessed 3 February 2010).
- ¹⁸ Committee on Economic, Social and Cultural Rights (CESCR) 1991, *General Comment No. 3: The nature of states parties obligations*, UN Doc. E/1991/23 (14 December 1990) [hereinafter ‘General Comment No. 3’], available at: <http://www.unhcr.ch/tbs/doc.nsf/0/94bdbaf59b43a424c12563ed0052b664?Opendocument> (accessed 3 February 2010).
- ¹⁹ The TRIPS Agreement specifies the use of the Dispute Settlement Understanding in Article 64. Note in this context the extension of the transition period under TRIPS Article 66.1 for the least-developed WTO member states from 1 January 2006 to 1 July 2013; see World Trade Organization (WTO), Decision of the Council for TRIPS of 29 November 2005, Extension of the Transition Period under Article 66.1 for Least-Developed Country Members, Doc. IP/C/40 (30 November 2005), available at: http://docsonline.wto.org/GEN_highLightParent.asp?qu=&doc=D/DDFDOCUMENTS/T/IP/C/40.DOC.HTM (accessed 19 March 2010). The Decision also states in paragraph 6 that ‘This Decision is without prejudice to

- [...] the right of least-developed country Members to seek further extensions of the period provided for in paragraph 1 of Article 66 of the Agreement'. Observe, however, that paragraph 5 of the same decision says: 'Least-developed country Members will ensure that any changes in their laws, regulations and practice made during the additional transitional period do not result in a lesser degree of consistency with the provisions of the TRIPS Agreement' (ibid.).
- ²⁰ Committee on Economic, Social and Cultural Rights (CESCR) 1999, *General Comment No. 12: The right to adequate food*, UN Doc. E/C.12/1999/5 (12 May 1999) [hereinafter 'General Comment No. 12'], available at: <http://www.unhchr.ch/tbs/doc.nsf/0/3d02758c707031d58025677f003b73b9> (accessed 3 February 2010). See further Chapter 1 on the nature of such General Comments and the extent of their legal authority.
- ²¹ United Nations General Assembly, Resolution on the Right to Food (18 December 2008), G.A. Res. 63/187, UN Doc. A/RES/63/187 (2009), available at: <http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N08/482/01/PDF/N0848201.pdf?OpenElement> (accessed 2 April 2010).
- ²² For example, in the Andes of Peru, Colombia, Ecuador and Bolivia; in the Himalayas in Nepal and Tibet; in many parts of India; and on the African plains.
- ²³ Examples include technologies which serve to reduce emissions and/or to make industrial systems more efficient by reducing energy inputs.
- ²⁴ *Monsanto Canada Inc. v. Schmeiser*, [2004] 1 S.C.R. 902, 2004 SCC 34, available at: <http://csc.lexum.umontreal.ca/en/2004/2004scc34/2004scc34.pdf> (accessed 1 February 2009).
- ²⁵ See *Monsanto Canada Inc. v. Schmeiser* [2001], 2001 FCT 256, paras. 116–119. While the trial judge explored the possibility that 'some Roundup ready seed was carried to Mr. Schmeiser's field without his knowledge', he was convinced that this could not explain the concentration or extent of Roundup Ready canola ultimately found in Mr. Schmeiser's crop (ibid., para. 118). The majority in the Supreme Court did not challenge this part of the trial judge's analysis. See *Monsanto Canada Inc. v. Schmeiser*, [2004] 1 S.C.R. 902, 2004 SCC 34, paras. 66–68.
- ²⁶ *Monsanto Canada Inc. v. Schmeiser*, [2004] 1 S.C.R. 902, 2004 SCC 34, paras. 69–97.
- ²⁷ One of the best-known cases is that of Canadian farmer Percy Schmeiser and Monsanto Canada Inc. See *Monsanto Canada Inc. v. Schmeiser*, [2004] 1 S.C.R. 902, 2004 SCC 34, para. 66, available at: <http://csc.lexum.umontreal.ca/en/2004/2004scc34/2004scc34.pdf> (accessed 1 February 2009). See the discussion in Box 3.2. See Phillips 2007, pp. 49–64.
- ²⁸ The story of the agricultural input industry is discussed in Tansey 2008, p. 9.
- ²⁹ Some findings indicate that the private sector is more efficient than the public sector in actually delivering the products resulting from research (Dalrymple & Srivastava 1994, p. 204; Louwaars et al. 2005).
- ³⁰ See US Patent No. 4,736,866 (filed 22 June 1984) (issued 12 April 1988); European Patent No. 0169672 (filed June 1985) (issued 13 May 1992); European Patent Office (EPO) Boards of Appeal, *In re Transgenic Animals/Harvard*, Case No. T 315/03 – 3.3.8 [6 July 2004], OJ EPO 1/2006, pp. 15–82, available at http://archive.epo.org/epo/pubs/oj006/01_06/01_0156.pdf (accessed 1 February 2010).
- ³¹ *Harvard College v. Canada (Commissioner of Patents)*, [2002] 4 S.C.R. 45, available at <http://csc.lexum.umontreal.ca/en/2002/2002scc76/2002scc76.pdf> (accessed 1 February 2009).
- ³² See European Patent Office (EPO) Enlarged Board of Appeal, *In re Transgenic Plant/Novartis II*, Case No. G 1/98 [20 December 1999], OJ EPO 3/2000, pp. 111–41, available at http://archive.epo.org/epo/pubs/oj000/3_00/3_1110.pdf (accessed 15 February 2009).
- ³³ During the appeal, the EU Biotechnology Directive /98/44/EC was adopted, reading in Article 4: '1. The following shall not be patentable: (a) plant and animal varieties; (b) essentially biological processes for the production of plants or animals. 2. Inventions which concern plants or animals shall be patentable if the technical feasibility of the invention is not confined to a particular plant or animal variety'. Directive 98/44/EC of the European Parliament and of the Council of 6 July 1998 on the legal protection of biotechnological inventions, OJ L 213 (1998). The EPO's decision in *Transgenic Plant/Novartis II* (OJ EPO 6/1995, p. 115) stated that 'in all cases where a concept of genetic engineering applicable to more than one variety was the invention, the resulting products should be patentable, even if they were plant varieties'.
- ³⁴ European Patent Office (EPO) Examining and Oppositions Division, *In re Howard Florey Institute* [8 December 1994], OJ EPO 6/1995, pp. 388–407, available at http://archive.epo.org/epo/pubs/oj1995/p373_460.pdf; see also European Patent No. 1069819 (filed April 1999) (issued July 2002); European Patent Office (EPO) Boards of Appeal, *Broccoli/Plant Bioscience*, Case No. T 83/05 – 3.3.04 [22 May 2007], OJ EPO 12/2007, pp. 644–69, available at http://www.european-patent-office.org/epo/pubs/oj007/12_07/12_6447.pdf. The EPO decision in

- Howard Florey Institute* (OJ EPO 6/1995, p. 396) reads: ‘...if a substance found in nature has first to be isolated from its surroundings and a process for obtaining it is developed, that process is patentable. Moreover, if this substance can be properly characterised by its structure and it is new in the absolute sense of having no previously *recognised* existence, then the substance *per se* may be patentable’ (emphasis added).
- ³⁵ This document was prepared as part of the work programme of the UNDP Bureau for Development Policy, Poverty Group. It was published as a working document on which comments were solicited (see UNDP 2008, p. i).
- ³⁶ Citing Smith, S. R. 2007, ‘Intellectual Property in Free Trade Agreements’, paper presented at UNDP RCC/UNDP Malaysia/Third World Network workshop, Doha and Beyond: Incorporating Human Development into Trade Negotiations, Penang, 17–18 December 2007. See further Correa, C., ‘Human Development Implications of IPR Protection and TRIPS-plus provisions in Asia-Pacific’, paper presented at the same conference.
- ³⁷ The UNDP Guidelines note that, for such schemes to be viable, ‘the rights of the knowledge holders would need to be clearly defined; for instance, if investment and R&D goes towards developing medicinal properties of a plant, the original purveyors of this knowledge would need to have opportunities to fully participate in the R&D and gain from the potential derived benefits (e.g. in the form of IPRs)’ (ibid., p. 27).
- ³⁸ *Monsanto Co. v. McFarling*, 363 F.3d 1336, 1343 (Fed. Cir. 2004).
- ³⁹ As of 15 January 2009, thirty-nine developing countries (including emerging economies; based on IMF criteria) are members of UPOV: twenty-one are parties to the UPOV 1991 Act, while others had ratified the earlier UPOV 1978 Act.
- ⁴⁰ International Convention for the Protection of New Varieties of Plants (Paris, 2 December 1961), 815 U.N.T.S. 89 (entered into force 10 August 1968), as revised at Geneva, 10 November 1972, 23 October 1978 and 19 March 1991 [hereinafter ‘UPOV Convention’], available at: <http://www.upov.int/en/publications/conventions/index.html> (accessed 24 February 2010).
- ⁴¹ Some reference may be made to Leskien and Flitner 1997, and the 2001 publication by Crucible Group II on *Seeding Solutions* (Volumes 1 and 2). Volume 1 deals with ‘policy options for genetic resources’, while Volume 2 addresses ‘options for national laws governing control over genetic resources and biological innovations’.
- ⁴² Malaysia Protection of New Plant Varieties Act 2004, available at: http://www.wipo.int/clea/en/text_pdf.jsp?lang=EN&id=3143 (accessed 12 April 2010).
- ⁴³ The UNDP Guidelines note suggestions by some NGOs in India that the parent genetic material contributed by rural and tribal peoples should be included in the definition of ‘initial variety’ within the EDV provisions in the country’s PVP law (ibid., p. 8).
- ⁴⁴ Plant Varieties Protection Act, B.E. 2542 (1999) (Thailand), available at: <http://www.biothai.org/cgi-bin/content/pvp/show.pl?0001> (accessed 12 April 2010).
- ⁴⁵ Complex administrative procedures, complex definitions of ‘genetic resources’ as subject matter, unclear scope and coverage, among other factors, have made ABS legislation very difficult to implement in practice, at least in a few countries such as Bolivia, Brazil, Costa Rica, Panama and Peru. For further discussion of the high transaction costs in access regulations, see Walloe Tvedt and Young 2007. As access to genetic resources becomes more problematic and limited, inappropriate incentives may also be created which, in cases, lead to illegal access to and use of these resources.
- ⁴⁶ See declarations by indigenous communities opposing FTAs with the US (especially in Peru and the Andean Region). Some of these may be seen at the website of Red Muqui (Muqui Network for the Promotion of Sustainable Development), <http://www.muqui.org>. Another interesting network is Red Peruana por una Globalización con Equidad/Peruvian Network for Globalization with Equity (RedGE). This network (for citizens’ vigilance of rights in FTAs) publishes and disseminates information and articles regarding the social, cultural and economic impacts of FTAs, especially on marginalized sectors and indigenous peoples. See the RedGE website, available at: <http://www.redge.org.pe/> (accessed 15 March 2010).
- ⁴⁷ The SMTAs do not cover in situ collections which are still governed by national legislation (Article 12.3(h) of the ITPGRFA).
- ⁴⁸ Article 13.2(d) of the ITPGRFA requires that ‘a recipient who commercializes a product that is a plant genetic resource for food and agriculture and that incorporates material accessed from the Multilateral System, shall pay to [a financial mechanism to be established] an equitable share of the benefits arising from the commercialization of that product, except whenever such a product is available without restriction to others for further research and breeding, in which case the recipient who commercializes shall be encouraged to make such payment’.

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- ⁴⁹ There are some indications from the ITPGRFA Secretariat that the Standard Material Transfer Agreement and Multilateral System are starting to fulfil their goal of allowing for an unrestricted and open flow of plant genetic resources for food and agriculture (pers. comm. Shakeel Bhatthi, ITPGRFA Secretariat).
- ⁵⁰ For the terms under the GPL, see <http://www.opensource.org/licences/gpl-license.php> (accessed 10 December 2009).
- ⁵¹ As Aoki and Luvai explain: ‘The key thing about the GPL is that it contractually keeps you from claiming copyright – it can be viewed as a “private” alternative to “public” copyright law as it pertains to software. This is paradoxical; by using “private” contractual terms, the GPL keeps GNU/Linux “public”, or freely available. One of Richard Stallman’s mottos is “Free Software, Not Free Beer,” which means that you may purchase a copy of open source software for cash, but you are “free” to copy and modify that software, subject only to the GPL’ (ibid. p. 62).
- ⁵² To illustrate parallels between the movements to ensure free access to software source code and PGRs respectively, Aoki and Luvai compare the manifesto of the GNU (<http://www.gnu.org/gnu/manifesto.html>) with the version of farmers’ rights advocated by the Philippines-based Magsasaka at Siyentipiko Para sa Pag-unlad ng Agrikultura (MASIPAG), an organization bringing together farmers, scientists, and NGOs to engage in agricultural research (ibid., p. 63). See the MASIPAG (Farmer – Scientist Partnership for Development, Incorporated) website, available at: <http://www.masipag.org/cms/> (accessed 13 April 2010).
- ⁵³ They venture that the material transfer agreements (MTA) that recipients of PGRs must currently sign in order to receive seeds from seed banks might conceivably be re-tooled to contain GPL-like terms (ibid., p. 64).
- ⁵⁴ For concrete proposals, see the ‘disclosure requirement’ proposal by Norway in 2006 (WTO 2006a) and by several States in 2008 (WTO 2008).