

Policy Paper

Intellectual Property, Agrobiodiversity and Gender Considerations

Issues and Case Studies from the Andean and South Asian Regions

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POVERTY REDUCTION



Summary

Women form an integral part of agriculture in the developing world, as farmers, as custodians and users of traditional knowledge and as seed managers. All of these roles and responsibilities in various ways ensure rural food security and maintenance of agricultural biodiversity. In fact, informal exchange of knowledge and seed sharing is central to farming practices in the developing world. The World Trade Organization's intellectual property agreement (TRIPS) and other bilateral and regional trade agreements may impact these practices by introducing monopolistic and exclusive rights regimes into the area of plants and plant varieties (including seeds). In this context, among the major groups affected by these changes are women farmers. Expansive intellectual property rights (IPR) with limited safeguards for plant varieties and genetic resources can potentially affect women's reproductive health, agriculture, food security and traditional knowledge in health care and medicines. Privatization of biological resources directly affects women, who lack resources to purchase them and are left relying on shrinking and increasingly degraded common property resources. Moreover, intellectual property rights that further incentivize privatization of plant and food can dilute gender roles and responsibilities and potentially impact food security, biodiversity and have economic impacts over rural livelihoods. As a result, creating gender specific safeguards with respect to plant rights will result not only in greater security for women, but will also ensure maintenance of agricultural biodiversity and continued food security.

The studies conducted in the Andean and South Asian region set out to explore these linkages and provide an understanding on the implications of these linkages over roles and responsibilities of women farmers. They also discuss if changes in these roles could potentially have an impact over biodiversity and food security. These studies use farming communities, two in each region, where women play major roles related to farming, as case studies to establish the linkages and the implications. The *Jambi Kiwa* association (Ecuador) and the *Potato Park* (Peru) in the Andean Region were studied. In the South Asian region, the dryland deccan plateau of *Parvathapur* and *Enkepally* (India) and the hilly region of *Chaur* and *Begnas* (Nepal) were studied.



Photo: Manuel Ruiz

The Andean study analyzes the complex connections that exist between intellectual property, small farming, agrosystems and gender issues that exist at a broader, multilateral level. It further discusses the regional laws to help analyze the linkages and impacts. It draws some of its arguments from analyzing the role women play in *Jambi Kiwa*

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and *Potato Park*. In both these communities, the study reveals that women play a critical role in farming including saving and exchanging seeds, using customs and traditional knowledge to assist in farming and cooking practices and in case of *Jambi Kiwa* local marketing of community products. In the Andean context women perform roles beyond traditional farming wherein it is not restricted to seed management or growing and harvesting crops (harvesting has largely been the male domain) for the market. In case of *Potato Park* the women have established innovative collectives such as the medicinal plants collective (including a network of communal pharmacies) and the gastronomy collective where use of traditional knowledge, native plants and food varieties and practices play an important part towards their economic sustenance. Intellectual Property has both direct and indirect impacts over the communities. Direct implications have arisen from the various biopiracy cases which have resulted in loss and misappropriation of traditional knowledge. Women in both communities are very aware of biopiracy and have accordingly used available IP tools such as trademarks and community collective marks to brand and market their products. Indirect implications have begun to surface especially in case of privatization of seeds and its effects over continued availability of traditional foods. The women from the communities though aware are not effectively equipped in any way to deal with potential loss of traditional varieties and thereby economic implications over the innovative collectives which rely on these varieties.

The South Asian study is centered on women who play significant roles in sustenance farming in the dryland Deccan Plateau of India and the hilly region of Nepal. In both the cases, women partake in all major agricultural work especially with regard to seeds-selecting, drying, storing, sowing, arranging, transplanting and marketing. They are also primary managers of agricultural biodiversity and in some cases, custodians and users of traditional knowledge including knowledge around climate resilience which is of critical importance for agricultural adaptation to climate change. The IPR and gender interface in this study has been analyzed within the broader context of seed commercialization and how this has impacted agricultural biodiversity and the status of women farmers. In the case of *Parvathapur* and *Enkepally* in India, women are occupied in mixed cropping wherein depending on the area, 'small change' crops are grown in association with 'cash crops'. While this is undertaken to meet household food security on one hand, the practice significantly contributes to agricultural biodiversity. Women farmers in *Chaur*, Nepal grow 24 different varieties of rice on their land. Predominance of market seeds has meant a reduction of varied crops, as farmers rely on cash crops to buy market seeds. The fact that men manage cash crops also means change in roles of women and a long term impact on their knowledge that the study identifies as 'deskilling'. IPR currently have no direct impacts, since only recently plant variety rights have been introduced in India and Nepal as an LDC need not meet its WTO obligation until 2013. But providing exclusive rights over market oriented varieties and monopolies over seeds could only result in further degradation of sources for household varieties and diminished roles of women farmers.

Both the studies clearly establish the significant roles women undertake in farming activities at various stages from sowing to selling. In certain cases (Andean) women are solely responsible for building innovative cooperatives to launch food products and related services in the market. In other cases, women use traditional knowledge (South Asia) in farming practices that uphold agricultural biodiversity and maintain household food security. Introduction of commercial seeds in the market have also introduced changes that affect these roles. Women in both Andean and South Asia have coped with the changes, albeit differently depending on the needs and objectives of the community. Intellectual Property protection in plants and plant varieties introduces exclusive private rights that further monopolize commercial varieties by providing rights based incentives to its growers. Farmers (specifically women as seen in these studies) that grow community or household varieties that are equally important (if not more) are left out of this protection structure. As evidenced in both the studies, these varieties are often critical in contributing to household food security and agricultural biodiversity. The impacts are not restricted to loss in the aforementioned but also in dilution of women's roles and responsibilities in farming activities, which would only serve to expand inequalities. To offset these impacts, the studies make several recommendations from creating gender specific safeguards and provisions to seeking established gender tools and conventions for remedial purposes. For instance, the South Asian study enunciates a comprehensive

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framework to address gender which includes developing gender centric provisions within participatory plant breeding systems, community registries and seed banks and a gender based approach to governance and decision making. The Andean Study while making regional and national recommendations presents a significant take-away within the multilateral and international arena – it recommends exploring the use of the Convention on the Elimination of All Forms of Discrimination (CEDAW) to offset potential negative impacts of intellectual property on women farmers. Specifically, the recommendation is to assess whether overlooking women's contribution to conservation, food security and traditional knowledge development, in the context of establishing IPR, may fall under discrimination or exclusion as per the Convention, with the effect of curtailing the recognition and enjoyment of human rights by women.



Photo: Carine Pionetti

As discussed in the Andean study, international instruments and conventions can offer the necessary space to build safeguards and address these issues in a more balanced form. Most developing countries have not taken advantage of these flexibilities and moreover recently, this space has become restricted. At the time of writing this summary, India was negotiating a free trade agreement with the EU which could potentially have some impacts on flexibilities regarding development of plant rights, Nepal while has until 2013 to establish a plant rights law was seeking to pass its bill before 2010. Also underway, are the negotiations on an International Access and Benefit Sharing Regime, under the CBD, where the Andean countries are among those who have put these issues forward. In addition to the ongoing ABS negotiations, we hope that these studies shall be useful in the UNFCCC negotiations where gender roles within community adaptation to climate change are discussed.

These studies have been commissioned under the Innovation for Human Development pillar of work undertaken by the Inclusive Globalization Cluster, Poverty Group, BDP. The premise of this work is that enhanced participation, access for all and sustainable financing for innovation constitute the three dimensions of inclusive innovation. Innovation is sustainable only when it develops with knowledge from all (technical, scientific and cultural); benefits all and is accompanied by a balanced incentive mechanism.

The Intellectual Property Impact studies under this pillar seek to understand linkages between expansive intellectual property rights and their impacts over human development objectives in key areas such as health, food security, biodiversity, climate change, human rights, gender and traditional knowledge.



Intellectual Property, Agrobiodiversity and Gender Considerations: Issues and Case Studies from the Andean and South Asian Regions

Summary *i*

***Intellectual Property, Agrobiodiversity and Gender Considerations:
Issues and Case Studies from the Andean Region
by Manuel Ruiz***

***Intellectual Property, Agrobiodiversity and Gender Considerations:
Issues and Case Studies from South Asia
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Intellectual Property, Agrobiodiversity and Gender Considerations:

Issues and Case Studies from the Andean Region

Manuel Ruiz



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List of acronyms and abbreviations

ABS	Access and Benefit Sharing
CEDAW	Convention on the Elimination of All Forms of Discrimination against Women
CETCA	Compañía Ecuatoriana del Té
CBD	Convention on Biological Diversity
CORPEI	Corporación de Promoción de Exportaciones e Inversiones
FAO	United Nations Food and Agriculture Organization
FAO IT	FAO International Treaty on Plant Genetic Resources for Food and Agriculture
FTA	Free Trade Agreement
IP	Intellectual Property (rights)
IGC	Intergovernmental Committee on Genetic Resources and Intellectual Property, Traditional Knowledge and Folklore
PBR	Plant Breeders' Rights
TK	Traditional Knowledge
TRIPs	Agreement on Trade Related Aspects of Intellectual Property
UNCTAD	United Nations Conference on Trade and Development
UNESCO	United Nations Education, Science and Culture Organization
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

1. Introduction

Intellectual property (IP) and its impacts on development have been extensively documented in the recent years. Over the past few years, industrialized countries have led a systematic process of broadening the scope of patents over biodiversity components and strengthening plant breeders' rights (PBR). This situation has heightened the interest of experts, policy makers and indigenous people, among others, in regards to how these instruments may be limiting or excessively conditioning and affecting science, research and development options, farmers' activities and livelihoods of small communities. IP effects on biodiversity and the role of traditional knowledge (TK) in these contexts have also become part of an ongoing international debate and agenda.

Tensions between industrialized, technologically-advanced nations and developing, biodiversity- endowed countries have become apparent, especially in international negotiations at the World Trade Organization (WTO) and the World Intellectual Property Organization (WIPO) and in many other forums such as the Convention on Biological Diversity (CBD), the Cartagena Protocol of Biosafety, the United Nations Food and Agriculture Organization (FAO), the United Nations Conference on Trade and Development (UNCTAD), and the United Nations Education, Science and Culture Organization (UNESCO).

Intellectual property includes tools to stimulate research and compensate innovators and creators – but with a catch. IP protects innovation through exclusive rights, which also impose legal restrictions on third parties, including accessing, using and benefiting from protected products – other than in the right-holder's terms (often through licences and royalty payments). When applied to biodiversity, its components and biotechnology, these restrictions become a serious problem for farmers, small communities, researchers and society at large, who traditionally have been free to access and use biodiversity for many purposes, including for consumption, trade, exchange, breeding, research and development in general.¹

The interests of small farming communities often occupy centre stage in these discussions, given that it is their livelihoods that are more directly affected by decisions made in relation to IP and its use. Indeed, their livelihoods are where biodiversity and traditional knowledge thrive and evolve. In quite a few international policy instruments, women are recognized as critically important in the conservation and sustainable use of genetic resources and the development, management and enhancement of

"I have these potatoes since the time of my mother and grandparents, who cultivated them... they are my heritage... I have always had more than 200 varieties... over the past few years I have increased the number of varieties through exchange with family members and in fairs... potatoes themselves are reproducing and varying..."

Mrs. Juana Segama Velito (48), widow, traditional Quechua farmer, mother of three, from the Allato community of Huancavelica Region in Peru.

1 This report will not analyse the complex nature of biotechnological patents and plant breeders' rights (PBR) and their effects. Especially in the case of patents over protected genes, traits, isolated biochemicals and other molecular components, they often have perverse effects on the possibilities of researchers and farmers accessing, using, cultivating and (ultimately) commercializing seeds and products that may contain or incorporate these protected genes, traits, etc. At this point, much is still to be decided in IP multilateral negotiations and by international and national courts and administrative bodies as to the extent to which rights over these components can be legally extended, invoked and enforced. For a detailed analysis of biotech patents and their effects see, McMannis, Charles (Ed.), *Biodiversity and the Law: Intellectual Property, Biotechnology and Traditional Knowledge*, Earthscan, London, U.K., Sterling, VA, 2007. To understand the effects of biotechnological patents, see, International Expert Group on Biotechnology, Innovation and Intellectual Property, *Towards a New Era of Intellectual Property: From Confrontation to Negotiation*, Report, Montreal, Canada, September, 2008. p. 26-41. Smolders offers interesting insights as to the effects of strong IP on seed availability and small farming. See, Smolders, Walter, *Plant Genetic Resources for Food and Agriculture: Facilitated Access or Utility Patents on Plant Varieties?* IP Strategy Today No. 13, 2005, p. 1-17. Also see assessment of high costs placed by the patent system on society in MacDonald, Stuart, *Exploring the Hidden Costs of Patents*. Occasional paper 4, Quaker United Nations Office, Geneva, 2001.

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traditional knowledge related to biodiversity.² The CBD and WIPO have been especially receptive to participation of indigenous and women representatives, albeit their active and continued involvement is still in its initial stage. Women farmers continuously interact, use and improve genetic resources (i.e. biodiversity components in general), and an important portion of their daily activities evolve around biodiversity and its use. Proportionately, more women are involved in agriculture than men in most countries, and men and women perform complementary roles in cultivating, harvesting, sowing, breeding, etc., evidence demonstrates. Paradoxically, qualitative and quantitative data in this regard is not included in national labour data nor reports, a fact that leads to under-reporting the significance of women's contribution in labour and agriculture markets.³

Access to and availability of biodiversity components is a key living condition for farming communities in general. Restricting access or affecting the availability of seeds, land, fertilizer, etc., can have the effect of preventing women farmers from fulfilling their different roles in communities and, therefore, impact their daily lives and cultures.⁴ This can occur, for example, through enforcement of IP. More importantly, local and national food security may also be jeopardized if IP limitations (or any policy or legal measure for that matter) place excessive burdens on farmers' abilities to access and provide timely and appropriate sources of food.

This research paper presents an overview of some of the key issues and outstanding discussion points regarding the impacts of IP on agrobiodiversity, women farmers and traditional knowledge, from a gender equality perspective.

- Section 2 is a brief description of how IP has evolved over time and how developing countries have sought to respond to its effects through international initiatives in biodiversity (and agrobiodiversity), traditional knowledge and small farming. It identifies some of the most important international agreements and conventions addressing these issues, including gender.
- Section 3 describes how these issues have evolved in the Andean region and its leadership in streamlining biodiversity and traditional knowledge into IP-related debates and forums.
- Section 4 presents two case studies, the Jambi Kiwa experience in Ecuador and the Potato Park experience in Peru, to demonstrate and highlight the practical implications that IP may have when applied in contexts of small farming and agrobiodiversity. Women farmers are especially vulnerable when genetic diversity, traditional knowledge, ancestral culture and communities' natural heritage are affected by across-the-board IP policy and laws. This section presents key areas where IP may have an impact over women farmers' roles and responsibilities, drawing from two practical examples in Ecuador and Peru.
- Sections 5, 6 and 7 present key findings and propose some recommendations at national and international levels.

2 Two examples of international instruments that expressly refer to the role of women and women farmers in conservation and sustainable development (in the context of agro-ecosystems) include the *Gender Plan of Action under the Convention on Biological Diversity* (UNEP/CBD/COP/9/INF/12/Rev.1) (2008) and the *Global Plan of Action for the Conservation and Sustainable Use of Plant Genetic Resources*, which was adopted as part of the Fourth FAO International Conference on Plant Genetic Resources in 1996.

3 As suggested by Howard, "... if women's roles and needs are overlooked, then the costs and benefits of biodiversity depletion and conservation will not be accurately understood or estimated". Howard, Patricia, *The Major Importance of "Minor" Resources: Women and Plant Biodiversity*. Gatekeepers Series, IIED, 2003, No. 112 p. 15. Available at: www.genderandmacro.org.

4 See, Gibb, Heather, *Gender Dimensions of Intellectual Property and Traditional Medicinal Knowledge*. Working Paper Series, 07-7, GEM – IWG, June, 2007, p. 7. Available at: www.iied.org.

2. The development of intellectual property and responses

2. The development of intellectual property and responses from a gender, agrobiodiversity and traditional knowledge perspective

IP relates to and affects almost every imaginable human activity.⁵ From literature and the arts to science and technology, and from health and food security to biodiversity conservation and indigenous peoples' creativity, IP is an underlying, common thread to human endeavours in all fields. Directly or indirectly, IP permeates all aspects of daily life at various levels – countries, cities, communities and households. The price of food, consumer preferences, research trends in farming and breeding, the price of cars, pencils, duct tape, CD's or computer programs are all, in some way, affected by IP.⁶

Increased international trade and commercial exchanges of goods and services throughout the 19th century, as well as the recognition of the need for more standardized and harmonized approaches to IP between countries, gave way to the adoption of the Paris Convention for the Protection of Industrial Property (1883), which is the first true international IP convention.⁷

Since then, a wide range of other international treaties, conventions and instruments, have served to build the international framework or 'architecture' on IP (see Table 1). The Agreement on Trade Related Aspects of Intellectual Property (TRIPS) of the WTO is, arguably, the most important standard-setting agreement of its kind. In practice, TRIPS and other IP agreements have served mainly the interests of developed and industrialized countries and have further widened the technological and development gap that separates the poor from the rich. As a tool for dominating markets and ensuring monopoly control of essential goods and services (including Information Technology innovation, seeds, agrochemicals, and goods and services of all kinds), the different variants of IP (patents, marks, copyright, etc.) have been intensively used over time to secure economic advantages and market dominance.⁸

International IP policy and legal frameworks have been designed in such a way that developing countries and small farming interests in breeding, conservation, innovation generation and handicrafts are almost unaccounted for in discussions that shape these frameworks. Pressure has also mounted on WIPO to respond with new instruments and international legal regimes to protect software, biotechnological products (including new plant varieties and genetically modified seeds), business plans, data and non-original databases, online publications and, more recently, nanotechnologies and synthetic biology products.⁹ In very general terms, industrialized, developed countries (and their companies and research institutions) are at the front of these new developments and advances. The exceptions are Brazil, China, India and Mexico, which stand out as developing countries rapidly catching up in these areas of technological and scientific progress.

5 A simple definition of IP, is a series of legal tools which provide innovators and creators (in all fields of human activity) with exclusive rights (often as temporary, legal monopolies) as a means to promote further innovation in exchange for disclosure and use by society of these innovations and creations. Patents, copyright, marks, trade secrets, and plant breeders' rights, are some of the better known examples of these legal instruments. Taken from Wikipedia, The Free Encyclopedia, en.wikipedia.org/Intellectual_property.

6 It should be noted that IP and protecting TK are Human Rights. It is not that patents or copyright per se are Human Rights, but the fact that intellectual efforts of all (including indigenous people and creative farmers) in the arts, science, technology and other areas of human development, should be protected, recognized and compensated. Article 27.2 of the Universal Declaration of Human Rights (1948) specifies that "*Everyone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is author.*" The protection of traditional knowledge and its tangible results is based on this right and on rights conferred by other international instruments, including the UN Declaration on the Rights of Indigenous People (2007).

7 Trade has been a recent strong incentive for the development, consolidation and strengthening of the IP regime in general. For a detailed account of the trade phenomenon over time, see, Bernstein, William, *A Splendid Exchange: How Trade Shaped the World*, Atlantic Books, London, 2008.

8 Some consider this process of privatizing innovation, goods and services as the "enclosure movement". This trend is recognized as particularly problematic, and affects social and economic development in areas where public goods or fundamental rights are involved, such as in the field of health and food security. See, Boyle, James, *The Second Enclosure Movement and the Construction of the Public Domain*, Duke University, 2003. This article is available at: www.law.duke.edu/papers/boyle.pdf.

9 WIPO was created in 1967 on the basis of its predecessor, the International Bureau for the Protection of Intellectual Property which was created in 1893. As a result, it still holds true that over 80 to 85 percent of patents awarded worldwide, in almost all technological fields, are owned by industrialized or developed countries' institutions, companies and nationals.

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Table 1: Key international agreements and conventions related to IP

Instrument	Issues addressed	Position of countries
Paris Convention for the Protection of Industrial Property (1883) (binding)	- Covers patents, collective marks, etc., and sets general, international principles and obligations for contracting parties (which have been further specified and refined in newer international instruments).	- In the light of the TRIPS Agreement and other more recent multilateral treaties, this convention is perceived as a principle-setting convention with no practical effects in terms of sanctions and penalties for non-complying countries.
The Patent Cooperation Treaty (1970) (binding)	- Makes it possible to seek patent protection in a wide range of countries simultaneously, through an international patent application.	- Some developing countries question their exposure to speedy patent applications and thus rights, given that patent filings are dominated mostly by developed countries.
The International Union for the Protection of New Varieties of Plants (1991) (UPOV Convention) (binding)	- Grants legal protection to plant varieties that are new, stable, homogeneous and distinct. - UPOV 91 has gradually strengthened the right of the plant breeder. - Farmers are provided with a limited 'right' to exchange and reuse seeds.	- Developed countries favour strong protection. - Developing countries prefer strong breeders and farmers exemptions and question whether UPOV or UPOV-like regimes are the only <i>sui generis</i> option.
Trade Related Aspects of Intellectual Property Rights (1994) (TRIPS) (binding, part of the GATT and, subsequently, WTO)	- Establishes minimum standards for IP protection in the area of patents, trade secrets, marks, copyright, etc. - In the area of patents, TRIPS outlines the standards for protecting inventions over life forms and biotechnological innovations (including microorganisms) (article 27). - It excludes discoveries, plants and animals from protection (article 27).	- Review of TRIPS has enabled developed countries to push for stronger protection and opposition to review of article 27.3.b and 29 (proposed by developing countries). - Developing countries propose a flexible interpretation and implementation of TRIPS through national legislation (for example, explicit prohibition of patents over genes or isolated biological components).
The WIPO Development Agenda (2007) (non binding)	- Seeks to balance the costs and benefits derived from further developing and implementing stronger IP worldwide, balance the public interest with the rights of IP holders and promote a strong public domain, especially in the light of the interests and needs of developing countries. - Under Cluster B (Norm Setting, Flexibilities, Public Policy and Public Domain), No. 18, there is a specific and urgent call for parties (to WIPO), to accelerate the process of protecting TK, genetic resources and folklore. ^a	- Developed countries strongly opposed the adoption of the Development Agenda, which was originally conceived by Argentina and Brazil in 2004. - Developing countries seek to streamline IGC work into the Agenda's overall goals. - At present the IGC has been given a new mandate by the General Assembly to continue its work and negotiate and international regime on TK protection (September, 2009).

Note: a: For a critique of the slow start to the implementation of the WIPO Development Agenda see, SAWTEE, The WIPO Development Agenda: A Start but it Lacks a Role for Developing Country Enterprises, Issue Paper, September 2007. Available at www.sawtee.org.

2. The development of intellectual property and responses

As a direct result of the TRIPS inclusion in the General Agreement on Tariffs and Trade (GATT), IP has become a central issue of trade policy development at the international, national and regional levels. Almost all trade negotiations now incorporate an IP chapter, which is regularly ‘TRIPS-plus’ in nature.¹⁰ Industrialized countries in bilateral, regional and multilateral trade negotiation processes, including Free Trade Agreements (FTA), favour a ‘take it or leave approach’ to the IP chapter when developing countries try to consider its implications. This is significant in a context of opening global markets and liberalisation as the drivers of development for many countries (including Peru and Ecuador) because the IP chapter often gives these countries very limited space to negotiate appropriate IP standards that respond to their very specific interests and needs. Furthermore, trade agreements (especially FTAs) inevitably include economic sanctions for non-compliance, which adds further burdens and pressure to developing countries.

There is general consensus among a wide set of social actors that the relevance of and benefits from IP and implementing TRIPS or creating TRIPS-plus legislation is highly questionable, especially in the context of developing countries’ needs. All agree that an equitable and balanced national patent system needs to account for and respond to the scientific, social, economic and cultural context of countries; measures should not be imposed based on a TRIPS model or rigid standard.¹¹

2.1 Considerations in international policy and instruments: A response from the South

Agrobiodiversity, genetic resources, traditional knowledge and gender considerations all factor into the South’s response to IP. Developing countries have sought to respond to IP from different fronts and through various means. Rather than invest excessive time and energy in trying to modify or alter the IP system altogether and make it more fair and equitable, a parallel road has been pursued, using different forums to bring issues of interest to the developing South to the negotiating table. Countries in South America, including Ecuador and Peru, have been especially active in some of these efforts (see Section 3 below).

Key components of developing countries’ proactive international agenda include regulating access to genetic resources, protecting traditional knowledge of indigenous peoples and communities, and maintaining and enhancing agrobiodiversity and small farming systems. Most legal and regulatory examples addressing these issues are based on initiatives by developing countries themselves. These countries also have been especially active in the CBD, the FAO International Treaty on Plant Genetic Resources for Food and Agriculture (FAO IT)¹² and WIPO (at the IGC and promoting the Development Agenda) (see Tables 1 and 2).

10 “TRIPS-plus” refers to standards which favor industrialized countries and especially multinational corporations, particularly in the field of biotechnology, agro-industry and pharmaceuticals. For a review of the significance of TRIPS and IP in general and their impact on developing country interests see, Stiglitz, Joseph, *Making Globalization Work*, W.W. Norton & Company, New York, London, 2007 (Chapter 4: Patents, Profits and People).

11 UNDP. *Making Global Trade Work for People*, UNDP, Earthscan Publications Ltd. London and Sterling, Virginia, 2003, pp. 203-221. Sanjaya has provided with useful data regarding the relevance of strong IPRs in developing countries. See, Lall, Sanjaya, *Indicators of the Relative Importance of IPRs in Developing Countries*, Issue paper 3, UNCTAD-ICTSD, Switzerland, 2003. The Crucible Group has long argued that exceeding TRIPS standards does not assist developing countries’ needs to promote innovations and creativity. Seedling Solutions, Vol 1, *Policy Options for Genetic Resources: People, Plants and Patents Revisited*, and Vol. 2, *Options for National Laws Governing Control over Genetic Resources and Biological Innovations*, IDRC, IPGRI, Dag Hammarskjöld Foundation, Ottawa, 2001.

12 For a detailed analysis of the history of and background to the FAO IT see, Moore, Gerald, and Tymowski, Wytold, *Explanatory Guide on the International Treaty on Plant Genetic Resources for Food and Agriculture*, IUCN Environmental Policy and Law Paper No. 57., IUCN Gland, Cambridge, Bonn, 2005.

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Table 2: International, regional and national instruments addressing biodiversity (agrobiodiversity), genetic resources, traditional knowledge and gender

Instrument	Issues addressed	Position of countries
The Convention on Biological Diversity (1992) (binding)	<ul style="list-style-type: none"> - Its objectives are: conservation, sustainable use, and fair and equitable benefit sharing. - Makes clear and explicit connections between IP, indigenous people, ABS and gender. - Recognizes the importance of women and their active participation in the conservation and sustainable use of biodiversity.^a 	<ul style="list-style-type: none"> - Strong disagreement between developed and developing countries in areas of IP, ABS and TK. - Developing countries invoke sovereignty and indigenous people's rights; developed countries seek strong IP, facilitated access.
The FAO Global Plan of Action for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture (1996) (non binding)	<ul style="list-style-type: none"> - Recognizes and highlights different roles played by men and women in conserving, preserving and sustainably using plant genetic resources for food and agriculture. - Offers countries with basic orientation to overcome genetic erosion and support maintenance of agro-ecosystems. 	<ul style="list-style-type: none"> - Developed and developing countries shared the Plan's goal but have different positions in regards to how to implement its different provisions.
The FAO International Treaty on Plant Genetic Resources (2001) (binding)	<ul style="list-style-type: none"> - Seeks to ensure conservation, sustainable use and fair and equitable benefit sharing from plant genetic resources for food and agriculture. - It establishes a Multilateral ABS system, based on MTAs. - It recognizes Farmers' Rights (participation, benefit sharing, TK protection, exchange of seeds).^b - No reference to gender issues. 	<ul style="list-style-type: none"> - Developed countries seek to enforce strong IP provisions (plants under the List that are improved, can be protected). - Developing countries interested in implementation of Farmers' Rights and the benefit sharing mechanism.
Convention for the Safeguarding of the Intangible Cultural Heritage (2003) (binding)	<ul style="list-style-type: none"> - Protects "the intangible cultural heritage" of communities, groups and individuals (this may include indigenous communities and small farming communities). - Heritage includes "knowledge and practices concerning nature and the universe", which may extend to cultural practices of women related to seed saving, or healing ceremonies, or tributes to the land, etc. - Countries are obliged to create and maintain official lists and registers where the cultural heritage is recorded and preserved. 	<ul style="list-style-type: none"> - Developing and developed countries share the same goals pursued by the convention. - Still in the process of being effectively implemented in countries.
FAO Voluntary Guidelines on the Right to Food (2004) (non binding)	<p>States should promote:</p> <ul style="list-style-type: none"> - adequate and stable supplies of safe food (through domestic production, storage, etc.); - better functioning of food and agricultural markets; - small scale local and regional markets. 	<ul style="list-style-type: none"> - Widely agreed by most governments. - Women may play a key role in carving out spaces for their intervention and involvement in developing cooperatives, seed banks, seed exchange fairs, etc, to support the right to food realization.
The UN Declaration on the Rights of Indigenous Peoples (2007) (non binding)	<ul style="list-style-type: none"> - Ambitious attempt to protect and safeguard the interests and rights of indigenous peoples in the social, economic, cultural, political and environmental realms. - Explicit, albeit general, references to traditional knowledge protection, biodiversity (including seeds) conservation, intellectual property protection and women, in terms of their specific rights and special needs. 	<ul style="list-style-type: none"> - Governments of developed and developing countries alike have expressed concerns, specifically over conceding sovereignty over territorial claims of indigenous people.

Notes: a: Preamble: The Contracting Parties recognize "... the vital role that women play in the conservation and sustainable use of biological diversity and affirming the need for the full participation of women at all levels of policy making and implementation for biological diversity conservation". However, it should be noted that according to the CBD Secretariat (referring to the Second National Reports-on CBD implementation), only 25 percent of member States have incorporated women and their organizations in CBD related activities. See, Deda, P. and Rubian, R., *Women and biodiversity: The long journey from users to policy makers*, Natural Resources Forum 28,2004, pp. 201-204.

b: See, Bunning, Sally and Hill, Catherine, *Farmers Rights in the Conservation and Use of Plant Genetic Resources: A Gender Perspective*, FAO Social and Economic Development Department, 1996. Available at: www.fao.org/docrep/X0255E/x025e00.HTM.

2. The development of intellectual property and responses

Four initiatives stand out as being clearly part of an agenda pursued by developing countries, Andean countries in particular. The initiatives are in areas where their leadership and drive is unquestionable:

- Regulating access to genetic resources and benefit sharing (based on CBD principles) and developing an International Regimen on Access and Benefit Sharing;
- Protecting traditional knowledge, innovations and practices (including cultural expressions) of indigenous people (based on CBD principles);¹³
- Regulating access to genetic resources for food and agriculture (through the FAO IT Material Transfer Agreements); and
- Developing and implementing Farmers' Rights (as required by the FAO IT).¹⁴

In addition to these priorities on the agenda, gender issues are starting to receive more scrutiny and attention by developing countries, especially in their relation to biodiversity conservation and their role in sustainable development. Initial research in this regard has focused on women farmers and genetic diversity in small farms and agro-ecosystems.¹⁵

Table 3: Specific international agreements and conventions addressing gender equality

Instrument	Issues addressed	Position of countries
The Convention on the Elimination of All Forms of Discrimination against Women (1979) (binding)	<ul style="list-style-type: none"> - Defines what constitutes discrimination against women and sets up an agenda for national action to end such discrimination. - Commits States' parties to take measures to end discrimination against women in all forms, including in public and political life, education, health, employment, rural activities, economic and social development. - Commits States' parties to (i) incorporate the principle of equality of men and women in their legal system, abolish all discriminatory laws and adopt appropriate ones prohibiting discrimination against women; (ii) establish tribunals and other public institutions to ensure the effective protection of women against discrimination; and (iii) ensure elimination of all acts of discrimination against women by persons, organizations or enterprises. 	- Developed and developing countries share positions regarding common objectives of the convention.

13 The CBD does not specifically refer to the protection per se of TK. However, article 8(j) determines that each Contracting Party shall as appropriate, and subject to national legislation, "... respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities, embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of benefits arising from the utilisation of such knowledge, innovations and practices." This has become the legal foundation for various international regional and national policy and legal processes to protect TK. As a result, policy and regulatory efforts include for example, the African Union Model Law for the Protection of the Rights of Local Communities, Farmers and Breeders and for the Regulation of Access to Biological Resources in Relation to International Law and Institutions (2002); or the Peruvian Law for the Protection of Collective Knowledge of Indigenous People as it Relates to Biodiversity (2001); or the ARIPO Legal Instrument for the Protection of Traditional Knowledge and Expressions of Folklore.

14 Article 9.1 of the FAO IT recognizes Farmers Rights based on the "...enormous contribution that the local and indigenous communities and farmers of the world, particularly those in 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." Further, Article 9.2 determines that the responsibility of implementing Farmers Rights lies with national governments. Thus, Farmers Rights may include: protection of TK as it relates to PGRFA, the right to participate in benefits generated from the use of PGRFA, the right to participate in relevant decision making processes, and the right to save, exchange, use and sell farm saved seeds (subject to national law).

15 Though a relatively recent effort, some are seeking to find the connections between access to and use of genetic resources and the role women play in these processes. For further details see, Aguilar, Lorena, and Tobin, Brendan, *Mainstreaming Gender Equality and Equity in ABS Governance*, IUCN Working Paper, October 2007. For an analysis of women farmers and their role in small farming communities and in agro-ecosystems see, Howard, Patricia, *The Major Importance of "Minor" Resources: Women and Plant Biodiversity*, Gatekeepers Series, IIED, No. 112 p. 15, 2003. Available at: www.genderandmacro.org. See also, GTZ, *Gender and Agrobiodiversity*, Thematic Issues "People, Food and Biodiversity", 2008.

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Table 3: Specific international agreements and conventions addressing gender equality (contd.)

Instrument	Issues addressed	Position of countries
Agenda 21: Earth's Action Plan (1992) (non binding)	- Chapter 24 (Global Action for Women Towards Sustainable Development) recognizes that countries have over time endorsed plans and agreements for the full, equal and beneficial integration of women in all development activities.	- Developing and developed countries alike have signed and endorsed Agenda 21 and its guiding principles and roadmap towards sustainable development.
Fourth World Conference on Women – Beijing Declaration and Platform for Action (1995) (non binding)	<ul style="list-style-type: none"> - The Beijing Declaration and Platform for Action emphasize that empowerment of women and equality between women and men are prerequisites for achieving political, social, economic, cultural and environmental security among all peoples.^a - Gender equality and women's empowerment are addressed through 12 Critical Areas of Concern. Some of these include: (i) poverty, (ii) education, (iii) health, (iv) violence, (v) armed conflict, (vi) the economy, (vii) power and decision-making, (viii) institutional mechanisms, (ix) human rights, (x) the media, Declaration and Platform of Action, recognize advances in achieving equity and equality among men and women in all areas of human and social development, but calls for overcoming considerable problems in discrimination against women. - Governments and other actors were called upon to involve women actively in environmental decision making; integrate gender concerns in development policy and programmes; establish and strengthen programs to assess the impacts of development and environmental policies on women. 	- Developed and developing countries have accepted the main principles enshrined in the Declaration and endorsed its Plan of Action.
The Chennai Platform of Action (2005) (non binding)	<ul style="list-style-type: none"> - Recommendations seek to assist governments in achieving the Millennium Development Goals by 2015, through the conservation and sustainable use of agrobiodiversity. - Recommendation 2 makes explicit reference to women and their traditional knowledge which is instrumental in supporting poverty reduction and hunger alleviation through appropriate use of agrobiodiversity. - Gender equality is called upon in Recommendation 5 (III). More specifically, countries are called upon to introduce legislative measures to use resources to enhance agrobiodiversity and traditional knowledge, in harmony with traditional rights, cultural identity, ecosystem integrity and gender equity. 	Generally accepted by developed and developing countries alike.
The World Summit on Sustainable Development (Johannesburg, 2002), resulted in the Johannesburg Declaration and the Plan of Implementation of the World Summit (non binding)	- Call for women's equal access to and full participation in decision making at all levels, gender mainstreaming into environmental policies and strategies and awareness-raising for women in environmental issues.	- Generally accepted by developing and developed countries alike.
The Committee on Economic, Social and Cultural Rights (non binding) (1985), under the <i>aegis</i> of the UN Economic and Social Council	Stresses the importance of guaranteeing women's full and equal access to economic and natural resources. It also defines "the right to food" as appropriate, timely availability of food in appropriate quantity and quality, which is linked to the limitations often women farmers have in accessing resources in general.	- Not all governments accept the definition of the "the right to food".

Note: a: Whilst the outcomes of this UN conference and declarations are non-binding, they are very important "soft law," in the sense that they aim at guiding national implementation of policies, laws and other measures, especially at the national level. Even courts may seek guidance from soft law instruments under certain circumstances (for example, when no explicit legislation is available to determine rights and obligations). For an analysis of the nature of "soft law" see, Hunter, David, Salzman, James, Zaelke, Durwood, 1998, *International Environmental Law and Policy*, New York, Foundation Press (Chapter 5, III. A, International Soft Law p. 250-268).

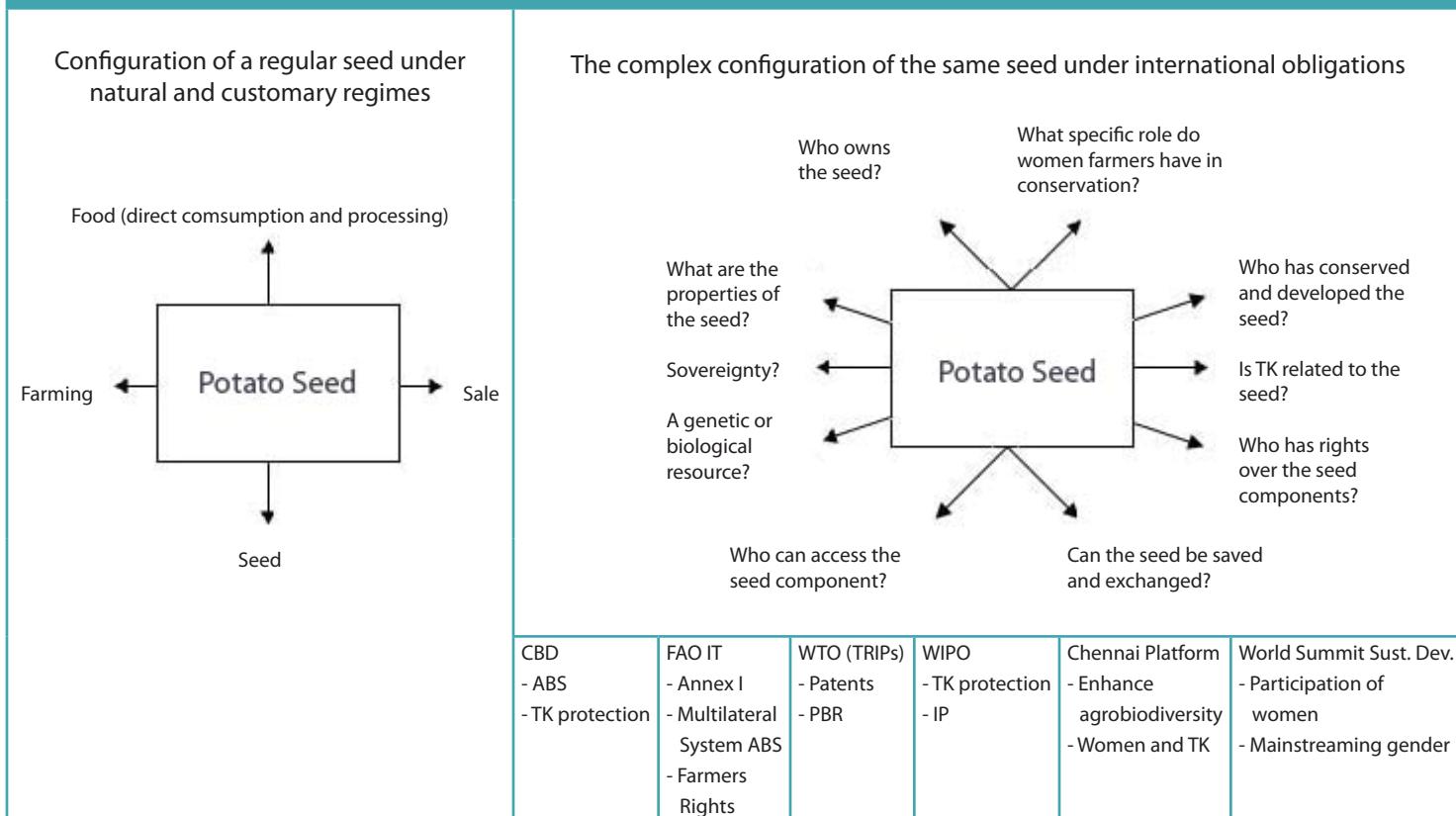
3. Critical processes in the Andean region

3. Critical processes in the Andean region

3.1 Linking agrobiodiversity, genetic resources, traditional knowledge and intellectual property

Andean countries and the Andean Community in particular,¹⁶ have pioneered ideas, policy and legal developments to establish and regulate the connections and linkages between agrobiodiversity, genetic resources, traditional knowledge and intellectual property, as mentioned in Section 2. Figure 1 illustrates the complexity of issues: At the centre is a seed (an important agrobiodiversity component) and arrows around it show how different international agreements (CBD, TRIPS, FAO IT), forums (WIPO) and regional and national laws respond to the challenges (or try to do so) posed by TK, genetic resources, IP and gender. The figure reflects the perspectives of IP law, property law, real law, customary law, access law and a gender perspective, among others.

Figure 1: The complex scenario: TK, genetic resources, IP and gender



Since 1993, the Andean Community has been developing a set of policies and legislation that seek answers to the complex questions proposed in Figure 1. Following is a brief summary of these answers and the process within which they were generated.

¹⁶ The Andean Community or formerly the Andean Pact, is a regional social and economic integration bloc formed in 1969. Its original members included: Bolivia, Chile, Colombia, Ecuador, Peru and Venezuela. Chile retired in the early 1970's and Venezuela did likewise a few years ago. It is similar in its structure to the European Union and it operates in a fairly similar way. All Andean Community countries have ratified the CBD. The FAO IT has been signed by Colombia, Ecuador and Peru but has only been ratified by the latter. Decisions and Resolutions adopted by the Andean Community are mandatory and binding in Member States and require no approval by national Congress. They are immediately and directly applicable (with no need for implementing legislation – unless required).

3.2 The plant breeders' rights (PBR) process

One important and critical milestone is the development of the Andean regime for the protection of plant breeders. Prior to 1993, Andean legislation had forbidden granting IP over life forms of any type. The question of who owns a seed was of no particular relevance or interest at the time. Decision 345 of the Andean Community on a Common Regime for the Protection of New Varieties of Plants (adopted in 1993), radically changed this situation and opened the door for the protection of biologically-derived innovations, in this particular case of new plant varieties. Decision 345 is, in essence, a 'UPOV type' regime, informed by its key guiding principles and protection requirements. It is one of the potential forms of *sui generis* protection as provided for in article 27.3.b of TRIPS.¹⁷

Five aspects are of special interest in regards to the origin of Decision 345 on plant protection. First, it was Colombian and Ecuadorean flower growers (exporters) who called for the protection of their varieties in the early 1990s. Second, in terms of implementation, only Colombia and Peru have awarded plant breeders' rights through Decision 345 and national implementing regulations. Third, it is interesting to note the wording of article 4, which refers to the creation of new plant varieties "...through the use of scientific knowledge to breeding..." The obvious question is why limit the usage to scientific knowledge, when there may be other forms of knowledge and know-how that could equally be used in breeding for plant varieties. Is there discrimination underlying against TK which may also serve to enhance and develop a new plant? The answer by UPOV officials and Andean Community experts attending the negotiating process was that there is in practice, no discrimination neither intended nor foreseen. Indeed, there are no claims to the contrary over a decade after Decision 345 entered into force. Fourth, both the Farmers Privilege and the Breeders Exemption have been reduced to their minimum expression in Decision 345. Furthermore, an express recognition has also been made to the extension of protection to "essentially derived varieties". All of this brings Decision 345 close to the standards set by the UPOV 91 Act.

Finally, the fifth point, and possibly the most important clause in Decision 345 is the inclusion of a Third Transitory Provision that calls for the development of an Andean regime on access to genetic resources and benefit sharing (ABS) and biosafety, according to CBD principles; thus the interest in responding more specifically to the question of who owns genetic resources and seed components and how can they be accessed. For the first time, a regional agreement makes an explicit connection between an IP system (in this case PBR) and ABS interests – part of CBD discussions.

Andean countries are mega-centres of biodiversity and centres of origin and diversification of very important food crops (beans, potatoes, maize, tomatoes, etc.). They have continuously and repeatedly raised their voice about a very evident paradox: Often, new plant varieties are in fact essentially derived from varieties and landraces that have been conserved over time by small farmers throughout the region. However, this initial effort by small farming communities, individual farmers and women in particular goes unrecognized, unaccounted for or unnoticed, in favour of modern breeding and research activities. If rights are to be granted over plant varieties from mega-diverse countries, these same countries have the right to protect their interests in regards to genetic resources that will be used in the development of these varieties, through ABS and TK protection laws.

17 This is one of the areas of controversy within TRIPS debates. Whether *sui generis* means only a 'UPOV type' regime or whether it can be interpreted to mean a system for protecting plant varieties which is not necessarily UPOV like or compatible. It may rather respond more to specific national needs, for example, the expectations and interests of small, traditional farming communities who have conserved and developed a wide range of native crops throughout history. The concept of an "effective" *sui generis* system in article 27.3.b is critical, as it is argued that only an internationally recognized system like UPOV offers (at present in any case) effective protection. However, this does not preclude in any way that a totally different national or international legal instrument is designed that results in effectiveness and is perfectly compatible with TRIPS. For an elaboration on the imbalances in the UPOV agreement and therefore not the optimum *sui generis* law, see Mullapudi Narasimhan, Savita, *Towards a balanced sui generis plant variety regime: Guidelines to establish a national PVP law and understanding of TRIPS-plus aspects of plant rights*, UNDP, New York, 2008. Available at www.undp.org/poverty/topics7_intellectual_property.shtml. In this regard, some interesting policy and legal developments have occurred in the Hindu-Kush Himalayas, a mountainous region similar to the Andes range, with a strong presence of culturally and diversity based agricultural systems. Countries like Nepal and India have developed their own proposals regarding *sui generis* protection of plant varieties, through a mixture of UPOV principles and express recognition for and protection of traditional and native varieties grown and bred by small farmers/breeders. For a detailed account of these processes see, Adhikari, Ratnakar, and Adhikari, Kamlesh (Eds), *Evolving Sui Generis Options for the Hindu-Kush Himalayas*, SAWTEE, Modern Printing Press, Katmandu, Nepal, 2004.

3. Critical processes in the Andean region

3.3 The ABS process

As a result of Decision 345, the Andean Community initiated another regional process. It concluded in 1996 with the adoption and enactment of Decision 391 on a Common Regimen on Access to Genetic Resources. This is the first ABS norm of its kind and it paved the way for initiatives in Brazil, Costa Rica, Cuba, Panama and many other countries.¹⁸

Decision 391 establishes the rules under which genetic resources of Member States can be accessed and used. It includes provisions on prior informed consent, mutually-agreed terms, benefit sharing, form and content of access agreements, recognition of traditional knowledge related to genetic resources (including seeds), among others.¹⁹

As in the case of Decision 345, Decision 391 includes critically important Second and Third Complementary Provisions, which are the foundation for 'defensive protection' measures throughout the world.²⁰ The idea of defensive protection is that as a condition for the granting of IP (especially patents), applicants must provide national IP authorities with credible evidence that genetic resources or TK which are used directly or indirectly in the claimed invention, have been legally accessed or obtained. Furthermore, these provisions determine that IP rights will not be recognized if ABS laws and regulations have not been complied with.

The principle of defensive protection has served as the basis for an interesting and ongoing international process regarding the creation of a certificate of origin, source, legal provenance and/or compliance, to ensure that the origin of genetic resources and TK can be determined (and disclosed in patent applications and documents) and that they have been access and obtained according to national ABS and TK protection laws and regulations.²¹

The Eighth Transitory Provision of Decision 391 calls on Member States to develop a regional regime for the protection of TK of indigenous people (including small, traditional farmers), a process currently under way.

3.4 The new patent regime in the Andean Community

Andean countries are legally bound by TRIPS and Decision 486 on a Common Regime on Industrial Property (2001). Decision 486 'fits' within the broad standard of TRIPS and allows for inventions in biotechnology to be protected, but expressly excludes patenting of isolated genes or biological materials (it also includes a section on patents). This interpretation and exception is compatible with article 27.3.b. of the TRIPS Agreement. In many cases, however, negotiations of Free Trade Agreements with the United States (all of which include IP chapters) have diluted the flexibilities in TRIPS and aligned countries such as Colombia and Peru with US-style patent regimes.²²

18 For a detailed review of this process, see, Caillaux, Jorge, Manuel Ruiz and Brendan Tobin, , *El Régimen Andino de Acceso a los Recursos Genéticos : Lecciones y Experiencias*, SPDA, WRI, Lima, Perú, 1999.

19 For an overview of Decision 391, its history and specific content, see, Ruiz, Manuel, *Guía Explicativa de la Decisión 391 y una Propuesta Alternativa para Regular el Acceso a los Recursos Genéticos en la Sub Región Andina*, The MacArthur Foundation, GTZ, SPDA, Lima, Perú, 2008. Available at www.spda.org.pe.

20 Defensive protection measures, regularly invoked and promoted by biodiversity rich countries, have been incorporated in a series of national laws, including IP laws in Norway and Switzerland. For a detailed review of defensive protection principles and disclosure requirements see, Chouchena-Rojas, Martha, Manuel Ruiz, David Vivas, and Sebastian Winkler (Eds.), *Disclosure Requirements: Ensuring Mutual Supportiveness between the WTO TRIPS Agreement and the CBD*, IUCN, ICTSD, CIEL, IDDRI, QUNO, Gland, Switzerland, 2005.

21 For a review of this process and its development, see, Cabrera, Jorge, *The International Regime on Access to Genetic Resources and Benefit Sharing, Progress, Elements and Recommendations*, BMZ, IUCN, Quito, Ecuador, 2006.

22 In the case of the FTA with Peru (2008), a Letter of Understanding in regards to IP and biodiversity is an annex to the agreement. Although its binding nature is debatable, there are some interesting inclusions which refer to the recognition of sovereignty of States over their biodiversity, recognition of the importance of TK, acknowledgement of the need to make patent search procedures more rigorous as a means to avoid bad patents and biopiracy, among others.

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Decision 486 of the Andean Community incorporates three groundbreaking provisions in regards to the linkage between IP, ABS and TK protection. First, it subjects granting of IP (in general) to safeguarding the interests of Member States over their biodiversity and genetic resources, and their communities' TK. Second, it provides that prior to granting a patent right over an invention that makes use of genetic resources or TK of which Member States are countries of origin or are obtained from communities therein (e.g. a farming field), an applicant must provide the national IP office with an access contract or evidence of having legally accessed the TK, respectively, as a condition for processing of the application. Third, it determines that if these requirements are not met, a patent which may have been granted could be declared annulled. This is 'defensive protection' in its operational form, with procedures, requirements, conditions and even sanctions for non-compliance with established obligations.

Table 4. Intellectual property and related tools: Coverage and advantages/disadvantages to small farmers in the Andean region

Tool/ instrument	Scope	Advantages/ Disadvantages	Implications for women farmers
Patents (TRIPs and Decision 486)			
<ul style="list-style-type: none"> - Inventions in all areas of technological development, provided they are new, involve an inventive step and have industrial application.^a - May include plants, animals and micro-organisms. - Patents will be granted, provided the interests of Member States in relation to their biodiversity are safeguarded (Decision 486). - Under FTA, Peru must make best efforts to adopt patents over plants. 	<p>Advantages</p> <ul style="list-style-type: none"> - Decision 486 provides defensive protection in regards to genetic resources and traditional knowledge. <p>Disadvantages</p> <ul style="list-style-type: none"> - Patents on seeds may restrict ability of farmers to reuse and save protected seeds. - Small number of companies and research institutions in developed countries holding most patents in the biotech field in particular. - Farmers/breeders exemptions absent. - Often suited for intensive, high input agriculture. - Patents protect processes and resulting products (i.e. isolated components of biodiversity). - Limited national capacities institutes to undertake costly research and development processes. - Peru (as part of its FTA with US) should make best efforts to grant patents over plants. 	<ul style="list-style-type: none"> - Patenting of seeds and/or plants, and their subsequent introduction into (small) farming systems may imply women need to alter traditional/ancestral agricultural, social and cultural practices. - They may also need to learn how to use new 'technological packages'; they may need to raise additional cash to purchase protected seeds and agricultural inputs; they may be prevented from saving seeds, etc. 	

Note: a: Article 27 of the TRIPS Agreement (Patentable Subject Matter), establishes that: (1) Subject to the provisions of paragraphs 2 and 3, patents shall be available for any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application ... patents shall be available and patent rights enjoyable without discrimination as to the place of the invention, the field of technology and whether products are imported or locally produced. (2) Members may exclude from patentability inventions, the prevention within their territory of the commercial exploitation of which is necessary to protect ordre public or morality, including to protect human, animal or plant life or health or to avoid serious prejudice to the environment, provided that such exclusion is not made merely because the exploitation is prohibited by their law. (3) Members may also exclude from patentability [...] (b) plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non biological and microbial processes. However, members shall provide for the protection of plant varieties either by patents or by an effective *sui generis* system or by any combination thereof ..." This provision is part of the minimum standards set by the TRIPS Agreement under which countries need to develop their national IP laws and regulations. TRIPS does offer a degree of flexibility to allow Member States to develop their IP framework according to their specific national development, scientific, industrial and social needs.

Table 4. Intellectual property and related tools (contd.)

Tool/ instrument	Scope	Advantages/ Disadvantages	Implications for women farmers
Plant Breeders' Rights (UPOV 91 and Decision 345)			
<ul style="list-style-type: none"> - Protect varieties which are new, stable, uniform and distinct. - Breeders may exclude non authorized third parties from use and commercialization of protected variety. 	Advantages <ul style="list-style-type: none"> - The Third Transitory Provision in Decision 345 calls for the development on an ABS and biosafety regime for the Andean region. - Small, rural farming communities in the Andes may not be the target of companies promoting improved and protected varieties. Disadvantages <ul style="list-style-type: none"> - PBR extends to "essentially derived varieties" (impedes minor improvements). - Breeders exemptions and farmers' exemptions are debilitated in Decision 345. - Peru under the FTA with the US must adhere to UPOV 91. 	<ul style="list-style-type: none"> - Small farmers and women farmers in particular may be prevented from saving seeds for future cultivation. The implications are similar to those of patents (above). 	
Access to genetic resources and benefit sharing legislation			
<ul style="list-style-type: none"> - States have sovereign rights over genetic resources. <ul style="list-style-type: none"> - Communities and individuals may have rights over <i>biological</i> resources which contain genetic resources. - Communities and small farmers are entitled to decide whether or not they will allow access to <i>biological</i> resources located on their lands. - Decision 391 establishes ABS rules and obligations applicable to all genetic resources and derived products of which Member States are countries of origin. 	Advantages <ul style="list-style-type: none"> - ABS is a means of exercising control rights over potentially valuable genetic resources (including seeds). - Debates on ABS inevitably lead to discussions on TK protection. - Possibility of developing effective PIC procedures. Disadvantages <p>Expectations regarding benefits may exceed true possibilities of obtaining benefits from bio-prospecting activities.</p> <ul style="list-style-type: none"> - Genetic resources are geographically widespread and shared by many communities, even countries. - Until now (since 1996), Decision 391 has not been fully implemented in countries. - High transaction costs and perverse effects on national scientists. 	<ul style="list-style-type: none"> - Women may be in a position of participating more actively and informatively in decision making regarding access to and use of native and local seeds, medicinal plants and other resources on their lands and farm lands (empowerment). - They may also have a chance to participate in benefit sharing schemes that are devised as part of bioprospecting projects. - Furthermore, women also have the opportunity participate in providing information and knowledge regarding specific uses and applications of seeds, plants, extracts, etc. 	
Traditional knowledge protection laws			
<ul style="list-style-type: none"> - Decision 391 establishes that contracts may be a form of regulating access to and use of TK. - Decision 391 Ninth Transitory Decision calling for the development of a regional TK protection regime. - Decision 524 establishes a Regional Indigenous Peoples Working Group (2002). - Decision 523 establishes the Regional Biodiversity Strategy which includes lines of action for TK protection (2002). - Law 27811 in Peru for the protection of TK covers confidential TK and TK in the public domain. - Draft law in Ecuador covers all expressions of indigenous peoples intellectual output (arts, seeds, handicraft, folklore, etc.). - Process initiated in 2008 for the development of a first draft regional Decision for the protection of TK. 	Advantages <ul style="list-style-type: none"> - Formal recognition of TK as an important cultural, social and economic asset of indigenous people and communities (including small farming communities). - In the case of Law 27811, it includes a set of tools and instruments (contracts, registers, a national fund, trade secrets, etc.) to protect TK of indigenous people (including small farming communities). Disadvantages <ul style="list-style-type: none"> - TK is often shared among communities of the same or even neighbouring countries, thus making it difficult to determine who has rights over TK and who can validly grant PIC. - There are also high expectations regarding the potential benefits which may be derived from access to and use of TK. 	<ul style="list-style-type: none"> - Specific traditional knowledge (and other cultural expressions, e.g. garments, handicraft, art work, etc.) of women farmers may be protected through contracts, trade secret principles, registers of traditional knowledge and other legal instruments. - Women may receive benefits (monetary and non monetary) from access to and use of their traditional knowledge. - Revaluing of women's TK (through its recognition and protection) is also a way to strengthen cultural systems and women farmers role in conservation, development and use of agrobiodiversity and its components. 	

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Table 4. Intellectual property and related tools (contd.)

Tool/ instrument	Scope	Advantages/ Disadvantages	Implications for women farmers
Defensive protection provisions in IP, ABS and biodiversity laws			
<ul style="list-style-type: none"> - Decisions 391 and 486 include specific references to defensive protection. - These measures have also been adopted in legislation in countries such as Brazil, Costa Rica, Norway, etc. 	<p>Advantages</p> <ul style="list-style-type: none"> - The IP (patent) system rules are used to safeguard interests of countries of origin and their communities. - Defensive protection has been widely recognized as TRIPS compatible. - Key issue in IP debates worldwide. - Links ABS, TK, IP (possibility for positive synergies). <p>Disadvantages</p> <ul style="list-style-type: none"> - It is still associated to the patent system which, in itself, is often criticized by countries and communities alike. - Defensive protection implies 'user' countries need to adopt and modify their national legislation. - All countries are users of genetic resources and providers as well, especially in agriculture. 	<ul style="list-style-type: none"> - Women may find that the use of their traditional knowledge and resources over which they have specific rights or exercise specific management or conservation activities, in innovations subject to patent applications, are safeguarded against misuse or illegal uses. 	
Agrobiodiversity zones			
<ul style="list-style-type: none"> - Applicable to areas which are especially rich in genetic diversity of native crops and wild relatives and which coincide with presence of traditional, ancestral, farming communities (indigenous people). - Recognized in Peruvian legislation (Supreme Decree 068-2001-PCM which regulates the national biodiversity law). 	<p>Advantages</p> <ul style="list-style-type: none"> - Protect geographical spaces (land and territories) of small farming communities in the Andes and Amazon, thus safeguarding culture, genetic diversity, landscape, and other values associated with agrobiodiversity. <p>Disadvantages</p> <ul style="list-style-type: none"> - Only applicable at the national level (Peru), though the Andean Community Regional Biodiversity Strategies also refers to the need to conserve agrobiodiversity and centres of origin and diversification. 	<ul style="list-style-type: none"> - Women farmers may be in a position of better coordination within and among communities' conservation and management activities. - These zones may also become a form of revaluing contribution of agrobiodiversity and women farmers' role in particular, to conservation in centres of origin and diversification. - Women may also be in a position of participating more actively in zones development and management plans (empowerment). 	
Laws for the protection or registering of native crops and wild relatives			
<ul style="list-style-type: none"> - Recognize and provide native crops with a special legal status. - In Peru, Law 28477 establishes a list of native crops and breeds which are recognized as part of the national patrimony. 	<p>Advantages</p> <ul style="list-style-type: none"> - This recognition, grants native crops and breeds a special status (politically) in regards to national biodiversity. <p>Disadvantages</p> <ul style="list-style-type: none"> - No specific rights are granted. Mostly of a declarative nature, but still enables linking certain resources to the country. 	<ul style="list-style-type: none"> - Women farmers may be specifically recognized as breeders and "conservationists" of specific cultivated plants and wild relatives. 	

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Table 4. Intellectual property and related tools (contd.)

Tool/ instrument			
	Scope	Advantages/ Disadvantages	Implications for women farmers
Participatory Plant Breeding (PPB)			
- Seeds of particular importance for national agriculture, including small farming systems.	Advantages <ul style="list-style-type: none"> - PPB calls for participation and collaboration between researchers and farmers and, thus, joint decisions are made in regards to the focus and objectives of the breeding process. - Benefits derived from PPB are collectively shared between those participating in process and farmers in general who receive improved seeds. - Women farmers often play an important role in the PPB process. Disadvantages <ul style="list-style-type: none"> - It is often difficult to balance the interests of small farmers with those of breeders/researchers (often seeking a profit or return to investments). 	<ul style="list-style-type: none"> - Women may be able to participate in conception of breeding projects, management and execution of specific activities in them. This implies key bottom up approaches to developing and designing these PPB projects. - They may also have the opportunity of actively engaging in decision making regarding conservation and marketing strategies as well as other important decisions. 	
Seed laws			
- Seeds which have a certain quality and comply with phytosanitary requirements (certified seed).	Advantages <ul style="list-style-type: none"> - Seed laws seek to formalize seed production and commercialization practices. Disadvantages <ul style="list-style-type: none"> - Seed laws mostly focus on seeds used in intensive farming systems. - Formalization not always possible (nor desired) in countries with wide/ diverse agricultural practices. - Seed laws usually restrict trade and exchange of seeds which are not certified/ meet national commercialization criteria (thus often affecting small farmer's practices). 	<ul style="list-style-type: none"> - Women may be affected in regards to the possibility of sale and commercialization of seeds which may not be certified according to seed laws. This however, may not be necessarily a problem in the context of small farming communities where commercialization is rather small scale and complementary to subsistence farming, barter and seed saving and local processing. - Small farming communities (and women farmers) may be affected if seed systems systematically promote and force gradual use of certified seeds or if markets (of seeds and products) demand only certified seeds. 	

3.5 Traditional knowledge (TK) protection in the Andean Community

Traditional knowledge of small farming communities world-wide, and in the Andes in particular, consists of a series of complex expressions of their individual and collective intellect. TK in essence is the knowledge that has been mostly transmitted orally over generations of farmers who have maintained traditions and cultures strongly based on working and respecting the land and environment (the "Pachamama" or Mother Earth in Andean cultures).

Indeed, this is traditional but evolving knowledge, constantly adapting and enhancing itself through years of experiences and reactions to environmental changes, and even to market pressures. In some places, such as the Andes, small communities seem to have remained static in time, 'frozen' when observed superficially, but they are alive and maintaining and adapting ancestral pre-Inca and Inca traditions to confront new environmental and economic challenges. This phenomenon is similar to practices

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undertaken in the Amazon, and in places in Africa and Asia.²³ A collective and individual process shapes traditional knowledge into all sorts of expressions – seeds, rituals, arts, textile designs, a medicinal potion, etc.

Table 5. Areas and types of traditional knowledge

Areas	Type of knowledge
Agricultural (general)	cultivation seasons (best times of year to cultivate)
	seeds and their different uses
	techniques to store seeds
	techniques to organize and plough fields (pre cultivation and post-cultivation)
	methodologies to teach younger generations of family members in agriculture chores
Breeding	techniques to breed and select new varieties
	use of wild relatives of local crops, native crops and landraces
	abilities and potential of certain domesticated animals and breeds to serve farming activities
Pest control	techniques to combat pests, plagues and others
	techniques to eradicate pests and weeds (often using biodiversity and biological controls)
Medicinal	uses of medicinal plants and other biodiversity components
	treatments of certain human illnesses and diseases
Gastronomy	prepare foods and local, traditional dishes
Religious	local rituals and religious practices associated to Mother Earth
	other rituals related to plants and animals
Ecosystem management	changes in climatic patterns through observation of ecosystem and its components variations and behaviours

Men and women almost always play different roles and have different responsibilities in regards to how TK is generated and developed, transmitted, enhanced, disseminated, maintained and, ultimately, protected. This varies considerably from one farming community to the other. In many cases, for example, women are the guardians of medicinal applications of plants for treating the young or the guardians of ancestral food recipes, which are now being re-valued in many regions.²⁴ In the Amazon, it may be the 'shaman' who has been traditionally considered the healer and health guardian, although his is very specialized knowledge which

23 It is important to stress and highlight as noted by indigenous peoples declarations that "...knowledge is not merely a commodity to be traded like any other in the market. Our knowledge of biodiversity is indivisible from our identities and our laws, institutions, value systems and cosmovision as Indigenous People. For generations, our people have been and continue to be custodians of nature upon which we all depend ... any discussion of the third objective (of the CBD) that of access and benefit sharing, must recognize our fundamental right to control our knowledge, our right to free, prior informed consent as peoples and our collective land and territorial rights". Traditional knowledge is, for indigenous people, much more than an economic asset. It involves cultural, social and environmental values, which are often overlooked by policy makers. Statement of the International Indigenous Forum on Biodiversity, made during the Ad Hoc Open Ended Working Group on Access and Benefit Sharing, CBD, Bonn, Germany, 22-26 October 2001.

24 The last decade or so has seen an interesting phenomenon in Peru. Biodiversity is being re-valued among urban sectors of society through food and tourism. A young and vibrant generation of chefs have rediscovered the potential of Peruvian native foods (including native potatoes) and a gastronomic boom has followed. Women community members have been instrumental in the process of sharing knowledge about local and traditional dishes of the Andes and Amazon regions. Lima is now one of the world's centre of the so-called "gastronomic tourism". This has helped the society at large to understand and become aware of the importance of diversity as a value. For further details of this phenomenon see, Ruiz, Manuel, *Agrobiodiversity Zones in Peru: Two Experiences with Multiple Dimensions*, Biodiversity International, GRPI, SPDA, Lima, Peru, 2009. Available at www.spda.org.pe.

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is applied to extreme cases. Women still take care of minor pains, stomach aches, skin rashes, fevers, etc. In the Andes, women are usually the main source of cures for a much wider set of ailments, including serious diseases.²⁵

TK is also critical in revaluing the social, cultural and economic importance of biodiversity through a new and fresh look at native crops and their potential,²⁶ a new policy and management approach to natural protected areas conservation,²⁷ and increased participation of local and indigenous communities in management of protected sites.²⁸

A policy process was initiated in 2002 in the Andean Community for the development of a regional, common regime for the legal protection TK. Numerous legal norms have been enacted to pave the way for a formal process to construct and design this regime (see Table 4).²⁹ At present, the outstanding element of the initial draft for this TK regime is that it includes a broad scope of protection, e.g. TK and cultural expressions (arts, song, crafts, artefacts, etc.).

25 It should be noted that traditional medicine may still account for the greatest proportion of cures for basic illnesses; modern medicine is recognized as a last resort among communities. Problems associated with modern medicine are often issues relating to access to medicines and health facilities – often very distant from communities and their surroundings. An approximate figure used by the World Health Organization (WHO) is that nearly 80 percent of world's population uses traditional medicine (from plant and animal origin) to satisfy primary health needs. This percentage increases as poverty levels increase and furthermore when referring to indigenous communities and native populations. World Health Organization, *Traditional Medicine*, Fact Sheet No. 134, May 2003. Available at www.who.int/mediacentre/factsheets/fs134/en/.

26 So called "underutilized crops" (native crops and land races) are extremely important for women and food security in the context of rural communities. For an analysis of underutilized crops in Peru, see Pastor, Santiago, Funtealba, Beatriz, Ruiz, Manuel, *Cultivos Sub Utilizados en el Perú. Análisis de las Políticas Públicas Relativas a su Conservación y Uso Sostenible*, SPDA, PROUD, Lima, 2006. See also the work of the Global Facilitation Unit for Under Utilized Species (GNU) at www.underutilized-species.org.

27 In the case of Peru, "agrobiodiversity zones" are legally recognized *sui generis* protected areas which are created to preserve agrobiodiversity and cultures. These were first recognized in Supreme Decree 068-2001-PCM which regulates the national biodiversity law. The main features of these areas is that they need to reflect: communities and culture, high genetic diversity of cultivated plants, traditional ancestral agricultural practices and potential for undertaking activities such as "ecotourism" and other sustainable activities.

28 Solano has suggested that for a country like Peru, biodiversity and protected areas as well as gastronomy could become key elements of national unity, a sentiment of self pride and transversal interests for society at large (whether urban, rural, poor or rich). This also applies to neighbouring countries like Ecuador, Colombia and Bolivia. See, Solano, Pedro, *La Esperanza es Verde*, Peruvian Society for Environmental Law, Lima, Peru 2005, pp. 55-58.

29 For a detailed analysis of policy and legal advances in the protection of TK in Latin America and the Andean Community in particular, see, Ruiz, Manuel, *The Protection of Traditional Knowledge: Policy and Legal Advances in Latin America*, BMZ, SPDA, Lima, 2006. Available at www.spda.org.pe.

4. Case studies in the Andean Region: Jambi Kiwa and the Potato Park

Section 2 provided a general overview of the IP system and its different tools and instruments.

Section 3 drew attention to some of the complex interactions and synergies between genetic resources, traditional knowledge, and intellectual property and, to some extent how gender considerations are part these dynamics. It also provided with a basic outline of how countries in the South (in the Andean Community) are seeking to balance the effects of an ever-stronger IP system, through access to genetic resources policy and law, proposals for the protection of traditional knowledge, and defensive protection measures, among other routes.

Section 4 will analyse case studies in Ecuador and Peru that reflect the interface between small farming and women farmers in particular, intellectual property, genetic resources and traditional knowledge. The objective of Section 4 is to explore how and whether women farmers perform specific roles and have certain responsibilities in farming communities in Ecuador and Peru, and to highlight some of the implications for these roles from the implementation of policy and law in the field of IP, genetic resources and traditional knowledge.

Both case studies refer to farming by small farming communities in the Andean regions of Ecuador and Peru and emphasize the role women farmers play in each.

4.1 An analysis of case studies in Ecuador and Peru: The interface between farming, intellectual property and gender equality³⁰

Jambi Kiwa

Jambi Kiwa is the formal name given to an Association of Producers of Medicinal Plants of Chimborazo (Ministerial Accord N-202-MBS-CH of 2001). The Jambi Kiwa experience is a product as much as it is an ongoing process. More than 80 percent of its members are women from the Puruahé indigenous people.³¹ The Association was created in 1999, as a cooperative, community-based business model to cultivate and harvest, gather (from the wild), process and commercialize medicinal and aromatic plants and derived products. Farmers participating in Jambi Kiwa are often owners of very small plots of land (less than a hectare in extension), but they farm their lands very sustainably and without chemical agricultural inputs such as fertilizers or pesticides. Today, Jambi Kiwa's membership includes 600 producers (mostly families) from 62 indigenous communities of the Chimborazo Province in the Ecuadorean Andes.

³⁰ The Millennium Development Goal 3 specifically calls for the promotion of equality and empowerment of women. According to an IFPRI and World Bank Report, "A dynamic agricultural sector that offers broad welfare benefits can be expected to emerge only when women are given the opportunity to participate profitably in the sector (agricultural sector)". Furthermore it suggests that in relation to women empowerment, agricultural technology "...developed with close attention to alleviating some of the labour constraints experienced by rural women has the potential to improve not only the well being of women farmers, but also of others in the household who are dependent upon her care". This section of the report does not make references to cultural and social specificities in certain type of farming, as in the Andes and its small, ancestral communities. These specificities may require other incentives and tools other than technology) to support empowerment and equality contexts for women. IFFRI, World Bank, *Agriculture and Achieving the Millennium Development Goals*, Agriculture and Rural Development Department, Report No. 32729-GLB, The World Bank, Washington D.C., U.S., p. 10, 2006.

³¹ For details about the history and objectives of Jambi Kiwa, see www.jambikiwa.com. See also, Cunningham, Cord, *The Jambi Kiwa Story: Mobilizing Assets for Community Development*, Comart Foundation, Canada, 2007. Available at www.coady.stfx.ca/resources/abcd/JAMBInglhsfin.pdf.

4. Jambi Kiwa and the Potato Park

The Potato Park

The Potato Park is a self-proclaimed Indigenous Biocultural Heritage Area, located in Pisac, Cusco, Peru. It covers an area of 9,000 hectares. It is formed by more than 6,000 inhabitants of six indigenous Andean farming communities (Sacaca, Cuyo Grande, Chawaytire, Pampallaqta, Paru Paru, Amaru). They formed the Potato Park Association in 2000. The Park is situated between 3,200 to 5,000 meters above sea level. The Potato Park is a centre of genetic diversity with over 350 recognized cultivated and wild varieties of potatoes, plus a wide range of medicinal plants and other native roots and tubers. Inca ruins and sites are also located within its geographical limits. The Park is also an Agrobiodiversity Zone as recognized in national legislation.³² With assistance and guidance from the Andes Association (a Cusco-based NGO), the Potato Park Association has embarked on a series of projects including, among others: repatriation of local varieties, with the assistance of the International Potato Centre; registration of traditional local knowledge and biodiversity in a Local Register; creation of a Medicinal Plants Women Collective, as part of a network of communal pharmacies; and agro-ecotourism activities based on trekking and communal gastronomy tours. Activities in the Park are organized based on working groups or 'collectives' that are responsible for operations in the Park in the many different fronts, e.g. local register, gastronomy, natural products development. There are four collectives. They are formed by women and men *campesinos* (traditional Andean farmers) from all six communities of the Potato Park.

In both the Jambi Kiwa and the Potato Park, women play an important role and are actively involved in and committed to improving their local, traditional livelihoods and conserving traditional practices and indigenous culture. Women farmers in the both places share common responsibilities and have similar roles, which include complementing agricultural chores in the field; taking care of their family in terms of assisting children with homework, cooking for the family, completing household chores, taking care of the sick and elderly, etc.; leading communal businesses, often in medicinal plants and natural products; participating in seed fairs and selecting the best seeds for conservation, consumption and exchange.

An outstanding and important difference between these two experiences pertains to the market for sales. In the case of Jambi Kiwa, market forces (including some forms of IP) as a means to serve local interests are perceived as affirming and supporting indigenous culture and its enhancement. In the case of the Potato Park, the commercial marketplace is only a marginal component of its development strategy and is viewed with caution and suspicion by its indigenous community members. Jambi Kiwa has become, over time, a successful locally-based 'business model' that is fully linked to medicinal plant commercial and productive chains, with plans to serve foreign markets. Its partners include Ecuadorean companies and its activities are supported by the national Corporation for the Promotion of Exports and Investment (CORPEI).³³ The Potato Park, in contrast, is only marginally linked to local markets in Cusco and nearby provinces, through limited production and commercialization of potatoes. Its focus is mainly on enhancing the local livelihoods of its six communities through a subsistence model of agriculture, small scale tourism and sale of local medicinal plants, soaps, creams, and other products.

The following sections address some of the key issues highlighted throughout this paper, and their specific significance in the case of the Potato Park and Jambi Kiwa.

³² Supreme Decree 068-2001-PCM, the regulation of the national biodiversity law (Law 26839 from 1997), created Agrobiodiversity Zones as special sites to be protected for the conservation and sustainable use of agrobiodiversity and its different components. Article 38 of the regulation establishes that "... agrobiodiversity zones oriented towards the conservation and sustainable use of native cultivated species by indigenous people, cannot be destined to other goals than those of conserving these species and maintaining indigenous cultures. They can be destined to tourism when focused on promoting and further understanding native agrobiodiversity and traditional indigenous practices such as seed fairs and others ...". For a detailed review of the social, policy, legal, cultural and economic aspects of these sites in Peru, see, Ruiz, et. al. 2009.

³³ CORPEI is an organization responsible for promoting non traditional and traditional Ecuadorean exports. It works closely with national and foreign companies, and is backed and supported through private and State contributions.

4.2 National IP policies and laws on seeds and their components

It is generally accepted that if farmers start utilizing IP-protected seeds, this will almost inevitably lead to their customary practices and cultural values becoming affected, as they turn to foreign technological packages that alter their ancestral cultivation processes and practices. This would probably be the case for small farmers from communities in the Potato Park and for farmers from the Jambi Kiwa association.³⁴

Patents or PBR protection over seeds could also have a series of effects on women's activities in particular. For example, traditional varieties may be displaced or become underutilized (due to preference for the modern variety), which implies women have fewer options for cooking and maintaining inputs for a traditional diet. In the Chimborazo area in Ecuador, for example, loss of traditional varieties of tubers and roots over the past decade or so has altered the traditional eating habits of communities as well as the cooking practices of women. It was especially due to preferences for commercial varieties (not *necessarily* protected by IP). This has been especially highlighted by Jambi Kiwa leaders. In the Potato Park, extension programmes in the 1970's, had the effect of dramatically reducing genetic diversity in the Pisac area (see point 3.7 for the repatriation experience in the Potato Park) and thus forcing women to seek external foods such as noodles, rice and canned food.

If the introduced variety is that of a wholly new species, this may further alienate women's cultural practices as new knowledge is required to cultivate, select, and continuously purchase improved seeds. Women may be required to use their time to understand new cultivation techniques that are not necessarily compatible with ancestral practices. In this context, money/income needs may become another alienating factor, as further external inputs may be required, including fertilizer and pesticides. This may mean a basic shift in roles of women and men, in the light of a new technological farming paradigm.

Patent or PBR protection could also have the effect of restricting (or stopping altogether) traditional exchange of seeds among women farmers and seed managers. Exchange options would be reduced due to uniform settling in fields and in turn affect conservation of genetic diversity.

Farmers may find their already-limited opportunities to earn extra cash from selling seeds further restricted if small scale sales of seeds or products are affected, even in farming communities where commercialization still remains marginal. This means that, for example, women may need to dedicate more time to non-agricultural activities to raise cash (e.g. through sale of embroidery and handicrafts or by undertaking odd jobs). This in turn may mean less time on the farm, less time with children, less time in collaborating with their husbands in agricultural chores, less time for traditional cultural activities and ceremonies, etc.³⁵ This may also erode specific TK of women farmers who start detaching themselves from traditional ways and practices.

Though money is now extensively used in most Andean communities (including in the Potato Park and Puruhae communities in Chimborazo) to purchase goods such as utensils, foodstuffs, school uniforms, building materials, etc., it has not yet become the

34 The Regional Government in Cuzco for example and a wide range of social organizations, realizing the potential problems posed by patenting of seeds and their introduction, have formally opposed extension of IP over life forms. Furthermore, the Regional Government of Cuzco has also expressly prohibited the introduction of genetically modified organisms, on the basis that the region of Cuzco is a centre of origin and diversification and seeks to remain free of foreign, genetically modified seeds. See, Regional Ordinance 010-2007-CR/GRC.Cusco (2007). Under the FTA with the US Peru is obliged to make best efforts to patent plants. Ecuador's Constitution has expressly prohibited patents over life forms and TK. However, in this case, it is still to be seen how exactly is this provision interpreted in National Courts or by Congress.

35 Here again, further research and quantitative data is required, but some have argued that if IP owners or holders seek to enforce their rights, this may involve considerable costs, especially when targeting small farmers in remote areas in the Andes or Amazon. For example, seeking to enforce IP on seeds in a isolated area in the high Andes may require: identifying numerous small plots spread throughout vast areas; identifying the specific infringing farmer (which may be a problem in communal fields); initiating legal actions in courts which may be reluctant to punish or condemn small, poor farmers in remote areas, etc. So concerns regarding the impacts on small farmers may be excessive. Nevertheless, the problem is more complex, as IP is part of a broader context where the media, marketing, consumer trends and processed foods, shape demand and therefore affect the options farmers have to satisfy their own and local national and even niche international markets. For a more detailed analysis see, Hardon, Jaap, *Plant Patents Beyond Control. Biotechnology, Farmer Seed Systems and Intellectual Property Rights*, Agromisa Foundation, Agrospecial No. 2, Wageningen, The Netherlands, pp. 20-27, 2004.

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driving force and central goal of community activities, especially in the case of the Potato Park. Given its nature as a sustainable business model, Jambi Kiwa has a greater interest in generating income for its members and achieving its commercially-oriented goal.

These apparently minor but profound changes in cultivation and daily living habits, customs and practices may have profound impacts on the culture and livelihoods of families in the medium- and long-term, and on women's activities in particular.

4.3 Some intellectual property tools and their potential

Certain symbols, images of landscapes and sites, and other traditional designs of indigenous peoples – and of small farming communities in particular – have been incorporated into clothing (e.g. T-shirts, carpets, sweaters), movies, arts, TV advertisements and special programmes and tourism promotion campaigns. What seems a very straightforward design choice for urban societies may be a usage that is degrading to cultures and traditions that are based on respect and veneration for these symbols and sites.³⁶

In many cases, these designs and symbols are part of the intellectual effort of women over time. At some point, women may be missing an opportunity either to express their opposition to non-authorized uses of these design and symbols or, perhaps, to participate in the benefits these motifs are generating, which now accrue only to non-authorized third parties such as entrepreneurs, companies and members of the media.

Women of the Potato Park and Jambi Kiwa are well-informed about and aware of the potential of distinguishing their products (e.g. potatoes and medicinal plants, soaps, creams, infusions, textiles) and services (e.g. locally-run restaurants, agro-ecotourism) in order to benefit from market dynamics. Jambi Kiwa even owns a small but modern processing plant to stock, process and distribute its natural products. Members of Jambi Kiwa are inclined to work together with the market, including international markets. In contrast, members of the Potato Park are more interested in securing national recognition for their goods and services, with a much more cautious approach to market forces.³⁷

Jambi Kiwa has a wide range of natural products and has a production and marketing strategy in place for this purpose of increasing sales. Jambi Kiwa's members are conscious that IP instruments, and trademarks in particular, can become important in their effort to succeed in the market. Their various products (e.g. tea, herbal infusions, cosmetic creams, dyes and shampoos) are all commercialized under the brand 'Jambi Kiwa', which has already added value to them in local and national markets. The sale and marketing of products from the Potato Park is much more 'situation based' and relies on visitors and tourists purchasing these products during their visits to the Park, which is one hour from Cusco City. Both Jambi Kiwa and the Potato Park have developed specific distinguishing trademarks: a collective mark in the case of the Potato Park and a series of trademarks under the 'Jambi Kiwa' commercial name. All of these marks are pending approval by national IP authorities in Peru (INDECOPI) and Ecuador (IEPI), respectively. In the case of the Potato Park, the collective mark identifies and is placed on all natural products, leaflets and posters, web site, and other materials which refer to the Potato Park.

For Potato Park representatives, these alternative IP tools are a sort of 'defence' against biopiracy, though at this point it is not clear if women and communities of the Park in general are aware that a collective mark or even a geographic indication are not

36 A novel conceptual approach to non authorized use of "site images" has been suggested by Vogel through the term "geo-piracy". For details of this proposal, see, Vogel, Joseph, Gomides, Camilo, Robles, Janny, Muñiz, Carlos, *Geopiracy: The Unjustifiable False Attribution of Location in the Visual Arts*, International Centre for Trade and Sustainable Development (ICTSD), Bridges, Vol. 2, No. 4, December 2008. Available at: ictsd.net/i/news/bioresreview/34796/. The notion of "geo piracy" can extend to non authorized use and commercial use of symbols, designs, indigenous words, etc. (even if 'modernized' and transformed into new symbols, designs, etc.).

37 In 2003 a meeting was held at the International Potato Centre (CIP), with representatives of the Potato Park and the biggest supermarket chain in the country (E. Wong). This meeting included an exhibition of the Potato Park's wide range of diversity of potatoes and typical food products. Whilst the supermarket chain was very interested in doing business and commercialize native potatoes in their stores, Potato Park representatives were very wary about increasing their production of potatoes to satisfy a potential stronger demand by a broader, national market.

necessarily designed to prevent biopiracy or misappropriation of their knowledge and resources (their main concern) and heritage. However, as indicated before, there is considerable awareness in regards to the role of these tools in supporting a marketing strategy at the regional and national level.

4.4 Awareness among women farmers of biopiracy or misappropriation of resources and TK

Especially since the entry into force of the CBD, biopiracy has been denounced as a serious cultural, legal and economic problem affecting biodiversity-rich countries and their indigenous communities (including small, traditional farmers).³⁸ Frequently, when genetic resources and related traditional knowledge are accessed and used as a result of bioprospecting projects, products from the research and development process are subject to patents or other IP rights.³⁹

However, countries and communities from which resources and TK are obtained have hardly ever participated or equitably gained from the benefits generated.

Women can be affected by biopiracy when they are interviewed by researchers in the field and when these researchers obtain specific information regarding, for example, use of seeds or medicinal plants. But in most situations, risks and harm derived from biopiracy (in economic, moral and ethical terms) is felt collectively by communities, or by the indigenous peoples' national or ethnic group whose resources or TK are identified as becoming part of a valuable commercial or industrial product – far detached from the community setting and culture.

Cases of biopiracy or misappropriation of resources and TK from communities in the Andes have been well-documented over the years. Quinoa (*Chenopodium quinoa*), Ñuña (*Phaseolus vulgaris* var *ñuña*) and Maca (*Lepidium meyenii*) are just a few examples of Andean grains and tubers grown for centuries by traditional farmers. Dozens of patents have been claimed over inventions derived from these crops, especially in the US, Europe and Japan.⁴⁰

Women of communities that are part of the Jambi Kiwa association are very conscious and aware of the problems created by IP and the biopiracy phenomenon in general.⁴¹ As a result, Jambi Kiwa and other organizations in Ecuador have become more conscious and aware about the role and often perverse effects of IP and patents in particular when applied over biodiversity.

Similarly, Potato Park representatives and women have been especially vocal with regards to biopiracy, speaking up in the media, through public statements and during national and regional workshops addressing biopiracy. This has increased since 2000, when a patent was granted to a US-based company (Appropriate Engineering and Technology) over a cross of a Peruvian nuña

38 There is no universal definition to the concept 'biopiracy'. However, some definitions have been suggested. In 2004, Peru adopted Law 28216, where biopiracy is defined as the illegal access to and use of genetic resources and traditional knowledge through physical appropriation or through the use of intellectual property. This law created the National Commission for the Prevention of Biopiracy. See www.biopirateria.org.pe. There is considerable literature regarding biopiracy, misappropriation, illegal use, etc. of genetic resources and TK. Especially illustrative has been the work of organizations such as GRAIN and ETC Group over the years (see www.grain.org and www.etcgoup.org).

39 Many countries (including Andean Community Member States, Brazil, Costa Rica and others in Africa and Asia), have started to combat biopiracy by regulating and implementing access and benefit sharing laws (ABS) as well as TK protection laws. Efforts are also under way to develop an International Regime on Access to Genetic Resources and Benefit Sharing under the aegis of the CBD. For the texts of some of these norms see www.biopirateria.org. Also see, Ruiz, Manuel, Lapeña, Isabel (Eds.), *Acceso a Recursos Genéticos; Propuestas e Instrumentos Jurídicos*, SPDA, Lima, Mayo 2004.

40 For a list of potential biopiracy cases in regards to Peruvian genetic resources and related TK, see, Comisión Nacional contra la Biopiratería, *Análisis de Potenciales Casos de Biopiratería en el Perú*, Documentos de Investigación, Iniciativa para la Prevención de la Biopiratería, Año 1, No. 3, Setiembre de 2005. Available online at www.spda.org; this document was also presented by the Peruvian Government at the TRIPs Council September meeting as document IP/C/W/493 (Combating Biopiracy – The Peruvian Experience). For further details about the biopiracy phenomenon in the region see www.biopirateria.org.

41 One of the most notorious cases of biopiracy (the infamous Ayahuasca Patent), occurred in Ecuador, and indigenous groups, under the leadership of the regional organization COICA (Coordinadora Indígena de la Cuenca Amazónica) undertook the successful effort of challenging this culturally perverse (and technically absurd) patent.

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bean. Since that time, any form of appropriation of life forms has encountered strong opposition from the Park, based on cultural, ethical and religious beliefs.⁴²

4.5 Introducing genetically-improved seeds into small farming agricultural systems

The extended introduction and use of genetically modified and IP-protected seeds is an extremely contested issue for certain countries, especially Andean countries, which are centres of origin and diversification of important food crops. The situation is further aggravated given that many forms of agriculture coexist, including organic agriculture, small scale traditional farming, intensive industrial agriculture, etc. Small farmers and organic farmers are concerned that their products are not affected by gene flows or 'contamination' from transgenic crops. Whilst modern, intensive farming oriented towards export and foreign markets may (may) benefit from continued genetic improvement of seeds and the use of genetically modified seeds, small farming that is based on diversity and seeks to preserve economically-undervalued resources (that of diversity and culture) may not necessarily require improved seeds but other strategies to enhance this type of agriculture. Other strategies may include stimulus for local and national demand of native products,⁴³ facilitated access to credit, more participatory public breeding programmes that serve the needs of local and regional markets, and promotion of agro-ecotourism. Furthermore, genetic improvement may not require transgenic seeds but traditional, biotechnologically-assisted breeding.

Dependence on genetically modified seeds would change and alter the lives of women in terms of having to learn new cultivation techniques (not culturally based), having to deal with displacement of traditional varieties, having to seek new sources of income to purchase introduced and protected seeds, having to change feeding customs of households and communities in general, having to purchase agricultural inputs that are part of the technological package, and having to be exposed to potential health risks from use of pesticides and agrochemicals.⁴⁴ This is not taking into account conservation matters that relate to over-use of soils, introduction of chemical fertilizers, loss of genetic diversity and wild relatives of traditional native crops, and hazardous genetic contamination, among other risks.⁴⁵

Women farmers (both in the Potato Park and Jambi Kiwa) are especially apprehensive and concerned about the implications of Free Trade Agreements and the trend towards allowing for the introduction and liberation of improved seeds and genetically modified seeds. In early 2009, the Regional Government of Cusco declared that the Cusco Region is considered "free of transgenic crops" and opposed to all forms of biopiracy, in clear response to free market trends promoted, in particular, by the FTA with the US.⁴⁶ Women expressed their worry that free trade means new, improved seeds that may displace their traditional varieties which are at the core of the Potato Park spirit. However, the Potato Park as a unique experience is very well-internalized by all community

42 For details see, IIED, *Protecting Indigenous Knowledge Against Biopiracy in the Andes: Sustaining Local Food Systems, Agricultural Biodiversity and Livelihoods*, 2008. Available at: www.iied.org.

43 Law 25420 in Peru on the Promotion of Production, and Consumption of Food Products of the Andes (1986), seeks to stimulate national consumption of native crops. These are prioritized in poverty alleviation and food programs.

44 It could be argued that modern, genetically modified crops could actually *diminish* pressure on women, as these varieties require less human labour and thus, demand less physical effort from men and women alike. More time on their hands would mean more time to spend on other traditional activities on the farm. This is a speculative argument that requires research on the ground. Initial preliminary evidence from the Potato Park in Cuzco (in the area where the Park is located and prior to its creation), shows that the introduction of modern potato varieties through extension programs (in the 1970s and 1980s), had very negative effects on communities in terms of economic results (depressed prices), over production, culture preservation and traditional practices, dependence on provision of new seeds, etc. Evidence in regards to the introduction of modern varieties and its effects on diversity is, however, inconclusive. In another area in Northern Peru, it seems that "... the greatest threat to on-farm crop genetic diversity may not be replacement by modern varieties but shifts in resource use away from the production of these crops". See, Winters, P., L. H. Hintze and O. Ortiz, Rural Developments and the Diversity of Potatoes on Farms in Cajamarca, Peru. In: Smale, Melinda (Ed.), *Valuing Crop Biodiversity: On Farm Genetic Resources and Economic Change*, CABI Publishing, Oxford, U.K., Cambridge, U.S., pp. 147, 2006.

45 For a detailed review of the dangers of transgenic crops in South America, see: Noticias Aliadas, La Amenaza de los Transgénicos, Informe Especial, Enero, 2009, Volumen 46, also available at www.noticiasaliadas.org.

46 Regional Ordinance 048-2008 which entered into force in January, 2009.

members and all are very much aware about the critical importance of continuing the tradition of conserving and nurturing diversity (in all its forms) as a development vehicle.

If modern, protected, genetically modified varieties are introduced into farming, the downside to a supposed increase in production will inevitably be the loss of medicinal plants from farm plots, displacement or erosion of wild relatives, and the need for women to find other sources of income to support purchase of the newly-introduced seeds and, importantly, a potential change in their role from seed managers to seed buyers. This may also imply for women, once again, moving away from traditional, perhaps ancestral activities such as embroidery, pottery and handicraft, and even alienating young children from traditional practices and local cultures.

4.6 *Participatory plant breeding and IP: An option for farmers, and women farmers in particular?*

Researchers and breeders have noted that most modern, high-yielding varieties (HYV), and often IP-protected, are beyond the reach of small farmers, who cannot afford high priced seeds and agricultural inputs such as fertilizers and pesticides. Furthermore, these varieties are not suited for small scale, extensive agriculture nor do they meet local needs and preferences. When they have been adopted by small farmers, multiple problems have emerged. These include displacement of local crops, genetic erosion, dependence on a single provider of seeds, and loss of cultural values.

Participatory Plant Breeding (PPB) is a research methodology that integrates scientific and resource-intensive breeding programmes with social sciences (e.g. sociology, anthropology, law) as a means to induce collaboration between farmers and breeders. The main idea of PPB is that new varieties respond to specific, often very localized, needs of farmers.⁴⁷

Participatory Plant Breeding may generate potentially lucrative and commercially viable products (seeds). In this context, a still-unanswered question is how to balance innovator interests in pursuing IP protection (over the generated product) and incorporate small farmers as co-authors, co-innovators or co-inventors of the new variety. This may become a complex problem, especially due to the often diverging interests of breeders and farmers (particularly traditional farmers). The Potato Park collaborates continuously with the International Potato Centre (CIP) to identify best seeds and to assist in naturally improving local crops and landraces. Though not under the conceptual framework of PPB, it is a way to jointly define best and most appropriate seeds for cultivation campaigns. Women are especially active in interacting with CIP researchers.

4.7 *Seed laws and their implication over small farming practices*

Women generally collaborate with men in agricultural chores. They are specifically responsible for selecting the best seeds to continue cultivating and selecting the best agricultural produce for family consumption. Whilst women select best seeds in search of flavour, colour and culinary properties, men are more inclined towards yield, pest resistance and size. Both act as 'seed managers' with differentiated roles and expertise applied at different moments of the cultivation and harvesting process.

Men plough the fields and women follow thereafter planting seeds and assisting in the process of selecting seeds when harvesting occurs. They are also very active and supportive during communal work in Minka and Ayni form (collective and reciprocity-based).

Seed laws in the Andean region (and the world for that matter), were originally created to ensure good, quality production and distribution of seeds to promote sound and healthy agricultural systems. As a result, seed laws place considerable attention on sanitary issues and on improving production and productivity. Though they are not IP per se, the requirements they impose create a mechanism that, in a way, parallels IP requirements.

⁴⁷ See, Vernooy, Ronnie, *Seeds that Give: Participatory Plant Breeding*, In Focus: IDRC, Canada, 2003.

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Seed laws were not conceived to take into account the interests of small farmers and seed producers. This is especially true for small farmers and seed producers who are culturally inclined to maintain diversity as the key element in food security and environmental adaptation strategies, and to exchange and sell small quantities of seed. Moreover, seed laws are often expressly adverse to any form of seed production and distribution other than that which is supported by certification by a national competent authority. This includes small scale production of seed that is neither stable nor homogenous, often based on traditional exchanges between small farmers and conventional breeding techniques.⁴⁸

In Andean countries however, rather than an ‘agriculture’ there are different ‘agricultures’. They differ widely in terms of their orientation (e.g. export, local and regional markets, auto consumption, etc.), inputs used, technologies employed, labour sources, financing mechanisms and access to credit sources, and ownership of seeds. Each type of agriculture is responsive to and part of different types of seed systems – a State-driven, classic seed system or a farmers’ seed system.⁴⁹ In the specific case of the Potato Park and Jambi Kiwa there is no conclusive evidence to indicate that seed laws are having an impact on regular agricultural activities by farmers. In fact, most agriculture in the Andes relies heavily on informal exchange of seeds or purchase of non-certified seed. However, this may change if governments (pressed by industry or their modern agricultural sector) begin to scrutinize more rigorously the operations of the seed system both in Ecuador and in Peru. A question of particular interest is how governments will balance the rights under Farmers’ Rights in the FAO IT to ensure that IP over seeds is respected whilst, at the same time, permitting the same time traditional exchanges between farmers.⁵⁰

Only recently have agricultural strategies and plans (mainly through the influence of biodiversity laws) started to take into account the need to look at these other forms of agriculture and to develop specific, differentiated strategies and the right incentives to support and enhance their development. In Andean countries, for example, a very high percentage of the population is involved in or depends on agriculture. In countries such as Bolivia, Ecuador and Peru, more than 40 percent of the population is indigenous and rural, and works in agricultural-related activities. Most are small farmers, part of indigenous communities in the Andes and Amazon regions, with longstanding ancestral traditions of exchanging seeds among themselves. Local and regional seed fairs are the most typical mechanism through which farmers have access to seeds.⁵¹

4.8 Repatriation experiences

Repatriation is a concept derived from the CBD. It implies returning genetic resources and related information (which may include TK) held in ex situ conditions to countries of origin and their communities. In 2005, the Potato Park received from the International Potato Centre (CIP), a set of seeds of over 300 potato varieties that had all but disappeared from the Park (most through ill-conceived extension programmes in the 1970’s). These varieties are now growing in the Park and are used for food security and for medicinal and religious purposes.

48 Zimmerer, undertakes a study of formal (national) seed systems and their impact on and relation to small farmers in the Andes of Peru. See, Zimmerer, K.S., “Geographies of Seed Networks of Food Plants (potato, olluco) and Approaches to Agrobiodiversity Conservation in the Andean countries”, in: *Society and Natural Resources* 16(3), 583-601, 2003.

49 Howard confirms the critical role of women in farmer seed systems and affirms that “*Farmer seed systems are particularly important where seed is actually the edible or marketable product, generally readily available and the level of local knowledge in relation to seed quality is high. Since seed selection and handling in most cultures is the responsibility of women, this local knowledge is commonly concentrated in the female sections of society*”. But Howard is also aware of problems which farmers’ seed systems have, mainly in relation to quality and availability. See, Howard, et. al., 2003.

50 Under the FTA with the US, Peru is obliged to adhere to UPOV 91 and also take action to make best efforts to protect plants through patents.

51 The GEF *In Situ* Conservation Project of Native Crops and Wild Relatives (Peru), identified “conservationist farmers and families” throughout the Coast, Andes and Amazon regions. They have been well characterized and part of this includes the express recognition of women in enhancing and substantially contributing to conservation of genetic diversity. Seed fairs are an important aspect which provides with continued flow of resources and social recognition of the most dynamic and successful conservers of diversity – including women “campesinos” (farmers). The full description and details of the project can be accessed at www.insitu.org.pe.

The main feature of this repatriation process has been the recognition of farming communities' rights over these varieties. This is not a 'property' right but, rather, a symbolic albeit very important gesture which indicates and provides evidence that these varieties are part of the cultural heritage of Potato Park communities.⁵² The issue in repatriation is not the recognition of property *per se*, but of traditional Andean farmers recuperating lost or eroded varieties for further conservation and wider utilization in their fields.

4.9 The protection and registration of farmer seeds and traditional knowledge

Women in the Andean region are especially aware of the importance of traditional values, culture, knowledge and practices. As a result, the idea of privatizing or commoditization of biodiversity components is totally foreign to their cultural conceptions. Thus, the role of IP in this context is seen with extreme suspicion and is basically rejected.

As a reaction to these 'external ideas' but realizing that traditional knowledge needs to be protected against misappropriation or 'biopiracy', the Potato Park has created a local register to preserve all knowledge, innovations and practices which thrive and evolve in the Park.⁵³ To implement the register, young women have been trained (by the Andes Association) to use video as the means to film practical applications of indigenous knowledge: in farming chores, curative activities, conservation efforts, development of natural products, preparation of local palates and foods, etc. Information is systematized and entered into a database by trained community members. Most importantly, data and information are maintained and managed by the Potato Park Association. Women are particularly conscious about the 'biopiracy' phenomenon and its overall cultural implications for Potato Park communities. As mentioned earlier, in 2000, the Potato Park Association and a group of supporting institutions, internationally denounced the granting of patents in the US and in Europe over Ñuña (*Phaseolus vulgaris var. ñuña*), an Andean bean cultivated for centuries by farmers in the region.⁵⁴ The register is seen as a potential tool to assist in 'defensive protection' of indigenous peoples' TK and resources.

An important issue raised by women in the Potato Park was that the Park is not opposed radically to 'foreign' or 'external' influences or ideas. Members of the six communities in the Park are very practical and realistic and explain this by indicating that knowledge is conceived in three levels: ancestral knowledge, new and modern knowledge, and "their own" knowledge. It is the dynamic interaction between these forms of intellectual output that generates an evolving and vibrant intellectual environment which looks for the best and most useful features of different forms of cognitive systems (including foreign or external influences and ideas).

In terms of documenting their TK through videos, women in the Park seem quite comfortable that this mechanism does not adversely affect customs and practices of oral tradition and passing of TK from generation to generation. The actual process of documenting and the management of systematized TK is based on prolonged, careful and informed discussion as to how best manage and preserve TK in a video database.

52 For further details of this process, see, IIED, Protecting Indigenous Knowledge Against Biopiracy in the Andes: Sustaining Local Food Systems, Agricultural Biodiversity and Livelihoods, p. 15, 2008. Available at www.iied.org.

53 Law 27811 for the Protection of Collective Knowledge of Indigenous People as it Relates to Biodiversity (2002), provides that a National Public and Confidential Register be created by INDECOPI. The first register for traditional knowledge is in the public domain and the second for knowledge is maintained confidentially by communities (but requires special State protection and safeguards). Most interestingly it also provides that Local Registers can be created by communities for the purposes they may deem appropriate. The Potato Park register falls within this category. For further details of the operation of different TK registers worldwide, see: Merle, Alexander, K. Chamundeeswari, Alphonse Kambu, Manuel Ruiz, Brendan Tobin, *The Role of Registers and Databases in the Protection of Traditional Knowledge: A Comparative Analysis*, UNU-IAS, Tokyo, January, 2004. This document is available at www.ias.unu.edu. Information regarding the National Public Register in Peru may be obtained in www.indecopi.gob.pe.

54 See ETC web site and article: "Andean Groups Hopping Mad About Popping Bean Patent", available at www.etcgroup.org/en/materials/publications.html?pub_id=275.

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In the case of Jambi Kiwa, women have noted that traditional knowledge of Puruhae communities in the Chimborazo Province has been slowly but surely eroding over the past decades as a result of exogenous pressures mounting on indigenous livelihoods.

Urban migration predominant among men and younger generation has resulted in marginalization and exclusion of women. They have become especially effected and impacted, and have needed to shift [to new products and practices?] and abandon ancestral pottery, weaving, gastronomy and the use of native resources, including traditional medicinal practices. One very evident example of this situation has been the replacement of local foods and traditional plates by processed food and products such as oils, flour and milk.

Jambi Kiwa has helped communities, and especially women members, to return to and enhance traditional knowledge and its practical application in the case of:

- uses and applications of medicinal plants (see below)
- local foods and traditional, indigenous dishes
- embroidery techniques and garments
- traditional Puruhae handicraft

To achieve this return to TK, Jambi Kiwa returned to the sources: elders (men and women). Through a process of direct conversation and meetings and regular capacity building workshops, women farmers have been presented the virtues and potential of TK. They have learned that may have seemed to be frozen or forgotten in time, it has important cultural affirmation values in the present.

4.10 Participation and leadership of women in the Potato Park and Jambi Kiwa

Leadership and innovation by women leaders and representatives stand out as defining elements in both Jambi Kiwa and the Potato Park. Two areas with potential connections with IP are of special interest, especially as they involve very active and visible participation and leadership of women farmers. These areas are: use of medicinal plants and development of natural products and gastronomy.

Women from the Potato Park have formed the Medicinal Plants Women's Collective (*Sipaswam*), which is a group of women specialists in the use of medicinal plants located in the Potato Park and surroundings. The main objective of the Collective is to conserve local medicinal plants and maintain traditional knowledge and culturally-sensitive therapeutic applications. It is mainly women who are best-informed and traditionally have been trained by their mothers regarding the use of local medicinal plants such as ruda, calla calla and other local species. As part of the project Sustaining Local Livelihoods: Training and Education of Young Indigenous Women in the Conservation of High Altitude Medicinal Plants, women in the Potato Park are entirely responsible for developing phytomedicines for local and regional consumption. The actual processing of these plants is under the responsibility of the Hampiquamayoc Collective. Products are presented and sold to visitors and in local and regional fairs in a semi-processed or crude form. Small flasks, shampoo bottles and paper wrappings are used to deliver biodiversity-derived medicinal products.

To complement this effort, women in the Park have created a network of Communal Pharmacies that provide medicinal products to cover basic health needs to Potato Park communities. Many of these products are based on medicinal plants kept in nurseries and small botanical gardens (plots, really) where they are classified and nurtured according to specific features of each plant.

A special, distinctive feature of the Potato Park is the Gastronomy Collective, which is composed exclusively of women. The Gastronomy Collective has been responsible for a proven revaluation of local foods and cuisine. The shift to consuming noodles, rice, processed food and products introduced in the 1970's has reversed and, at present, all local consumption of basic food is founded on native and local produce (mostly Andean tubers and roots including potatoes combined with chicken meat, goat meat

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and fish from local streams). However, aware of the potential of improving local food offered in combination with foreign products, gastronomy for tourists in particular and to some extent local consumption, utilizes 'foreign' ingredients as a complement to native products. Women have recognized that this improves in many cases the taste and presentation of their traditional gastronomical offerings.

In the case of Jambi Kiwa, the associations' goal revolves around enhancing and transforming local biodiversity into medicinal and natural products, through involvement of a broad network of small farmers and communities. However, underlying this goal is a self affirmation of indigenous culture and the power of will of women farmers as leaders of Puruhaes indigenous peoples. From the foundation of Jambi Kiwa, to decisions concerning organizational matters, women decide what is to be done and how it is to be done.

At present, Jambi Kiwa is much more than a producers' association. After the initial stage where emphasis was placed on rescuing and valuing TK related to medicinal plants, further activities have included implementing special programmes to promote women's literacy and prevent family violence – with support from foreign donor agencies. This has strongly enhanced the self-confidence and pride of its members, especially women. In 2004, the Services for an Alternative Development in the South (SENDAS) awarded a prize and recognition to Jambi Kiwa as the Best Women's Business in Latin America. Furthermore, the Program for the Professional Formation of Organic Agriculture Capacities has been created to train local community members to enhance organic agricultural production, much of which is used as input to the core business of generating natural products.

5. Key findings

- 5.1 The connections between IP, agrobiodiversity and gender considerations are often subtle, unclear and complex. At present, no IP instrument or tool differentiates between innovation or creativity between men or women. However, in the context of a 'southern agenda' (strongly supported and influenced by Ecuador and Peru) discussions regarding TK, agrobiodiversity and seeds, especially within CBD, the Cartagena Protocol and WIPO's IGC, offer promising openings and possibilities for recognizing and appreciating distinctions between how women and men innovate and create. In the case of the FAO IT, national implementation of Farmers' Rights may also offer an opportunity for countries to identify and develop specific distinct policies and regulations regarding women and men farmers (especially in small communities and, for example, regarding participation and/or benefit-sharing). However, participation of women's organizations in these forums should be further encouraged.
- 5.2 In terms of interaction with the outside world, this report suggests that women may be more inclined to contact and interact with market forces, depending on specific circumstances. This is explained partially by culture and traditions, where man represents the household, and is reflected, for example, in the fact that in comparison with men, most women of the Potato Park do not speak Spanish and express themselves only in Quechua language. But this seems to have been changing in recent decades, with a more open approach to interaction with members of other communities, third parties, authorities, researchers, etc. Clearly, in the case of Jambi Kiwa, women leaders not only speak Spanish but actively participate in workshops and forums where their products are presented and described. They are very much aware of their role as leaders and the efforts they undertake in a market-oriented context.

At the same time, women leaders in both the Potato Park and Jambi Kiwa are very aware about the need to be careful with foreigners, particularly when they are approached for interviews and projects that seek to obtain information about, for example, uses of plants, seeds and applications of traditional knowledge, all of which may be related to the 'biopiracy' phenomenon.

On the other hand, women in the Potato Park are not fully conscious of their enormous contribution to community life and well-being, including their intellectual effort. They are modest and do not easily express, much less boast, about all that they do daily and regularly to contribute to family and community well-being. This may be explained by the fact that communities in the Potato Park still maintain strong ancestral customs and traditions that call for a sense of collectiveness, rather than exposing or underscoring individual merits.

- 5.3 There is contact with the 'outside world' and markets in particular, even if in different degrees, both in the Potato Park and Jambi Kiwa. The Potato Park is connected to this outside world through its tourism activities, an on-site restaurant, its interaction with the International Potato Centre, support from Andes Association, IIED, and other forms of technical and financial cooperation. Jambi Kiwa looks at the market as a vehicle to ensure sustainable development and better livelihoods of communities in the Chimborazo area. Intellectual property will not impact all communities and their members in the same way. Both the Potato Park and Jambi Kiwa are inclined to the use trademarks (including collective marks), as an IP instrument, to distinguish their products and services in markets.
- 5.4 Impacts of IP (particularly patents and Plant Breeders' Rights) are direct in some cases (e.g. in cases of biopiracy and misappropriation of resources and TK) and indirect in other cases (e.g. when new IP-protected seeds and technologies displace traditional crops, erode TK and alter traditions, customs and regular practices of women in the community). The verification of indirect impacts is still not conclusive in the case of the Potato Park and Jambi Kiwa. However, IP policy and legal trends (especially in Peru), could rapidly affect traditions and culture in small farming communities as pressure mounts to develop and implement stronger IP regimes such as patents over plants or systems resembling UPOV 91 for plant varieties.
- 5.5 Most of the literature reviewed suggests that to assess the impacts of IP on developing countries (such as Ecuador and Peru), a series of social, economic, cultural, technological and political considerations require attention. As it currently exists, the IP

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system in general and all of its tools (e.g. patents, plant breeders' rights, marks, etc.) are so detached from and alien to the context of indigenous peoples and their communities that the possibilities of their use by these groups are, in the best of cases, extremely slim (except for marks and trademark principles).

- 5.6 Women from the Potato Park and the Jambi Kiwa Association have expressed concerns about 'the impact of IP on their livelihoods'. Yet women and farming communities in general (especially the most isolated and marginalized such as in more remote Andean and Amazon regions), are not actually very interested in 'the impact of IP on their livelihoods'. In their minds, the main concerns are maintaining their cultures, improving their livelihoods and being able to generate better living conditions (whether through money or other means). Gradually, media and non-governmental organizations are raising awareness about IP and its impacts in all aspects of social life. This awareness is gradually reaching consumers in urban centres as well as members of farming communities (including in the Potato Park and Jambi Kiwa).
- 5.7 Though women in the Potato Park and from Jambi Kiwa are not fully familiar with the technical aspects of IP, they are very conscious about the potential negative effects patented seeds or protected varieties (through PBR) may have on their traditional cultures. They are aware that traditional exchange may be affected, local varieties may be gradually displaced by HYVs and, in general, their traditional agriculture could be altered. An additional perception is that international trade agreements such as FTAs are negotiated under considerable economic and political pressures, and most of the time these negotiations lack open, transparent, participatory and informed discussion between different sectors of society. This was strongly emphasized by Potato Park women leaders.
- 5.8 In the context of the indigenous peoples' debate, 'community interests' or 'indigenous peoples' interests' tend to be understood primarily as the interests of men. Yet it is clear that women have a very important and critical role in contributing to conservation and sustainable use of agrobiodiversity, and in the maintenance and development of local communities and family livelihoods.
- 5.9 Technologically-improved and IP-protected seeds targeted at serving commercial markets could certainly affect the practices of traditional agricultural Potato Park and Jambi Kiwa communities. Most importantly, they could affect the core goal of the both the Park and Jambi Kiwa philosophy: maintaining diversity and culture as intrinsic values. Altering these goals may have an adverse effect on women and their role in sustaining and enhancing diversity and culture in the Park.
- 5.10 Both the case of the Potato Park and Jambi Kiwa are clear examples of small farming communities driving development efforts that have benefited substantially from local expertise, knowledge and drive, but that have also made very intelligent use of existing resources and assets such as international cooperation, prudent use of information technology (e.g. to create the local register of biodiversity and TK in the Potato Park), linkages with reliable partners and assistance from NGOs to support a 'bottom up' approach to development.
- 5.11 Both the Potato Park and Jambi Kiwa experiences have empowered women considerably (in specific activities) and provided them with decision-making strengths based on their roles as leaders and promoters of community interests and cultural values. Jambi Kiwa is, to an important degree, the result of an individual indigenous woman's effort, which has subsequently built further strengths in other women leaders and generated a cascading effect.
- 5.12 A series of international policy and legal instruments recognize the need for equity and equality between men and women. However, countries still need to convert these general principles into specific national policies and, especially, into laws, regulations, programmes and action plans (at all levels). As in other areas, it becomes increasingly complicated to pinpoint how equity and equality principles (including gender differences) can be appropriately implemented in practice. Some initiatives exist in terms of specific projects and the work of NGOs and certain governmental bodies, seeking to streamline gender consideration into concrete, practical actions. In the context of IP, however, advances and progress in streamlining gender considerations is very incipient. This may be because the points of effective contact between IP and gender issues needs to be explored further.

6. Specific recommendations

6. Specific recommendations

Specific recommendations for the Potato Park (Peru) and Jambi Kiwa (Ecuador) experiences

- 6.1 **Farmers' Rights as an option to recognize specific rights to women farmers.** Peru has ratified the FAO IT and implementation of Farmers' Rights is a national obligation under this treaty. There may be an opportunity to develop very specific principles and regulations that address benefit-sharing, participation and protection of TK from a gender perspective and that recognize the differences (and complementarities) in intellectual contributions between small farmers who are women and small farmers who are men. Developing Farmers' Rights policy at the national level is a pending matter in Peru (and most countries), thus there is a possibility to consider discussing and regulating some of the issues addressed throughout this report. In the case of the Potato Park, supporting (through national or regional policies and legislative mandates) activities of the Hampiquamayoc Collective, the Gastronomy Collective or Communal Pharmacies may be one way enhance and strengthen culture and knowledge systems and women's TK in particular.
- 6.2 **Rebuking UPOV-like regimes and patents over plants.** Peru is in the process of adhering to UPOV 91 and, according to its FTA obligations, needs to undertake best efforts to patent plants. In contrast, Ecuador, given its new Constitution, has prohibited patents over life forms and is not implementing the regional PBR system in accordance to Decision 345. Evidence (literature and interviews over time with national experts) demonstrates that very limited research has been undertaken in regards to the economic, social, cultural and environmental impacts that may be generated from promoting these regimes or even prohibiting them. Furthermore, research has given very little consideration to the complex and very diverse agricultural systems that exist in each country. In this context, both Peru and Ecuador may require a thorough analysis of these implications from a broad, multidisciplinary and multi-sectoral perspective, as the basis for further policy or legal discussions. However, at a minimum, flexibilities in TRIPS should be defended strongly. This should be a minimum negotiating position in any international or bilateral process involving Peru and Ecuador.
- 6.3 **The biopiracy phenomenon.** Women in the Potato Park and in Jambi Kiwa have expressed very clearly their valid and founded concerns about biopiracy and misappropriation of their resources and TK. Countries like Peru have advanced in their efforts to prevent and combat biopiracy (in this case through a National Commission). It may be a good opportunity for Ecuador and other countries to consider the potential of similar commissions or working groups that support the conservation of and respect for the national cultural and natural heritage (including biodiversity and TK of indigenous peoples and farming communities in particular).
- 6.4 **Defensive protection of resources and TK.** Both Ecuador and Peru should remain firm in their position of advocating the development of national measures to ensure positive protection of biodiversity and TK. This includes neither conceding to pressure under bilateral agreements nor defecting from existing defensive protection (recognized in Decision 486 of the Andean Community). Defensive protection is a very practical mechanism to guarantee, to some extent, national and indigenous and farmers' interests in regards to biodiversity, agrobiodiversity and TK.

7. General recommendations

- 7.1 **IP tools specifically tailored for women farmers' innovation and creativity.** Though preliminary, it seems that there may not be a need for specific IP tools to protect women's creativity or innovation, further research may be required for a conclusive response to this suggestion. Research may focus on specific creations and innovations including crafts, rituals, seeds and designs. It may also focus on the elements that differentiate the creative process within a women farmers' context and men or even collective creative and innovation processes. In very specific cultural environments there may be circumstances where women's intellectual efforts are particularly distinct from men and thus given specific features may require complementary, different or new altogether, conditions for protection.
- 7.2 **Participation of women in policy and law developments.** There are a series of international instruments calling for active and informed participation of women in policy decision making processes. Others refer to gender equality or to the need to take into account gender considerations in these processes. In regards to intellectual property forums, though there has been some degree of involvement by women indigenous peoples in discussions, there has been limited opportunity to listen and analyse how women (farmers) perceive IP and alternative models (such as TK protection drafts or proposals). It would be a positive step to engage and allow women to engage in timely and appropriate participation in terms of considering their specific concerns and interests.
- 7.3 **Gender, IP and the right to food.** It has been recognized that IP may have an impact on access to and availability of food⁵⁵ (as in the case of medicines). The UN Committee on Economic, Social and Cultural Rights has expressed concern about how this right may be especially relevant in the context of women and farmers in particular. Furthermore, it could be suggested that IP may have a limiting effect on how this right is materialized, when food sources and their availability are curtailed in one form or another (therefore affecting at least one a fundamental human right critical for survival, and maybe others such as cultural rights, gender based rights, etc.).
- 7.4 **Women's creativity and IP: An exploratory workshop.** Much is known about the role of women farmers in small agricultural systems and as part of indigenous peoples' culture. Their role in seed conservation and management, nurturing of biodiversity, knowledge of medicinal plants and handicraft abilities has been well-documented. However, it may be time to suggest a specific workshop or meeting with women farmers to explore how and where there may be synergies and connections which could require policy or legal responses. This workshop may be proposed as part of or in parallel to CBD, WIPO IGC or other appropriate forums.
- 7.5 **Social recognition of women's contribution.** Social recognition is a powerful means to increase self-awareness, confidence and pride among men and women farmers. In the case of Peru, for example, over the past decade there have been many TV programmes focused on tourism and gastronomy. These programmes have permanently highlighted the special contribution of women farmers to the well-being of communities in terms of their work in selecting seeds, preparing traditional food recipes and collaborating actively in supporting traditional livelihoods. Seed fairs and recognition of women conservationists through prizes, appraisal, acknowledgement in publications, etc. can also contribute to creating incentives for women in particular to continue their collaboration and contribution to seed conservation and development. Finally, research and products related to access to and use of resources and TK in farmers' lands or indigenous lands, should regularly and expressly indicate and highlight the contributions made by indigenous people, farmers and women farmers.

55 See the Report of the Special Rapporteur on the right to food, *Seed Policies and the right to food: enhancing agrobiodiversity and encouraging innovation*, 2009. Available at daccess-dds-ny.un.org/doc/UNDOC/GEN/N09/424/73/PDF/N0942473.pdf?OpenElement. The report states that commercial seed systems and private-led research neglects the needs of poor farmers in developing countries and agrobiodiversity may be threatened by uniformization encouraged by spread of commercial varieties.

7. General recommendations

7.6 **Gender instruments and IP as an exclusion tool.** Further exploration may be required to assess whether overlooking women's contribution to conservation, food security and TK development, in the context of IP policies and laws, may fall under discrimination or exclusion, with the effect of curtailing the recognition and enjoyment of human rights by women under CEDAW. CEDAW is especially important given its binding nature and given that it places obligations on Governments to protect women against discrimination (through tribunals, administrative procedures or bodies). There may be a way to implement CEDAW in a manner consistent with specific women's interests and to create synergies with other relevant international agreements (CBD, FAO IT, etc.). This may be accomplished by implementing TK laws and by protecting rights to food and to health, among other measures.



Photo: Manuel Ruiz

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Intellectual Property, Agrobiodiversity and Gender Considerations:

Issues and Case Studies from South Asia

Carine Pionetti (with Suresh Reddy and Pitambar Shreshta)



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List of Acronyms and Abbreviations

Bt	Bacillus thuringiensis
CBD	Convention on Biological Diversity
CBO	Community-based organization
CBR	Community Biodiversity Register
CSB	Community Seed Bank
DUS	Distinctiveness, homogeneity, stability
EU	European Union
FAO	Food and Agriculture Organization
GE	Genetic engineering
GMO	Genetically modified organism
GURT	Genetic use restriction technology
HYV	High-yielding variety
ICSIR	Indian Council of Scientific and Industrial Research
IPR	Intellectual Property Rights
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-governmental organization
OAPI	Organisation Africaine de la Propriété Intellectuelle (African Intellectual Property Organisation)
OAU	Organization of African Unity
PBR	Plant Breeder's Right
PPB	Participatory Plant Breeding
PPVFR	Protection of Plant Varieties and Farmers' Rights
PRA	Participatory Rural Appraisal
PVP	Plant Variety Protection
TRIPs	Trade Related Aspects of Intellectual Property Rights
UPOV	Union pour la Protection des Obtentions Végétales (Union for the Protection of New Plant Varieties)
USPTO	US Patent and Trademark Office
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

1. Introduction

1. Introduction

Since Esther Boserup's groundbreaking research on women's economic contributions to development in the 1970s, there has been substantial research on how to integrate women's concerns in the development agenda.¹ However, much less progress has been made in transforming development policy and practice in a way that promotes gender equality. The culture and structure of most development institutions, whether they be national governments or development NGOs, tend to overlook gender dimensions, including in sectors like agriculture or food security where gender is of high relevance.

Gender refers to the social construction of the roles of women and men in a given society. Gender disaggregation of responsibilities, work and knowledge is a starting point in exploring the multiple roles of women and men as resource users and custodians of local agro-biodiversity.² In the field of plant genetic resources, there is mounting evidence that "gender dimensions of people-plant relations affect use, rights, knowledge, management, conservation and erosion of plant biodiversity."³ For instance, culinary practices and preferences, generally maintained by women, have a major influence on the knowledge, selection and use of crop diversity.

Gender-sensitive studies reveal that women farmer responses to changes in their farming systems may differ significantly from men's responses.⁴ For instance, the lack of access to productive resources such as land, or to extension services or low levels of human capital (such as education) may hamper women's ability to adopt new technologies or to opt for improved crop varieties.⁵ It is also now widely acknowledged that because mainstream agricultural research and development systems "typically do not consult female farmers and end-users, many improved varieties do not take into account women's needs, preferences and resources."⁶

Understanding the linkages between gender and agro-biodiversity management therefore implies looking closely into women's practices and knowledge and examining how and why they change and how these changes affect biodiversity conservation, food security, nutrition and women's status.⁷

Amongst the factors driving changes in agriculture are the introduction of new technologies, the promotion of commercial farming, the penetration of global agricultural commodity chains, migration patterns and modernization. The implications of some of these processes for gender roles have been documented to a certain extent, but call for more substantive research.⁸

Agricultural biotechnology has been the subject of much research, but only few studies address it from a gender perspective. In a recent paper, two researchers call for the need to investigate "how the use of biotechnologies on farms may alter, disrupt or reinforce existing power relations between men and women both on and beyond the farm."⁹

Intellectual property rights (IPR) over new plant varieties also constitute a factor of change for farming systems and rural livelihoods. The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs) requires all member countries of the World Trade Organization (WTO) to enact a system of plant variety protection (a system of IPR for plant varieties) within a specified timeframe. The key economic arguments advanced for extending IPRs to plant varieties are that they will create incentives for private investment in plant breeding and facilitate the transfer of IPR-protected varieties from developed to developing countries.¹⁰

1 Hoare, J., 2007. See also Boserup, E., 1970.

2 Abdelali-Martini, M. et al., 2007.

3 Howard, P., 2003.

4 Quisumbing, A. and L. Pandolfelli, 2009.

5 Doss, C.R., 1999.

6 Quisumbing, A. and Pandolfelli, L., 2009. See also Sperling, L., and P. Berkowitz, 1994.

7 Howard, P., 2003.

8 See for instance Dolan, C., and K. Sorby, 2003; and Spring, A. (ed.), 2000.

9 Bryant, L., and B. Pini, 2006, p. 267.

10 Srinivasan, C., 2003.

One of the major concerns raised about Plant Variety Protection (PVP) systems by developing countries is that such systems reward plant breeders for their innovations without giving due recognition or reward to farming communities that have conserved and enhanced agro-biodiversity over generations — the very biodiversity that constitutes the critical resource base for plant breeders. The attempt to incorporate farmers' rights into PVP legislation is an effort to address this imbalance.

The intersection between IPR and gender roles in agriculture has received very scant attention from policy makers, development institutions and NGOs. Some of the potential impacts of IPR on gender roles that have been identified include the following:

- Overexploitation of biological resources (including medicinal plants) traditionally collected by rural and tribal women as a result of their increasing commercial value in the pharmaceutical sector (driven, in part, by patents on drugs).¹¹ This results in declining access by rural women to important sources of health, nutrition and income.¹²
- Disruptions or impediment to farmer-to-farmer seed exchange and flow of varieties between public research institutes and farmers' fields, which could be detrimental to the livelihoods of smallholder farmers who maintain biodiversity, especially women farmers in rainfed areas.¹³ As informal seed systems lose momentum, women's role in seed provisioning dramatically declines, which in turn limits their ability to make autonomous cropping decisions.¹⁴
- Exclusion of women from decision-making processes in agriculture (i.e., the ability to choose what to grow and how to grow it) as a result of IPR-induced restrictions on the ability of women to breed new, locally adapted varieties for food, fodder healing and rituals.¹⁵
- The erosion of gendered knowledge on agro-biodiversity as markets expand and as inventions protected by IPRs (embodying formalized scientific knowledge) gain precedence over local knowledge systems.¹⁶ The devalorization of women's knowledge and skills is often associated with loss of social status for women and a declining capacity to negotiate within the household.¹⁷

More evidence is needed on how IPR may affect existing farming practices, knowledge structures and customary rules around seeds in Asia.¹⁸ The present study proposes to explore the interface between IPR and gender in agriculture, with a focus on women farmers' changing roles and responsibilities. The major objectives of this study are to

- (a) document the extent, scope and complexity of gendered practices in agriculture and biodiversity management;
- (b) produce reliable data on the direct and indirect implications of IPRs on gendered practices and knowledge systems;
- (c) evolve mechanisms that will serve to empower women so as to mitigate the adverse impacts of IPRs and trade on women's agency in agriculture and rural livelihoods.

11 One such example is the Himalayan Yew tree, which is facing near extinction as a consequence of overexploitation for its cancer-curing properties. See Sahai, S., 2004.

12 Much literature shows how women's income and nutrition in particular are related to home gardening and wild plant collection and use. See, for instance, Scoones, I., M. Melnyk, and J. Pretty, 1992.

13 Ramanna, A., and M. Smale, M., 2004.

14 See Pionetti, C., 2005, chapter 4.

15 Sahai, S. 2004. A clear explanation of how IPRs might effectively restrict women's access to bioresources is lacking. The case of turmeric, which was patented by two researchers from the University of Mississippi Medical Center, USA, in 1995, may provide a valuable clue. If the patent had not been revoked by India's Council for Scientific and Industrial Research (CSIR), the owners of the patent would have been in a position to charge royalty fees to all users of the turmeric plant, a prospect which seems unfeasible in India at present, but nevertheless constitutes a threat to rural people. For more details, see Shiva, V., 2002.

16 See Stone, G.D., 2007. See also Bryant, L., and B. Pini, 2006.

17 See Howard, P., 2003, chapter 1 for an exploration of these linkages based on numerous case studies.

18 This study is based on fieldwork carried out in India and Nepal, and hence does not reflect the situation in all South Asian countries. However, given the agrarian nature of most Asian economies, some findings from this study (especially on women's role in crop diversity management) are applicable to many other Asian countries. This study draws on secondary data from countries like Bangladesh and Viet Nam.

1. Introduction

Background

The present report is the outcome of studies conducted in two parts of Asia: the dryland Deccan Plateau of India and the hill region of Nepal. Both India and Nepal are largely agrarian economies, with a very high percentage of the population deriving their livelihoods from agriculture and associated livelihoods (over 70 percent in India and over 80 percent in Nepal). Both countries are also home to a vast diversity of crop species, and are centres of origins for a number of cultivated crops.

The role of women farmers in agriculture is equally important in India and Nepal. Women partake in all major agricultural work and, as this study will seek to demonstrate, they are the primary managers of agricultural biodiversity, and in some cases, custodians and users of knowledge including knowledge around climate resilience, which is of critical importance and will become increasingly vital in the years to come. Hence, the introduction of IPR regime could have far-reaching implications for gender roles in both countries.

Framework for the study in India

India was one of the leading countries of the South in negotiating the TRIPs Agreement (Article 27.3) at WTO. Numerous groups, including government institutions, non-government organizations (NGOs) and farmers' movements, have since been actively involved in biodiversity conservation and the protection of farmers' rights and indigenous knowledge. India developed, as per its obligation under TRIPS, a very comprehensive legislation on Plant Variety Protection (PVP), known as the Protection of Plant Variety and Farmers' Rights (PPVFR) Act.

Though the Act was passed in 2001, the Rules were only established in 2006 and plant breeders' rights on varieties only started to be granted in 2007 onwards under the Protection of Plant Varieties and Farmers' Rights Authority in New Delhi.¹⁹ It is still too early, therefore, to gather hard evidence on the direct implications of PVP on farmers' practices.

Alternatively, for the sake of this study, the Gender and IPR interface has been analysed within the broader context of three processes that are closely associated with the introduction of IPR on seeds, namely, the process of seed commercialization and its impact on farming communities, formal breeding and the development of commercial agriculture, and market consolidation in the seed industry.

The major aim of the India field study is to compare and contrast the roles, responsibilities and *status* of women in farming communities when seeds are largely self-produced and when they are essentially purchased. In other words, the study examines changes in gendered roles (especially with respect to seed and biodiversity) induced by commercialization processes in agriculture.

In this continuum from high reliance on local seeds to high dependence on market seeds, it is important to understand what happens when farmers are completely dependent on seeds sold by the industry.²⁰ It is especially important to know how women farmers, who play a major role in seed-saving practices, experience this shift and respond to it. This study draws from secondary sources on transgenic cotton cultivation in Warangal District of Andhra Pradesh, which describes a situation with a very high degree of penetration of market seeds (i.e., farmers purchase 100 percent of the seeds they sow). Transgenic Bt cotton (cotton genetically modified with a gene from the *Bacillus thuringiensis* bacterium to produce its own insecticide).²¹ was first commercialised in India in

¹⁹ Hence, there are currently only a few dozens varieties protected by a Breeders' certificate in the country. One way of carrying out this study would have been to 'trace' some of these varieties on the ground (i.e., find out where they are being cultivated), and to evaluate their impact on local farming systems and gender roles. However, given that PVP legislation in India provides for the right to reuse the seeds, there was no certainty that this approach would yield useful data. The approach taken, therefore, involved looking at processes of seed commercialization (IPR being one component) and women farmers' specific experiences of these changes.

²⁰ Seeds sold in the market include open-pollinated varieties developed by public research institutes (for crops like rice and wheat), proprietary hybrids developed by private seed companies and genetically modified varieties of cotton. Some — but not all — of these are protected by Plant Breeders' Rights. No patented seeds are commercialized at present in India. More details on commercial seeds will be provided in section 4.

²¹ The genes expressing the insecticidal proteins are known as Cry genes. As of 2005, all commercial Bt cottons in India contained the same genetic construct, developed by Monsanto, containing the Cry1A(c) gene. Stone, G.D., 2007.

2002. By 2008, Bt cotton varieties accounted for 82 percent of all area under cotton in India, representing 7.6 million hectares.²² This phenomenal rate of adoption indicates that transgenic crops — and the IPR regimes regulating these crops — are now a matter of concern for, literally, millions of farmers.

Framework for the study in Nepal

With over 86 percent of its population living in rural areas, the economic well-being of most Nepalese households is closely related to agriculture and natural resources.²³ Nepal is home to about 550 species and sub-species that have food value, 200 of which are cultivated species.²⁴ Over 400 species of horticultural crops are also estimated to be found in Nepal. Home gardens tended by women farmers host many species of vegetables, fruit, species and medicinal plants.

Yet, in Nepal, as in many parts of the world, agricultural biodiversity is on the decline, especially in major crops like rice. It is estimated that around 80 to 90 percent of local rice varieties have been displaced by modern ones, due to the lack of inadequate incentives to farmers for growing local varieties and lack of innovative plant breeding techniques using these varieties.²⁵ Local landraces (see box 3 for definition) are also underutilized in breeding programmes: out of 56 rice varieties released at the national level, only six used landraces as one of the parents.²⁶

In a response to this, local NGOs have initiated Participatory Plant Breeding (PPB), which aims to encourage farmers to select preferred varieties, manage local crop populations and manage seed supply systems at the local level. Several varieties developed through PPB have been registered at the national level.

Nepal therefore has high stakes in protecting the rights of farmers in the most appropriate manner. The role of women in agriculture also deserves particular attention. Although Nepal does not have to comply with the TRIPs Agreement until July 2013 (due to its status of Least Developed Country), debates on the content of a legislation on plant varieties and farmers' rights are currently taking place, with important contributions from civil society and farmers' groups.²⁷

22 'Global Status of Commercialized Biotech/GM Crops: 2008. The First Thirteen Years, 1996 to 2008', ISAAA Brief 39, available at www.isaaa.org. The other major producer of genetically modified crops in Asia is China. Transgenic varieties of cotton, but also tomato, papaya and sweet pepper are under cultivation, covering 3.8 million hectares in total.

23 Adhikari, K., 2008.

24 MoFSC, 2002.

25 Gyawali, S., 2007.

26 Shreshta, P., 2008.

27 It is important to note that despite Nepal not having a IPR legislation, changes due to the entry of commercial seeds have already taken place in many crops including rice and vegetables.

2. Methodology

2.1 Objectives

The field study in India and Nepal aimed at collecting original data on the following:

- Women's role in seed provisioning at the community level
- The importance of localized (non-commercial) seed systems for women farmers
- Differences in men's and women's use and knowledge of crop diversity
- Intra-household decision-making processes on crops, input choices and food security
- Women's perceptions of and access to commercial seeds

2.2 Data collection

The research was conducted in October 2009. In India, two villages were selected in the dryland Deccan Plateau of India (in Medak District of Andhra Pradesh) for their demographic, geographic and economic differences: Parvathapur, composed of diverse ethnic groups (Hindus, Muslims and Adivasis)²⁸ characterized by very diversified cropping patterns, and Enkepally, located close to the small town of Sadasvipet, with a less diverse population, and a large area under cotton. In total, about 55 women and 15 men took part in the research.



Photo: Carine Pionetti

28 Adivasi refer to the tribal groups of India, who constitute around 8 percent of the nation's total population.

In Nepal, two villages, Chaur and Begnas, from the mid-hill region of Pokhara (in Kaski District of the Western Development Region)²⁹ were selected for the existence of collective action in agriculture-related activities (a women's cooperative on agro-biodiversity, cultivation of medicinal plants, PPB). Chaur is composed mostly of high caste households (Brahmin and Chhetri), tribal households (from the Gurung group) and low caste KDS households.³⁰ A women's group runs a cooperative which markets value-added agricultural products. In Begnas, where similar caste groups are found, there is an active Participatory Plant Breeding group composed of women and men. A group from Sundaridanda involved in the preparation of a Community Biodiversity Register also contributed to the study. Overall, about 40 women and 10 men participated in the study.

Interviews with a number of experts on biodiversity, IPR and gender were also conducted both in India and Nepal in order to get an accurate picture of the IPR debate at the national level.³¹

2.3 *Participatory and gender-sensitive methodology*

The methodology used involved focused group discussions and participatory techniques (including PRA, Participatory Rural Appraisal)³² such as mapping exercises and ranking matrix activities. These tools are very appropriate to the study of livelihoods in rural areas with farming communities, and they yield good results provided sufficient time, transparency and inclusiveness in the research process. A participatory research process encourages "those living in poverty to take control of the research process itself, and develop their own analyses of, and solutions to, the problems they face."³³

Gender-sensitive methodologies take into account the differing needs and interests of men and women and allow researchers to collect and disseminate women's and men's accounts of how development affects their lives. Female-only group discussions were held to facilitate a gender analysis of livelihoods, and research timings were set based on women's daily schedule of work.

Gendered research revolves around a number of objectives, including the following:³⁴

- Inquiring into power relations, along gender lines and with respect to class, caste and age;
- Paying attention to how gender inequality is constructed and reproduced through different social roles, responsibilities and access regimes to land and other productive resources;
- Assessing whether women's understanding of well-being, emancipation and change are recognized or neglected within the household and the community, and by the state;
- Evaluating interventions (employment programmes, new technologies etc.) based on how they affect women in terms of labour, income, security, well-being;
- Identifying factors enhancing or constricting women's ability to make changes in their lives;
- Focusing on the creation and consolidation of knowledge which can help bring about socio-political change as defined by the research participants.

29 Elevation ranges from 670 to 1,200 m, with annual precipitation of 3,979 mm (mostly occurring in June and September). Rana, R.B., et al., 2000, p. 8.

30 KDS (Kami, Damai and Sarki) are 'untouchables' in the Hindu caste system.

31 In India: Kalpana Shatry, National Academy of Agricultural Research Management, Hyderabad; Ramanjaneyulu, Director, Centre for Sustainable Agriculture, Hyderabad; Vilas, Plant Breeder, National Research Centre on Sorghum; Nagarajan, Chairperson, PPVFR Authority; Shalini Bhutani (GRAIN). In Nepal: Kamlesh Adhikari, Research Director, South Asia Watch on Trade, Economics and Environment (SAWTEE), Kathmandu; Pratap Shreshta, Technical Advisor, LI-BIRD (Local Initiatives for Biodiversity Research and Development), Pokhara; Rajju Malla-Dhakal, Executive Director, LI-BIRD.

32 PRA puts forth "a methodology aimed at enabling local people to take control over their own development." See Chambers, R, 1994. Concretely, this technique involves eliciting people's knowledge systems (on crops, water uses, natural resources and so on) through various exercises (seasonal calendars, crop matrix, maps), and thereby building up their capacity to understand their own reality and to find solutions to existing local problems

33 Hoare, J., 2007.

34 Pionetti, C., 2005, p. 32.

3. Gender roles in crop diversity and seed-related practices

3. Gender roles in crop diversity and seed-related practices

Biodiversity has been recognized as one of the most important challenges of sustainable development since the Rio Earth Summit in 1992. Women contribute significantly to the conservation and use of agro-biodiversity.³⁵ Yet, women farmers lack secured access to productive resources, and their contributions to agriculture and biodiversity management still often go unnoticed, due in particular to lack of proper documentation. Moreover, their contributions to essential post-harvest tasks such as processing and storing of grain and seeds tends to get labelled as ‘domestic’ rather than agricultural work, which leads to frequent underestimation of women’s knowledge in agriculture and seed management.³⁶

To start with, the various sources of livelihoods present in the two study areas are outlined, with information on the gender division of labour and responsibilities for major rural livelihoods.³⁷ An in-depth analysis of gender roles in crop diversity management follows, with particular attention to changes in cropping patterns and their implications for women. Finally, women’s role in maintaining seed stocks and in exchanging seeds at the community level is looked into.

3.1 Agro-ecology and rural livelihoods

3.1.1 Agro-ecology and livelihoods in the drylands of India (Parvathapur and Enkepally)

The semi-arid tropics of India are home to 45 percent of its population and 60 percent of the country’s arable land that lies in these regions is regarded as inhospitable.³⁸ Annual rainfall ranges from 400 to 1,200 mm. In 2009, the area faced severe drought conditions for three months during peak agricultural season (monsoon). Despite these constraints on agriculture, 87 percent of minor cereals, 79 percent of pulses, 82 percent of oilseeds and 90 percent of cotton produced in India are grown in semi-arid areas.³⁹

Small and marginal farmers, along with landless labourers, form the major agricultural workforce in the Deccan (above 80 percent). In Andhra Pradesh, rural women are especially active in the agricultural sector, with estimates ranging from 55 percent to 66 percent for the contribution of women to overall farm production. We should keep in mind, however, that many statistics grossly underestimate women’s work and overlook their contributions to rural livelihood systems.

Rural livelihoods largely revolve around land-based activities, livestock rearing (including sheep and goat raised by a large number of small farmers, but also bullocks, cows and buffaloes) and caste-based occupations like pottery and wood-work. Most households engage in agriculture on their own land, but also through share-cropping arrangements and daily agricultural labour (especially in the case of poor Dalit⁴⁰ households).

Farming is done by men and women jointly. While men are responsible for major tasks involving bullocks (ploughing, sowing and inter-cultivation) and contribute to crop-harvesting, women engage in sowing (along with men), weeding, harvesting, threshing and storing the grain after harvest. All seed-related work is also performed by women in the Deccan Plateau, and this holds true for all of rural India, regardless of caste and religion.

35 Swaminathan, M.S., 1998.

36 Oakley, E. and J. Momsen, J., 2007.

37 Given the focus of this study on plant genetic resources, little emphasis is placed on livestock-rearing activities in the presentation of findings. They do however play a central role — as a source of livelihood and income, and in the conduct of agricultural operations — in semi-arid India as well as in Nepal.

38 The agro-climatic conditions of semi-arid areas are extremely variable, but share several features: high inter-annual variation in rainfall, prolonged dry spells that increase the likelihood of drought; high rainwater run-off leading to soil erosion; and inadequate drainage leading to soil salinity and waterlogging. Joshi, PK., et al., 2001.

39 Gulati, A. and T. Kelley, 1999.

40 Dalit is a self-designation for a group of people traditionally regarded as of lower cast.

In many households, especially among the resource-poor, women engage in the collection of resources like fodder, dung (which may be sold) and edible plants. "Like hens, we collect anything we find that can go into our cooking pot," says a woman from Parvathapur. The most commonly gathered edible greens are Thota koora (*Amaranthus*), Doggali Koora (*Amaranthus polugamus*), Gunugu Koora (*Celosia argentia*) and Shyama Koora (*Colocasio antiquorum*).⁴¹

3.1.2 Agro-ecology and livelihoods in the hill region of Nepal (Chaur and Begnas)

From an ecological perspective, Nepal is divided into three regions: mountains in the North (alt. 4,877 m to 8,848 m), hills in the middle (alt. 610 to 4876 m) and the Terai (plains) in the South (up to 609 m). The mid-hill region of Nepal (where the study site lies) represents 42 percent of the country's total land area, one fifth of which is suitable for cultivation.⁴²

Nepal's population of 23.1 million in 2001 has a very diverse ethnic structure, with around 100 different ethnic groups, 92 languages and 9 religions. Around 86 percent of the population lives in rural areas and the female population (52 percent) is higher than the male population in the country, reflecting the high frequency of outmigration for work in foreign countries amongst Nepalese men.

Sources of livelihood

Though agriculture is the main activity in the mid-hill area, other sources of livelihoods are also derived from various ecological systems. Women farmers involved in the study identify five major ecosystems as sources of livelihood: *khet* lands used for rice cultivation (comprising swampy, irrigated and rainfed lands); *bari* lands, the non-irrigated uplands, reserved for rainfed crops like maize and finger millet; home gardens; fish ponds and water streams; and forests. These systems provide food, fodder, medicine, vegetables, firewood, hardwood, fibre and income (table 1).

Table 1: The relative importance of different sources of livelihoods in the mid-hill region of Nepal

	Paddy fields	Upland	Home gardens (incl. animals)	Fish ponds and water streams	Forest
Food	✓✓✓	✓✓✓	✓✓✓	✓	✓✓
Wild food		✓		✓✓	✓✓✓
Fodder	✓✓✓	✓✓✓	✓	✓	✓✓
Medicine		✓✓	✓		✓✓✓
Vegetables		✓✓	✓✓✓		✓
Fuel wood		✓			✓✓✓
Hardwood		✓			✓✓✓
Fibre (ropes)		✓			✓✓✓
Income	✓✓	✓✓	✓✓✓	✓	✓
Women's domain	✓	✓	✓✓		✓✓

Legend: ✓ not very significant; ✓✓ mildly significant; ✓✓✓ highly significant.

Source: PRA with 15 women in Chaur, October 2009.

The collection of wild foods, including fruit, leafy vegetables, tubers and mushrooms, is typically an activity undertaken by women, regardless of socio-economic caste and age. "When we go to the forest to collect fuel wood and fodder, we also collect wild

41 Satheesh, P.V. and S.B. Reddy, 2000.

42 Adhikari, K., 2008, p. 2.

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food," says a Gurung woman. Throughout Nepal, wild foods make an important contribution to the nutrition of rural people, and play a major role in their survival strategies, especially during the period of food shortage.⁴³

Forests and home gardens are essentially women's domains: women carry out most of the work involved in obtaining resources from these ecosystems and they control the income derived from selling part of the produce from home gardens.

Though food provisioning is the primary aim of this elaborate livelihood system, many items are sold in the market, including produce from the home gardens. Produce offered for sale in village markets or in the community include fruits (banana, orange, guava), dairy products (milk, curd, ghee), ginger, coffee, yam, taro products, rice, finger millet and animals (goats, hens, pigs, calves).

Home gardens

Home gardens are integral part of farming systems in various regions of Asia.⁴⁴ In Nepal, 72 percent of households have a home garden, generally comprising a vegetable plot, fruit trees, one or two dairy cattle, goats, pigs, hens, a fish pond, a bee hive, fodder trees, spices (chilli, ginger, onion, turmeric, coriander), medicinal plants and ornamental plants, thus combining subsistence and cash-earning activities.⁴⁵ The diversity of vegetables grown in home gardens is surprisingly large (table 2):

Table 2: Diversity of vegetable crops and spices grown in home gardens in Nepal

Gourds	Vegetables	Beans and peas	Tubers	Spices
Sponge gourd, Bottle gourd, Snake gourd, Ash gourd, Pumpkin*	Ladies' fingers, Broadleaf mustard, Cauliflower, Cabbage, Broccoli, Carrot, Eggplant, Radish	Kidney bean, Cow pea*, Pea, Beans*, Broad bean, Soybean	Yam, Taro	Ginger, Turmeric, Coriander, Garlic, Onion, Chilli

*Extensive genetic diversity within the crop.

Source: PRA conducted with 15 women in Chaur, October 2009.

Home gardens provide up to 60 percent of a household's total consumption of fruit and vegetables in Nepal. Women play a major role in home gardens, in terms of planning, growing the crops and plants, harvesting, selecting and saving seeds and planting materials, processing and marketing (table 3). Through home gardening, "women enhance family nutrition, conserve culinary traditions, economize on the use of domestic resources, contribute to subsistence and create alliances among themselves."⁴⁶

The significance of home gardens to rural livelihoods in Nepal has been largely overlooked by national agricultural policies. In fact, this observation holds for home gardens throughout the world.⁴⁷ There have been "no significant efforts been made to build on the potential of traditional food supply systems, integrating them into home garden projects."⁴⁸

43 In Chepang families (one of the ethnic groups of Central Nepal), up to 40 percent of the total food is contributed by wild sources. Regmi, B., et al., 2006, p. 39.

44 In Viet Nam, for instance, home gardens are found in many types of ecosystems, and feature a wide range of species that are used as food, spices, stimulants, medicines, beverages, fodder and shelter. Trinh, L.N., et al., 2003.

45 Pulami, R. and D. Paudel, 2006, p. 22.

46 Wilson, M., 2003, p. 223.

47 One hypothesis — which may require further investigation — may be that home gardens have received inadequate policy attention partly because they fall under women's domains. Given that in most developing countries, agricultural extension officers and agricultural researchers are men, it is not unlikely male researchers or field workers speaking largely to male farmers would have missed out on the significance of home gardens.

48 Trinh, L.N. et al., 2003, p. 318.

Table 3: Gendered distribution of roles and tasks in tending home gardens in Nepal

	Paddy fields	Women	Men	Both
1	Preparation of nursery bed			✓
2	Arranging for seeds	✓		
3	Manuring nursery bed	✓		
4	Field preparation			✓
5	Sowing	✓		
6	Transplanting seedlings	✓		
7	Irrigation			✓
8	Weeding	✓		
9	Taking care of the crop during growth period			✓
10	Staking (for climbers)		✓	
11	Disease and pest control			✓
12	Harvesting	✓		
13	Seed-related work (selection, cleaning, drying, storing of seeds)	✓		
14	Preparation of various food items (dried veg., pickles...) for home consumption	✓		
15	Marketing	✓		

Source: PRA conducted with 15 women in Chaur, October 2009.

Field crop cultivation is a shared domain. For rice cultivation, men are responsible for preparing the nursery beds and the fields, and for overseeing irrigation. They also take an active role in harvesting and threshing the grain. Women do most transplanting, manuring and weeding work, and they help during harvesting. All post-harvest operations (including drying and storing grain and seeds) are exclusively done by women in Nepal. The knowledge of seed varieties, cultivation, storage and use held by women "is a valuable form of human capital often ignored by policy and decision-makers."⁴⁹

3.2 Crop diversity: A gendered domain

A number of studies point to the importance of gender as a key parameter in understanding agro-biodiversity management in Asia. In Eastern Nepal, "Kirati women play a key role in postharvest activities including grain storage, food processing, and food preparation."⁵⁰ In central Bangladesh, women often decide, alone or with their husbands, which crops to plant and whether local or improved variety seeds are to be used in field crops.⁵¹ When men work off-farm, women assume the full responsibility for these tasks. In India, many studies attest the importance of women's role in managing agro-biodiversity.⁵²

The field study carried out in India and Nepal provides additional insights into men's and women's roles and responsibilities in managing crop diversity at the farm level.

49 Gurung, B. and P. Gurung, 2002.

50 Ibid.

51 Oakley, E, and J. Momsen, 2007.

52 Swaminathan, M.S., 1998; Shiva, V., 1988, *Staying Alive: Women, Ecology and Development*, Zed, London.

3. Gender roles in crop diversity and seed-related practices

3.2.1 Diversity of dryland crops in the semi-arid Deccan Plateau in India

The traditional cropping pattern of the Deccan Plateau is highly diversified, featuring a wide array of dryland cereals, pulses and oilseeds. Depending on the area, either sorghum, pearl millet or maize are grown in association with red gram, black gram and green gram, horse gram, field bean and cowpea during the *kharif* rainy season (June to October). In the *rabi* winter season, wheat can be grown in association with chickpea and mustard. Oilseeds like sesame, niger, linseed and safflower are also grown in small quantities, largely to meet household needs.

Women take the logic of mixed cropping to its extreme: crops like fieldbean, cowpea, sesame and mustard have a gendered story behind them (box 1). There is a clear demarcation between *paisa pantalu*, cash crops largely pursued by men, and *chillar pantalu*, 'small change' crops that women farmers insist on growing in order to meet household's food security.

Minor millets such as foxtail millet, finger millet and proso millet used to play an important role in dryland farming systems. However, agricultural policies skewed in favour of 'dominant' food crops like rice and commercial crops like cotton has led to the decline of minor millets, despite their high degree of adaptation to marginal rain-fed conditions and nutritional value. These crops can still be found in pockets of the Deccan Plateau, especially on the red (unfertile) lands largely owned by farmers from the lowest socio-economic groups (Scheduled Castes and Tribes).

Box 1. 'Small change' crops: Insignificant to men, invaluable to women

A gender-sensitive approach to agricultural change in the Deccan Plateau reveals interesting sub-stories.

In the village of Pastapur, Parvatamma tends 1.6 hectares with her son, who has decided to grow sugarcane on 1.2 hectares. On the remaining area, she grows sorghum, niger, safflower, wheat and chickpea, even though her children disapprove. "They tell me I grow too many kinds of crops... They don't mind if we don't grow any grain for ourselves." But Parvatamma does.

In Pipri, where the advent of commercial crops like cotton has marginalized many food crops, women explain that they discreetly mix seeds of 'minor crops' (pulses and oilseeds) into the bulk of sorghum seeds before going to the field. Jangubai explains: "I prepare the seeds of all the varieties that I want to grow and bundle them up in my saree while he [my husband] is busy preparing the plough."

Interestingly, women from other regions in the world develop similar strategies. In semi-arid Kenya, when mono-cropping of cotton displaces crops like legumes, sorghum and millet, women were found "intercropping beans with the cotton where the agricultural extension officers could not catch them".*

Source: Pionetti, C., 2005.

* Wangari, E., B. Thomas-Slayter, and D. Rocheleau D, 1996, pp. 127–154.

In villages like Parvathapur, farmers grow several varieties of sorghum and red gram, some of which are local, others improved (developed by government research stations) or hybrid.⁵³ The gendered analysis of varietal diversity in these two crops show that there are gendered perceptions and agendas in the Deccan, as in Nepal (table 4).

53 See section 4, box 3 for a description of different varietal types and how they shape farmers' practices.

Table 4: Gendered analysis of sorghum and red gram varietal diversity

		Variety type	Seed source	Food value	Taste	A women's crop? ^a
SORGHUM	Tella jonna	Local	Farm-saved	●●	●●●	✓
	Tella malla J.	Local	Farm-saved	●●●	●●●	✓
	Pacha jonna	Local	Farm-saved	●●●	●●●	✓
	Neela jonna	Improved	Market	●●●	●●●	✓
	Hybrid jonna	Hybrid	Market	●	●	✗
REDGRAM	Tella togari	Local	Farm-saved	●●	●	✗
	Erra togari	Local	Farm-saved	●●●	●●●	✓
	Nalla togari	Improved	Market	●●	●	✗
	Hybrid togari	Hybrid	Market	●●	●	✗

Source: PRA conducted with 25 women in Parvathapur, Medak District, Andhra Pradesh, October 2009.

Note: Jonna = sorghum, Togari = red gram, tella = white, pacha = green, erra = red (in Telugu).

a. The question asked in this PRA to find out when women farmers themselves recognized 'an association' with a particular crop was: "Do women have a particular stake in growing this crop?" The concept was immediately understood and translated in the matrix with great enthusiasm. We found women "taking ownership of their crops" in a very open way, partly due to the in-depth collective discussion sparked by the PRA exercises. Gendered research is also about creating a process wherein women gather confidence to speak out their minds.

Major findings from table 4:

- The three local sorghum varieties and *Neela jonna* are considered by women to have higher nutritional value than hybrid sorghum
- Among the four red gram varieties grown in Parvathapur, women have a strong preference for the local red variety, *Erra togari*, used to make the tastiest *Pappu* (red gram soup). Very few farmers grow hybrid red gram
- Women feel an 'association' only with the crop varieties that serve them well in the kitchen.

Gendered studies of cropping patterns and food systems in various parts of the globe point to the marginalization of women's crops.⁵⁴ Gender-blind development policies affect the production and use of traditional food crops, and this applies to the dryland millets of the Deccan Plateau. Supporting women's preferred cropping systems would mean reorienting policies and paying attention to the production and processing constraints faced by rural women and addressing the need to promote, store and preserve indigenous cereals, fruit and vegetables.⁵⁵

3.2.2 Diversity of rice and finger millet in Begnas area of Nepal

There is a high level of intra-specific genetic diversity for all major crops grown in Nepal. In the Begnas locality, farmers grow as many as 42 varieties of rice. Women farmers in Chaur grow 24 different varieties of rice on their land (6 improved varieties and 18 local varieties). While commonly grown rice varieties such as *Elke*, *Mansuli* and *Madhise* meet the bulk of a household's staple needs in foodgrains, others varieties are also grown to meet specific needs, such as *Rato Anadi* and *Seta Anadi* (glutinous rice varieties) and

54 In Swaziland, for instance, it was found that women's traditional crops are systematically discriminated against because their market prices are lower than non-traditional crops. Malaza, M., 2003, pp. 243-257.

55 One example is the approach followed by Deccan Development Society and the women's *sangams* (self-help groups) in the Zaheerabad region of Andhra Pradesh: participatory appraisal of women farmers' needs led to the development of a local millet processing facility run by the *sangams*. DDS also supports an organic shop where women farmers can sell surpluses of food grains from their fields in Zaheerabad. See www.ddsindia.com for more details.

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Jetho Budo and *Pahele* (aromatic varieties). *Kathe Gurdī* and *Mansara* are suited to marginal environments and *Mansara* is a drought-tolerant variety.⁵⁶

Finger millet (*Eleusine coracana*), commonly known as *kodo* is the fourth most important food crops in Nepal after rice, maize and wheat. It requires less water than rice and has high nutritive value.⁵⁷ When deciding which variety to grow on their land, women farmers in Chaur consider a whole range of parameters that fall under four major categories: agro-ecological constraints, season and maturity, culinary uses and, lastly, yield (table 5).

Table 5: Women farmers' rationale for genetic diversity in finger millet in Nepal

	Agro-ecological constraints			Season and maturity			Culinary uses			Yield
	Needs fertile soils	Suitable for poor soils	Grown in shaded area	Winter - Late maturing	Winter - Early maturing	Grown in summer	Suitable for bread	Suitable for porridge	Suitable for beverage	
Seto dalle	✓			✓					✓	✓✓
Seto jhape			✓		✓			✓	✓	✓✓✓
Kalo jhape	✓				✓			✓	✓	✓✓✓
Sheto jhapi	✓			✓				✓	✓	✓✓
Shaynkhole	✓			✓			✓	✓	✓	✓✓
Shamdhī Kodo	✓			✓			✓	✓		✓
Kuwakote	✓				✓			✓	✓	✓✓✓
Hetaude	✓			✓			✓	✓		✓✓✓
Kukurkane	✓	✓	✓		✓				✓	✓✓
Bhalu paile	-	-	-	-	-	-	-	-	-	-
Kalo dalle	✓			✓					✓	✓
Barkhe		✓			✓				✓	✓

Source: PRA conducted with 15 women, Chaur village, Begnas area, October 2009.

Note: Seto = white, kalo = black, rato = red (in Nepali).

Major findings from table 5:

- All finger millet varieties are grown in the summer season, except for *Barkhe*, which interestingly, is also suited to poor soils. It has cultural value and is used by local healers.
- Kukurkane* is suited to a range of agro-ecological conditions. Yet, its bitter taste restricts its use as a food item: it is reserved for making fermented beverages and alcoholic drinks.
- Bhalu paile* is a newly introduced variety and farmers are growing it for the first time in Chaur.
- With early maturing varieties like *Seto jhape* or *Kuwakote*, the land is cleared early on, which gives the opportunity to sow another crop like potato.
- All finger millet varieties are black, except for *Shamdhī*, which is white, and very tasty; it is always offered to guests. It is not grown in large areas due to its low yield.

56 Rana, R.B. et al., 2000, p. 29.

57 Kodo contains considerable amounts of minerals (calcium, phosphorus and iron), carbohydrates and proteins (7 to 14 percent), fats and amino acids. Rana, RB et al., 2000, p. 33.

The promotion of high yielding rice varieties by government officials in Nepal has led to a gradual increase in the use of improved varieties and chemical fertilizers.⁵⁸ The area of coverage under improved varieties of major cereals is, on average, about 89 percent, but the replacement rate (percentage of purchased seed of the total amount of seed used) of such seeds is only around 6 percent.⁵⁹ In other words, farmers still largely rely on farm-saved seeds or farmer-to-farmer seed exchanges.

3.3 Significance of farm-saved seeds

Seed-saving has been recognised as a “long-standing global institution, probably as old as agriculture itself... which helps farmers maintain their independence, allows them to predict how well a crop will perform in the following season, allows them to participate in maintaining the crop, serves as insurance against inadequate supplies of seeds, helps to maintain food security and creates a viable market that ensures that seed prices remain affordable.”⁶⁰ Women are largely responsible for saving seeds across Asia. However, industrial seeds interfere with this practice and modify gender relations around seed provisioning.

3.3.1 Saving seeds: Women farmers’ prerogative

Saving seeds for the next crop is an essential practice of farmers throughout Asia. In Nepal, estimates reveal that around 94 percent of the seed requirement of major food crops is met by farm-saved seeds, farmer-to-farmer exchange and informal purchase.⁶¹ All seeds of local varieties of crops, vegetables and tubers are saved at the household level and seeds of improved varieties of rice, wheat and maize are saved for two to three years before going back to the market for seeds (table 6).

Table 6: Distribution of crops according to seed sources in Nepal

Exclusively farm-saved seeds* (100 percent)	Mainly farm-saved seeds (75 percent)
Rice, finger millet, maize, rapeseed, ginger, turmeric, taro, garlic, black gram, soybean, sponge gourd, bottle gourd, pumpkin, ash gourd, snake gourd, chayote, yam, ridge gourd, <i>chamsur</i> , <i>somp</i> , winter beans, pointed gourd, sesame, horse gram, rice bean, buckwheat, linseed, pigeon pea, cassava, mustard, perilla	Cowpea, beans, cucumber, bitter gourd, ladies' finger, broad leaf mustard
Exclusively market seeds (100 percent)	Mainly market seeds (75 percent)
Potato, onion, coriander, cauliflower, cabbage, radish, tomato, green pea, broad bean, fenugreek	Wheat, lentil

* Includes own seeds and seed loans obtained from neighbouring farmers.

Source: Four-cell analysis of seed-saving practices in Chaur with 15 women, October 2009.

Both in Nepal and India, all skills and knowledge associated with seed-keeping practices rest with women (see box 2 for a description of these skills). In Eastern Nepal, Kirati women play a key role in local seed systems and post-harvest activities including grain storage, food processing and food preparation. Women from Begnas describe five different methods of storing seeds: large bamboo structures (rice), clay pots (finger millet), arranging of earheads in an organized form (maize), wooden structures to hang tuber seeds (taro), hanging bundles of pods (sponge gourd and cowpea).

58 See next section for a description of different varietal types.

59 Seed replacement rate is 96 percent in wheat, 85 percent in rice and 86 percent in maize.Thapa, M. et al., 2008.

60 Mascarenhas, M., and Busch, L., 2006, p. 124.

61 Bajracharya, J., 2008.

3. Gender roles in crop diversity and seed-related practices

Box 2. Steps and skills involved in seed management in India and Nepal

Seed selection

- ✓ Selecting panicles or earheads in the field for rice, maize, sorghum) or selecting panicles from the harvested stalks after they are brought home (for foxtail millet, finger millet)
- ✓ Selecting healthy plants, in the case of vegetables and tubers, leaving the fruit to reach full maturity
- ✓ Having knowledge of a wide range of criteria such as plant health, plant height, panicle size, grain density, tillering and straw volume (in the case of rice in Nepal). It requires in-depth knowledge of plant health, plant-ecosystem interactions, seasonal cycles and productivity factors such as grain density

Seed processing and drying

- ✓ Threshing, beating, winnowing (with a bamboo winnower or using the wind), sieving/grading and drying. These skills are transmitted from mothers or mothers-in-law to daughters
- ✓ Sun-drying: cleaned seeds are laid out in the courtyard floor for drying, for several days. This period involves constant attention by women (to stir seeds and keep animals away)

Seed storage and maintenance

- ✓ Making large bamboo seed storage units for major staple crops
- ✓ Storing seeds of pulses and vegetables. They are stored in a variety of containers: clay pots, metal tins, glass bottles, jute bags. Clay pots are sealed with a mix of cow dung/mud mixture
- ✓ Using crop-specific techniques for storage: mixing vegetable seeds with ash (a method of pest control found in many parts of India), mixing seeds of pulses with neem leaves (in the drylands of India) or river sand, and storing tuber seeds in a wooden structure (Nepal)
- ✓ Monitoring seed storage (for instance, checking the moisture content of seed or watching for pest infestation) is essential

Source: Adapted from Gurung and Gurung, 2002; Oakley, E., and J. H. Momsen, 2007; Pionetti, C., 2005.

A gendered research study on the local seed economy in the Deccan Plateau⁶² shows that saving seeds at the household level enables women farmers to achieve a number of things:

- cultivate a good crop mix on their land
- carry out seed selection in their fields
- sow their crops at the optimum time
- build up their seed capital
- lend seed to other farmers
- keep out of dependency on market and moneylenders
- secure household-level bargaining power

Apart from saving seeds at the household level, women farmers also engage in local seed exchanges. When there is a seed shortage for a given crop, farmers usually turn to other farmers. In the Deccan, seed loans come with an interest: for one kg of seeds borrowed, two kgs of seeds are returned after harvest for monsoon crops (a 'protocol' referred to as *Nnagu* in the local Telugu language), and one-and-a-half kgs for winter crops (known as *deedi*).

62 Pionetti, C., 2005, pp. 140-145.

This is an incentive for farmers to 'build up seed capital', which is about saving enough seeds from a harvest in order to be in a position to lend seeds to others. In fact, seed loans are part of small and landless farmers' strategies to increase their access to grains: "For virtually every crop she grows, Tuljamma, a small farmer from Shamshuddinpur (Medak District) saves a lot more seeds than she needs for her own 0.4 ha land. In all, she gave seeds to 15 people in 2001. The volume of grain she has earned approximately amounts to 30 kg. This is not a huge quantity, but it translates into significant savings on monthly expenditures, especially in the case of costly pulses like redgram."⁶³

Poor, female-headed households have been found to be especially active in the non-monetary seed trade taking place in communities. They turn some of the grain they earn as daily wage into seed, provide small seed loans, and receive double the amount in return. Landless families thus also indirectly benefit from the local seed economy which exists in most Asian communities.

In Begnas (Nepal), 21 out of 26 households were found to be actively involved in seed exchanges at the community level for field and home garden crops including rice, maize, black gram, cowpea and bottle gourd. Further discussion revealed that the remaining five households were not involved in seed exchanges for practical reasons (new arrivals, discontinued residence, geographical isolation).

Seed-saving practices and seed exchanges are therefore central to the reproduction of agricultural systems throughout Asia. They are relevant for agronomic, economic, ecological and sociocultural reasons, and extremely significant from a gender perspective.

3.3.2 Industrial seeds: A new equation in gender relations

In most Asian countries, the Green Revolution heralded the entry of industrial seeds into farming. HYVs of rice and wheat have largely displaced local varieties, with consequences in terms of biodiversity loss, ecological pollution and resilience of the ecosystem. The challenges posed by current patterns of agricultural development in terms of long-term agricultural production, poverty reduction and resilience to climate change have been clearly identified.⁶⁴ Hybrid and transgenic seeds — the most recent products of the seed industry — introduce new forms of dependency for women farmers: they cannot be saved and reused (thus they are no longer under women's control), are associated with high levels of external inputs and have to be purchased from dealers (the majority of whom are men).

For women farmers who took part in the study, market seeds clearly carry a different meaning when compared to farm-saved seeds. Both in Nepal and India, women comment on the inadequacy and high cost of market seeds, as shown by the following assertions: "Market seeds only make you happy once" (speaking of hybrid sorghum in India), and "Sowing these seeds is like sowing in water. You can never be certain that the seeds will grow" (referring to the problem of 'spurious' seeds in India).⁶⁵

Women also expressed deep concerns when answering the following question: How would you cope if you had to buy all your seeds (in the event of legal or technical restrictions on seed-saving)? "How would it be possible for us to buy all the seeds? We sow so many crops!" (Nepal); "It's expensive to buy seeds. And if we lose the crop, how will we repay our debts?" (India); "They don't provide us fertilizers on time."⁶⁶ How will they provide seeds on time?" (India); "Without our own seeds in our hands, we would have to move away from farming" (Nepal); "When everybody has to buy seeds, where is the freedom for farmers? It is a form of technocracy!" — the last comment coming from a middle-aged Gurung Nepalese lady.

These assertions eloquently speak of the reluctance of women to become dependent on the market. Industrial seeds adversely impact local seed economies managed by women farmers. Since commercial seeds have come into Nawabpet, a

63 Pionetti, C., 2005, p. 150.

64 IAASTD, 2008.

65 These assertions were collected during group discussions with women farmers in India and Nepal, October 2009.

66 Refers to a situation of fertilizer scarcity faced by Andhra Pradesh farmers since 2007.

3. Gender roles in crop diversity and seed-related practices

village of Andhra Pradesh, "there is no more giving and taking [of seeds]," says a man in his sixties.⁶⁷ In areas of Andhra Pradesh where commercial crops dominate, "all the seeds needed to grow cash crops are bought from the market. It is usually men who are responsible for buying the seeds. Women farmers only save a few handful of seeds for 'small change crops' like greengram, blackgram, mustard and sesame. Instead of mixing the seeds with ash and neem leaves as they used to do, they use a chemical powder. Low-caste women face humiliation by high-caste farmers who demand money for their seeds. The traditional modes of seed exchange have entirely disappeared and seed has become a monetarized commodity, even within the community. Only older women remember that once upon a time, seeds were exchanged based on *nagu* (2 for 1) and *deedi* (1.5 for 1). Young women have never heard these terms."⁶⁸

Thus, not only have women lost their skills and knowledge, but the entire localized seed system has slipped through their fingers with the advent of commercial, market-centred agriculture. As Bina Agarwal puts it, "The process of devaluation and marginalization of indigenous knowledge and skills impinges especially on the knowledge that poor peasant and tribal women possess.... Women have been excluded from the institutions through which modern scientific knowledge is created and transmitted."⁶⁹

Many findings show that as agriculture gets more entrenched in the market economy, the role and decision-making power of women with respect to cropping cycles and inputs diminishes.⁷⁰ Unless adequate safeguards for women farmers are introduced in the regulatory and legal systems promoting commercial agriculture (including IPR, as will be shown in the following section), women's loss of control over such crucial domains as seeds, crops and household food security is likely to translate into a net erosion of their bargaining power in the family and social status in the community. The lack of proper status for women as farmers, land owners, biodiversity custodians and food providers makes them more vulnerable to global trends that are beyond their control.

3.4 Cash crops and the demise of women's agenda in agriculture in India

Over the last two to three decades, Indian agriculture has undergone many changes, with policy support in various forms for the adoption of new crop varieties, the expansion of commercial crops and the use of modern technology. Although benefits have accrued in the form of higher yields, increased purchasing power and new modes of consumption, gender-sensitive studies also point to "the new form of dependencies, gendered shifts in status, workloads and responsibilities, and the long-term socio-economic implications of the new agricultural model."⁷¹

Many commercial crops are grown today in semi-arid India, including cotton (grown extensively in several districts), soybean, sugarcane and peanut. These cash crops entail a high degree of dependency on external inputs. As a woman whose husband has leased 20 acres of land in order to grow cotton in Enkepally puts it: "From the moment we sow cotton until the time we harvest it, this crop demands money." And, she adds: "When we go for cotton, our families are invariably affected."

In a group exercise conducted in Enkepally, women farmers single out cotton as a 'high-risk', 'very expensive' crop, which does not meet any essential need. This confirms Amartya Sen and Jean Drèze's analysis of the politics of commercial crops: the expansion of cash crops is arguably driven by male farmers *at the detriment* of other members of the household, namely women.⁷²

67 Pionetti, C., 2005, p. 166.

68 Ibid.

69 Agarwal, B., 1999.

70 See for instance Agarwal, B., 1997; and Mehta, M., 1996. Recent studies on gender and livelihoods suggest that shifting gender roles may also expand opportunities for women's empowerment and community development. For instance, women's marginalization in large-scale agriculture in rural Pennsylvania has contributed to their expanded involvement in sustainable agriculture. See Oberhauser, A. et al., 2004.

71 Mehta, M., 1996.

72 Sen, A. and Drèze, J., 1989.

Shifts to commercial agriculture can result in declining nutritional standards at the local level as nutritious traditional crops are replaced by non-food items, food items of lesser nutritional value, or food items that, while quite nutritious, are sold rather than consumed.⁷³

Interestingly, in Enkepally, as in many other villages of the Deccan Plateau, despite the relatively high proportion of cash crops cultivated in the village, women *continue* to grow food crops like foxtail millet, finger millet, pearl millet, sesame, cowpea, field bean, niger, linseed, wheat, chickpea, sorghum and mustard, without any form of credit, external inputs or market support.⁷⁴

Thus, changes brought about in farming systems, such as the introduction of IPR for seeds, are likely to influence or reshape the ability of women to make autonomous decisions in agriculture. Local *panchayat* laws that allow for a certain percentage of women amongst elected leaders at the community level in India could be leveraged to protect the rights of women farmers and take women's concerns and claims to local courts or to executive bodies where they may be heard.

The following section investigates some of these underlying mechanisms of industrialization in the seed sector and shows how they intersect with gender.



Photo: Carine Pionetti

73 de Walt, K., 1993.

74 In certain areas, women's self-help groups are making a concerted effort to revive local dryland crops, sometimes with the help of NGOs. See www.milletindia.org, a platform for advocacy and local experience around millets in India.

4. Implications of seed industrialization on gender roles

4. Implications of seed industrialization on gender roles

The industrialisation of seed is a process of change which hinges on several interrelated developments. One is the advent of modern plant breeding and the release of new crop varieties, including genetically engineered varieties developed through biotechnology. The growth of the seed industry — both public and private sector — and the regulatory framework put in place to steer this industry is another crucial dimension. Finally, the implementation of IPR legislation, including PVP, has great bearing on the evolution of the seed sector.

4.1 Limitations of conventional plant breeding

One of the driving forces behind change in agriculture is modern crop improvement and the adoption of improved crop varieties by farmers, which differ in fundamental ways from local varieties and tend to alter cropping practices and farming systems (box 3). Despite its evident contribution to better crop performance in a number of areas (cereals, oilseeds, vegetables), the formal breeding model has come under criticism for several reasons.

First, it has concentrated its effort on major staple and commercial crops, leaving aside crops that are more suited to marginal environments or low-fertility soils (like minor millet). The dominant agricultural paradigm focuses on monocrops, ignoring the fact that in many developing countries, women gather edible greens, fodder and small animals (like fish in rice fields) on cultivated lands. Although such produce may not have significant commercial value, they have intrinsic nutritional value and increase household food security. Rural women are directly affected by the transformation of diversified agro-systems into chemical-dependent monocrops.

Secondly, improved varieties only perform well under artificial conditions, with high levels of chemical inputs. As a woman farmer from Parvathapur (India) puts it, "this hybrid sorghum grows only if you apply fertilizers." The replacement of organic manure with chemical fertilizers has been increasing indebtedness and jeopardising long-term soil fertility.⁷⁵

Thirdly, breeding efforts have focused on improving parameters like yield and disease resistance, with very little emphasis on traits that women farmers pay heed to, such as taste and quality of straw (for fodder use). As a result, many improved varieties go unadopted by farmers, and when they are, women have strong reservations about them (as evident in table 6 above).

Fourthly, the idea behind formal breeding is to develop varieties that can be very widely adapted in very different agro-ecological contexts by homogenizing growing conditions. This is in sharp contrast with the agriculture that continues to be practised by small farmers in Asia. As Sita, a farmer from Chaur (Nepal) explains, in the case of Nepalese agriculture: "Our agro-ecology, land types, micro-climate are very diverse. We also have great variability in soil types and availability of irrigation. Some varieties are suited for black soils, others for irrigated land. A single variety can never be suitable for all land types, climate and ecology." In fact, farmer breeders like Saraswati (Begnas, Nepal) breed "to conserve and enhance the characters of local varieties." "The existence of each and every species is important," she says. "Each has to be preserved because it has a role to play in the ecosystem." For instance, in her breeding work, she is trying to cross wild rice (which naturally grows in swampy areas) with a local variety to enhance the latter's adaptation to water-logging (for cultivation in low-lying areas). If cultivated (but also wild) genetic diversity is perceived as a valuable asset by women farmers, then its displacement represents a net loss to them.

75 Reddy, S., 2009.

Box 3. Classification of crop varieties found in farmers' fields

Different varieties are cultivated by farmers, ranging from landraces to genetically modified (or genetically engineered, or transgenic) varieties. This box provides a brief description of major varietal types found in farmers' fields in Asia, along with key elements on how different varietal types interact with or shape farmers' selection and seed-saving practices.

Wild relatives (uncultivated): A wild plant taxon with a relatively close genetic relationship to a crop. Wild relatives of crops are often found in the vicinity of fields.^a Women farmers pay particular attention to wild relatives; interestingly, they refer to wild relatives of millet as 'the mother of all crops' in Niger, which corroborates recent findings on their intrinsic value.

Landrace: Heterogenous crop populations grown and selected by farming communities for many generations. Landraces serve to develop farmers' varieties.

Farmers' variety: A variety with recognizable characteristics (such as grain colour, plant height, maturity period, etc.), defined by a local name, and containing substantial genetic variability.

Creolized variety: The product of deliberate or natural mixing of modern varieties and landraces. Creolized varieties are formed by a continuous process of introduction of new seed types and local adaptation by farmers through exchanges between farmers and communities.

Improved (or modern) variety: A variety developed by a professional breeder, with essential elements of distinction, homogeneity and stability. The Green Revolution HYVs of rice and wheat are improved varieties for which seed can be saved and reused with any restriction.

Hybrid variety: The outcome of a breeding method that hinges on 'hybrid vigour', giving high yields with first-generation seeds, but very undependable yields with second-generation seeds. This effectively means that hybrid seeds cannot be reused by farmers, even in the absence of IPR regime. This has affected farmers' seed-saving practices all over the world since the early developments of hybrids in maize in the 1960s. Currently, some 500 hybrids of field crops and vegetables are being marketed in India, mostly by private seed companies. This concentration of breeding efforts on the development of hybrids — to secure higher returns — is therefore an issue of concern.

Genetically modified (or genetically engineered, or transgenic) **variety:** A variety obtained through genetic engineering, which entails gene transfers from one species to another (as in Bt cotton, which contains a gene from a bacterium). It is important to note that most small farmers who grow GM cotton in India have strictly no understanding of the science of genetic engineering. The idea that a transgenic variety fundamentally differs from a conventional variety — a matter of great controversy in the West — is largely nonexistent in rural India. Bt cotton varieties are not saved by farmers, they are purchased every year. At present, there is no IPR on Bt cotton varieties in India.

Source: Adapted from Gurung and Gurung, 2002; Oakley, E., and J. H. Mornsen, 2007; Pionetti, C., 2005.

Notes: (a) Wild relatives constitute an increasingly important resource for improving agricultural production and for maintaining sustainable agro-ecosystems. See Maxted, N., et al., 2006.

(b) Luxereau, A., 1994.

(c) Wood, D. and J. M. Lenné, 1997.

(d) Ibid.

(e) Hybrid vigor (also known as heterosis), the increase in size, yield and performance found in hybrids, results from crossbreeding of genetically different plants. However, inbreeding depression and segregation of characters occurs in the next generation, resulting in plants with unpredictable characters. For details see Kloppenburg, J.R., 1998.

(f) Personal communication with a representative from the Seed Association of India.

(g) The sale and regulation of Bt cotton seeds in India has proved to be very problematic. A recent study shows that apart from Government-approved varieties, two other 'types' of seeds are widely circulated and grown in the country. "**Counterfeit seeds** are frauds on farmers.

In counterfeit seeds, the genetic material is misrepresented by labelling or oral communication with the motivation to profit the seller by deception. With introduction of modern biotechnology, this phenomenon takes the form of claiming transgenic status for seeds that are only conventional, exacerbated when demand for transgenics exceeds supply. **Stealth seeds** are genuine transgenics that fly beneath the radar screen of firms claiming bio-property and states claiming bio-safety regulatory rights. These seeds require stealth because of the IP claims they contain and/or their unapproved status in the regulatory net." Herring, R., 2007.

4. Implications of seed industrialization on gender roles

Although breeding would appear, like many activities, to be 'gender neutral', the orientations of modern plant breeding do have gender-specific implications:

1. Women farmers have a higher stake than their male counterparts in maintaining on-farm genetic diversity both for field crops and for vegetables grown in home gardens.
2. When a woman breeder (like Saraswati) makes crosses between local and modern rice varieties, her aim is to increase the use value of local varieties but also to enhance the genetic diversity found in farmers' fields, whereas conventional breeding seeks to reduce it.
3. Women are more hesitant than men to adopt hybrid varieties. Three major reasons can be outlined in the case of hybrid sorghum in dryland areas: (a) its high cost of cultivation; (b) its inadequacy as a multi-purpose crop (poor fodder quality, poor grain quality, grain susceptible to pest during storage period); (c) the necessity to buy seeds every year.
4. Women involved in the study are generally more critical than men of commercial seeds. They are concerned about "fertilisers burning the soil," "the high costs of seeds," the risk associated with commercial seeds (germination failure, uncertain yields) and the "debt well" associated with increasing costs of cultivation, especially in cotton.⁷⁶
5. When the science of genetic engineering is explained to women farmers, they tend to see it as a high-risk venture with few associated benefits. Reacting to a presentation by a biotechnologist on the virtues of GM crops, a woman participant on a Citizen's Jury on Food and Farming Futures held in Andhra Pradesh (India) in 2001 declared:

"You are telling us you have created new varieties [GM varieties]. We don't know whether it is safe for our consumption. Because of chemical agriculture, our own fodder is already not edible to our own cattle because of pesticide residue. HYV fodder is not relished by our cattle. If you give them GM crops, which kill an insect when a leaf is eaten by an insect [referring to Bt crops], how can you be sure that it does not poison or kill ourselves and our cattle when we use it for human consumption and as cattle feed? All these are genuine doubts we have. I am sure that our own methods of agriculture are safer than these new untested ones."⁷⁷

The trends existing in contemporary plant breeding are likely to get further entrenched with the expansion of IPRs which provide additional incentives for the development of uniform varieties suited to commercial agriculture. The indirect implications for women farmers could be further marginalization of their preferred crops and seed types and new forms of alienation from local knowledge systems.

This alienation of farmers from their own knowledge systems can be quite severe in the case of widespread adoption of GM seeds.⁷⁸ This process has been documented in the District of Warangal (Andhra Pradesh), where Bt cotton seeds have been widely grown since 2003, without any form of PVP or patent (box 4).

76 Venkateshwarlu, D. and K. Srinivas, K., 2000.

77 Pimbert, M.P. and T. Wakeford, 2002, p. 24.

78 See Section 4.3.1. below for a discussion on the legal status of GM seeds in India.

Box 4. Transgenic Bt cotton seeds in Warangal: Deskilling farmers

Cotton is the major commercial crop throughout Andhra Pradesh. After the illegal entry of Bt cotton seeds in Maharashtra in 2001, followed by the granting of approval for Bt cotton by the Genetic Engineering Approvals Committee (GEAC) in 2002, Bt cotton has now been grown in India for eight years. Over 160 companies sell different brands of Bt cotton, most of which containing a technology licensed by the firm Monsanto to a range of Indian companies. In Warangal district, between 2003 and 2005, the market share held by Bt hybrids climbed from 1 percent to 20 percent and then to 62 percent. Seed vendors "collectively sold 125 different cotton brands from 61 companies." Farmers thus face a "frenzied turnover in the seed market (which they encourage with their penchant for new products), deceptiveness in seed brands, unpredictable ecological events such as pest and disease outbreaks, secular changes in insect ecology, and a noisy and unreliable information environment." The most common external source of information on cotton seed is corporate promotion. "For instance, companies often donate seeds to selected farmers for demonstration plots; the seed is typically new and the farmer always a pedda rytu – literally 'big farmer' in Telugu but connoting opinion leaders who tend to be emulated." In the end, what determines what farmers grow is a fad; farmers acknowledge their ignorance about what to expect in the cotton's boll size, water requirements, time to maturity, and resistance to any crop pests. The commercialization of cotton seed has thus led to a complete deskilling of farmers.

Source: Stone, G.D., 2007.

As Manjari Mehta points out in her study of agricultural change and gender dynamics in Uttar Pradesh (North India), the emerging gender monopoly over information tends to "reinforce women's dependence on men to act as mediators to critical resources, services, the banking system, and to various personnel (e.g., the agricultural extension agent) of the market economy."⁷⁹ In cotton-growing areas of South India where commercial agriculture now dominates, men are quick to say that "women don't know anything" about farming.⁸⁰

4.2 Emerging seed regulatory frameworks in India and Nepal

In many developing countries, new seed laws have been introduced in the last decade or so to accommodate changes in the seed sector.⁸¹ Seed laws comprise several components: varietal registration, seed certification and seed development. There are important interactions between seed regulation and IPRs for plant breeding, which is why it is important to give a brief overview of seed laws in Nepal and India. In fact, it has been argued that "the Seed Laws in various countries, both advanced and developing, are getting to be progressively oriented towards restricting market circulation to varieties that are conferred with plant breeder or patent rights."⁸²

India's Seeds Bill, 2004

The Seeds Bill, 2004 aims to regulate the quality of seeds sold, and replaces the Seeds Act, 1966. It contains several provisions on the registration of varieties and on seed certification procedures:⁸³

79 Mehta, M., 1996, p. 17.

80 Pionetti, C., 2005.

81 For a discussion on the development of the Indian seed industry over the last four decades, see Pionetti, C., 2005, pp. 169-201; Gadwal, V.R., 2003, "The Indian Seed Industry: Its history, current status and future", *Current Science*, 84(3): 399-406; and Louwaars, N., 2006.

82 Damodaran, A., 2003.

83 Madhavan, M.R. and Sanyal, K., 2006, Seeds Bill 2004. Parliamentary Research Service Legislative Brief, available at www.indiatogether.org/2006/jun/law-seeds.htm.

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- All varieties of seeds for sale have to be registered. The seeds are required to meet certain prescribed minimum standards of germination, and physical and genetic purity.
- The Bill exempts farmers from compulsory registration of seed varieties in order to use, exchange, share or sell farm seeds or planting material, provided seeds are not sold under a brand name. However, all seeds and planting material sold by farmers have to conform to the minimum standards applicable to registered seeds.
- If a registered variety of seed fails to perform to expected standards, the farmer can claim compensation from the producer or dealer under the Consumer Protection Act, 1986.
- The Bill forbids the use of 'genetic use restriction technology' and 'terminator technology'.
- Self-certification of seeds by accredited agencies is permitted. Seed certification is optional.
- Every seed producer and dealer, and horticulture nursery has to be registered with the state government.

Critics have pointed out that the requirements for varietal registration have essentially been borrowed from the UPOV⁸⁴ criteria of distinctiveness, uniformity and stability (known as the DUS criteria) which are inadequate for registering farmers' varieties.⁸⁵ In fact, "Indian legislators, informed by scientific studies, have recognised that the DUS criteria are clearly inappropriate for the myriad of heterogeneous, locally adapted farmers' varieties".⁸⁶ In the PVP legislation, more relaxed criteria have been set for registering farmers' varieties.

What is important, therefore, is to understand whether Seed Laws allow for the trade in seed of non-registered varieties, such as farmers' varieties. In India's Seeds Bill, 2004, the practice of seed exchange has not been banned, but all commercially traded seed varieties are to be registered with the National Seed Register. Such a provision is likely to have severe effects on farmer-to-farmer exchange and sale of seed, as has happened in developed nations and transitional economies.⁸⁷

Legislation on registration and certification based on the strict uniformity criteria of DUS can powerfully work against farmers' local seed systems and directly affect women farmers' efforts to maintain diverse seed stocks.

Nepal's Seed Act 1988

The Seed Act 1988 of Nepal contains similar provisions as India's Seeds Bill, 2004. It defines requirement for seed registration and release based on the DUS criteria. A National Seed Board oversees the registration of varieties, monitors testing procedures and coordinates the production and distribution of seeds. While modern varieties delivered to farmers are supported by seed certification, "seed produced by local farmers does not formally qualify for certification, ignoring the fact that local-level seed production usually includes farmers' preferred varieties. This lack of option for certification is a disadvantage for farmer-produced seeds in a competitive market."⁸⁸

Civil society and NGOs in Nepal call for "approaches to reward farmers for their contribution to seed conservation and development." Steps in this direction would include "the simplification of seed registration, release and certification systems" and

84 UPOV is based on the French name, Union internationale pour la Protection des Obtentions Végétales. It is an international convention for the protection of Plant Breeders' Rights, originally designed in 1961 by European countries. It has been revised in 1978 and 1991. The last version is characterized by a strict enforcement of plant breeders' rights, and by a restrictive definition of a so-called 'farmer's privilege', whereby farmers are entitled to reuse seeds of protected varieties provided they pay a royalty to the breeder.

85 Damodaran, A., 2003.

86 Ramanna, A., and M. Smale, 2004, p. 432.

87 For instance, "farmers of the East European bloc cultivating and conserving landraces have been adversely affected by new seed laws, which by prohibiting trade in non-registered varieties not fulfilling the DUS criteria have contributed to the erosion of landraces in these countries." Damodaran, A., 2003, p. 49.

88 Adhikari, K., 2008, p. 37.

adequate and effective implementation of self-certification schemes (such as ‘truthful labelling’) so that farmers may benefit from variety development, registration and marketing initiatives.⁸⁹

It is debatable, however, whether seed certification would actually add value to farmers’ seeds. Generally, seed certification requirements serve to limit informal seed sales, especially when they occur on a large scale.⁹⁰ Certification may help in guaranteeing seed quality, but alternative systems to achieve this objective could also be devised at the local level. Women farmers’ cooperatives could play a key role in evolving mechanisms to suit the needs of a localized seed economy.

A recent review of property rights and collective action in respect of natural resources reveals that “indigenous property rights institutions still exist alongside national laws and that these local institutions governing rights to national resources are often more effective in the eyes of local peoples than formal laws and regulations.”⁹¹ In the specific case of seed, women farmers play a central role in these ‘local institutions’, and they would greatly benefit from their enhancement.

Formal laws still pay very little or no heed to gender as a significant dimension in seed management, and safeguards have to be created to ensure that local seed systems continue to exist. These may include:

- (a) placing farmers’ varieties outside the purview of formal varietal registration systems;
- (b) supporting alternative community-based registration systems for local varieties based on women farmers’ needs and criteria;
- (c) keeping seed certification as an option in formal seed policy;
- (d) promoting the circulation of seed amongst and between communities through a better understanding of existing rules for sharing seeds;
- (e) supporting women’s leadership role in managing seed production and development locally.

4.3 Intellectual Property Rights, trade and agro-business

It is important, at this stage, to highlight interlinkages between IPR regimes, trade and agricultural development at the global level, as these should be kept in mind by any country entering into the phase of law development on PVP.

The adoption of IPR laws in developed countries, especially Europe, took place in the context of a strong seed industry and declining seed-saving practices. This allowed the seed industry to make strong demands in terms of IPR over new plant varieties, leading to the emergence of the UPOV Convention.

Strong IPR regimes on plant varieties have contributed to profound changes in European agriculture. Specifically, the introduction of PVP has been accompanied by⁹²

- a reduction in the proportion of the population engaged in farming;
- the gradual eclipse of public sector plant breeding by the private sector;
- a complete change in the relationship of farmers to the means of agricultural production.

The process of consolidation of farms — and associated disappearance of smaller ‘unproductive’ farming units — in Europe and North America has been widely documented.⁹³ This should be present in the consciousness of the people who design agriculture-related legislation that shape the agrarian economies of developing countries. The substitution of public sector breeding

⁸⁹ Ibid.

⁹⁰ Louwaars, N., 2006.

⁹¹ Eyzaguirre, P. and E. Dennis, 2007, p. 1493. See also Meinzen-Dick, R.S. et al. (eds), 2002.

⁹² Jaffé, W. and J. van Wijk, 1995.

⁹³ See Mazoyer, M. and L. Roudart, 1998.

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by private seed companies is already at play in many developing countries, and signs of such developments are perceptible in India, where the private seed industry is expanding at a fast pace.

Change in farmers' relations to the means of agricultural production is linked to many factors, including trade liberalization and the growth of agri-business. Trade liberalization accentuates specialization, as each region or country is expected to focus on the areas of production for which it has comparative advantage in growing conditions and production means (land, labour, capital).

The globalization of trade in food results in the gradual and steady lowering of agricultural prices.⁹⁴ It also accelerates the dismantling of local economies and deepens the dependency of farmers on agro-industrial capital. Indeed, international trade of agricultural produce and food items is increasingly controlled by a small number of multinational companies. A study shows that five large companies control 90 percent of the world trade in wheat, maize, coffee, cacao and pineapple, 80 percent of the trade in tea, 70 percent of the banana and rice market and 60 percent of the sugar market.⁹⁵

Agro-industrial firms extend control over farms and markets through horizontal and vertical integration. While horizontal integration may, for instance, involve "the global coordination of multiple production sites for a year-round supply of fresh produce,"⁹⁶ vertical integration refers to the expansion of a company's activities into various production stages of a single product. An example is industrial bread manufacturing where a company controls the entire production chain from the intensive cultivation of wheat varieties to the packaging and marketing of packaged bread. In such a set-up, agro-food companies are able to influence varietal choices made by farmers through the release of recommended varieties. This practice is very prevalent in cereal production throughout Europe, especially for crops like wheat, durum (a wheat-related cereal used to make pasta) and barley. Agricultural output for these crops is almost entirely purchased by large agro-industrial conglomerates involved, respectively, in the manufacturing of bread and biscuits, of pasta and related-products, and in the brewing of malt for beer production.⁹⁷

Processing industries regularly publish 'lists of recommended varieties', which become very widely used by growers.⁹⁸ These lists end up shaping farmers' varietal choices, indirectly establishing a dependency situation for farmers on commercial processors. As agro-business becomes more global, such commercial practices are spreading to many parts of the world, including South Asia (especially in the high-margin vegetable market). These practices are likely to spark critical changes for farmers, biodiversity and local markets, including

- a decline in farmers' ability to make independent decisions about crop varieties and farming methods;
- a decrease in crop genetic diversity due to the dominance of a very limited number of varieties, with adverse ecological consequences for agro-systems;
- a reduction in the selection criteria retained by breeders, as they have to align with the industry's preferred criteria in order to maximize seed sales and returns on investment;
- a lack of breeding efforts to develop varieties suited to non-industrial production and transformation systems (i.e., with criteria of rusticity, adaptability to crop mixtures and taste);
- a growing concentration of actors in the breeding sector, both at the national and international level.

At the crux of agro-industrial systems are plant breeders' rights, which secure returns to breeders on their investment. Yet, when agricultural production is defined and modelled by agri-business, farmers do not necessarily stand to benefit from rises in

94 See Mazoyer, M. and L. Roudart, 1998.

95 Torres, F., et al., 2000.

96 McMichael, M., 1998.

97 Pionetti, C., 2005, p. 206.

98 As an example, in the case of hard wheat (also known as durum) production in France, the French Committee on Durum-based Agro-industries published a list of 26 'preferred varieties' amongst the 71 breeders' varieties of durum present on the market in 2002. Five varieties occupied 63 percent of the area sown to durum that year, and four of these appeared on the list of recommended varieties. Pionetti, C., 2004, *Le Contrôle politique du Vivant*, PhD Thesis, Université d'Orléans, France.

productivity and increased sales of agricultural commodities.⁹⁹ Moreover, there is increasing realization that the UPOV Convention has had severe implications for farmers, like the need to pay a royalty in order to reuse farm-saved seeds or the reduced freedom for farmers to choose their production methods.¹⁰⁰

4.4 Intellectual Property Rights and plant varieties in India and Nepal

Demands from the commercial seed sector and the need to comply with the TRIPS Agreement have been two important driving forces behind the development of IPR legislation on plant varieties in developing countries. While a number of these countries ratified UPOV without much debate on whether it effectively met the needs of the country, countries like India and Nepal have allowed for a more elaborate and democratic process of law-making in the realm of IPR and farmers' rights over plant varieties.

In recognition of the fact that their economies are still largely agrarian, India and Nepal have made efforts to balance the rights of breeders with those of farmers in their IPR laws. It is yet to be seen whether these laws will effectively serve to protect farmers' livelihoods and to ensure the sustainability of farming systems in Asia.

This section provides a brief review of India's Act and Nepal's proposed Bill, along with a discussion of key elements of the IPR and agriculture debate in these two countries.



Photo: Carine Pionetti

99 For instance, the average revenue for American farmers has stagnated over the last thirty years despite the steady increase in the volume of exported agricultural produce between 1965 and 1995. Pimbert, M., Thompson, J., Vorley, WT. et al, 2001, *Global restructuring, agri-food systems and livelihoods*, Gate Keeper Series 100, IIED, London.

100 This realization has sparked a recent movement for the promotion of farmers' seeds in Europe, with three major aims: (a) to revive local crop varieties that had become extinct (b) to resume seed-saving practices at the farm-level and to regain the necessary skills to do so, and (c) to build up alternatives to commercial seeds and restore autonomy for farmers in agriculture. See www.semencespaysannes.org for the Farmers' Seed Network in France, www.redsemillas.info for Spain and www.semirurali.net for Italy.

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4.4.1 The Indian Protection of Plant Varieties and Farmers' Rights Act

The process of drafting the Protection of Plant Varieties and Farmers' Rights (PPVFR) Bill lasted more than 10 years and generated a considerable amount of public debate and controversy.¹⁰¹ First introduced in 1993, the Bill was redrafted several times as a result of a number of consultations with civil society. It was finally passed in Parliament in 2001, and the Rules were established in 2006. To date, over 1,300 applications for registration of varieties have been received by the PPVFR Authority in 11 major crops,¹⁰² including applications for transgenic varieties of rice and cotton. The applicants are Indian as well as foreign seed companies and six major agricultural universities.

Box 5. India's Protection of Plant Varieties and Farmers' Rights Act: Provisions on Farmers' Rights (Article 39 and 40)

- Farmers and farming communities are entitled to apply for the registration and protection of local varieties developed by them, provided they meet the criteria of novelty, distinctiveness, uniformity and stability established as conditions for plant variety protection.^a
- A mechanism for benefit-sharing is established to recognize the contributions of farmers "engaged in the conservation of genetic resources of land races and wild relatives of economic plants and their improvement through selection and preservation"^b or who have contributed to the development of a protected variety by providing genetic material. Such farmers are entitled to recognition and rewards from the National Gene Fund.
- Farmers are entitled to "save, use, sow, resow, exchange, share or sell their farm produce including seed of a variety protected under the Act, provided they do not sell branded seed of a protected variety."
- A breeder applying for registration of any variety must provide a "complete passport data of the parental lines from which the variety has been derived," describing the geographic location of origin of the material used, along with the information about any contributions from a rural or tribal farmer, village community, institution or organization in breeding the variety.
- A breeder's certificate may be countered on the grounds that the variety is a farmers' variety.

Notes: (a) Given that farmers' varieties feature genetic variability as "farmers farm against hazards and they are willing to tolerate some variation," the procedures for testing farmers' varieties have been simplified, especially on the criterion of stability. Personal communication with Dr. Nagarajan, Chairperson, PPVFR Authority.

(b) Nayar, M.P., A.K. Singh, and K. Narayanan Nair, 2009, p.8.

The articulation of farmers' rights in the Indian legislation goes beyond their conceptualization in the FAO International Undertaking and in the Convention on Biological Diversity in that it recognizes farmer innovation independently of any programme or scheme (such as in situ conservation) to conserve plant genetic resources.¹⁰³ However, the likelihood that IPR-based rights will provide significant economic returns to farmers or farming communities has been seriously questioned. The empirical literature suggests that "even in developed countries, the amounts generated through a levy on PVP certificates are likely to be quite modest in relation to the funds required for the conservation of agro-biodiversity."¹⁰⁴

101 Seshia, S., 2002.

102 Maize, wheat, rice, sorghum, red gram, black gram, green gram, kidney bean, cotton, jute and lentil. Personal communication with Lokendra Singh, Technical Officer, PPVFR Authority, New Delhi, October 2009.

103 Seshia, S., p. 12.

104 Srinivasan, C., 2003, p. 443.

Another issue of concern is the disruption of flow of improved germ plasm from public research institutions to farming communities.¹⁰⁵ Historically, public research institutes have provided seed varieties free of charge to individual farmers. Under the new regime of IPR, they may seek to charge for use of their materials by private companies instead of giving them away to farmers, thereby hindering farmers' access to improved varieties. In addition, "given that less informed, less educated, and marginalized rural populations are at a disadvantage in claiming ownership," assigning exclusive property rights to germplasm "might reduce the ability of poorer farmers to access seed germplasm."¹⁰⁶ This is especially true of small women farmers who are marginalized by extension services and market mechanisms.

The attempt to integrate gender into India's recent agriculture and seed-related policies must be underlined. In recognition of the fact that "the majority of primary conservers are women," the National Farmers' Policy of India (2007) stipulates that "there must be adequate representation of tribal and farm women in the decision making committees which award the benefits through Gene Fund." Further, the National Commission of Agriculture emphasizes the importance of gender equity in provisions for prior informed consent and benefit-sharing in the Biodiversity Act (2002). It also calls for "gender mainstreaming of the implementation procedures of both the Acts." This is a crucial point as, ultimately, the effective recognition of women's role in crop diversity management will depend on how rules are transcribed at the local level.

The intellectual protection of transgenic crops remains largely unresolved in India at present. The PPVFR Act does not provide for patenting of transgenic varieties and the Indian law on patents explicitly excludes all "methods of agriculture" from protection. However, the amended law (January 2005) extends protection to areas such as agrochemicals and the products of biotechnology.¹⁰⁷ It allows the protection of microorganisms (as required by TRIPS Article 27) and genes, although case law will have to determine the extent to which agricultural exemptions will limit the inclusion of plant varieties in the scope of protection.

The vast trade in Bt cotton seeds in India shows that the presence of IPR systems is not necessarily correlated with the effectiveness of controlling access to seed of transgenic varieties. Indeed, "the most effective control has been achieved through contracts in controlled output markets and the application of seed and biosafety regulations."¹⁰⁸ Biosafety regulations can function — if enforced and effective — as at least temporary de facto substitutes for property rights: "Monsanto, for example, did not have property rights for its Bt cotton that transformed the Indian industry, but for a time had the only legal seeds in the market: only their seeds had conformed to biosafety requirements."¹⁰⁹ This enabled Monsanto to contractually license its technology to many Indian seed companies, thus generating enormous profit.

4.4.2 Farmers' rights in Nepal

Like India, Nepal is planning to follow the *sui generis* option to comply with the TRIPs Agreement by 2013. Nepal's commitment to farmers' rights stems from a need to "safeguard the livelihood options of farmers to promote the agricultural sector for sustained growth and ensure food security, poverty reduction and rural development."¹¹⁰ Civil society proposes two set of provisions to protect farmers: promotional measures in relation to farmer-developed new varieties and related knowledge, and safety measures for farmers' rights on breeders' new varieties (table 7).

By and large, the provisions for farmers' rights in Nepal are similar to those proposed in the Indian law. It is questionable, however, whether an IPR-type protection for farmers' varieties is the most adequate form of protection. Alternatives such as liability regimes allow for the recognition of traditional knowledge, innovations and development of plant varieties that are in the public

105 Ramanna, A. and Smale, M., 2004.

106 Eyzaguirre, P. and Dennis, E., 2007, p. 1495.

107 Louwaars, N., 2006.

108 Ibid.

109 Herring, R., 2007.

110 Adhikari, K., 2008, p.44.

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domain without exclusive property rights.¹¹¹ For example, Thailand's Plant Varieties Protection Act (PVP Act, 1999) provides different kinds of protection for general domestic and wild varieties, as well as local plant varieties, but all plant varieties within Thailand are subject to state sovereignty.¹¹²

Table 7. A framework for farmers' rights in Nepalese proposed legislation on PVP

Farmers' rights over IPR-protected (breeders') varieties	Farmers' rights over their varieties and knowledge
<ul style="list-style-type: none"> Right to save, exchange and reuse protected varieties and sell them in non-branded forms Right to legally challenge breeders' rights and claim compensation in case of non-compliance with access- and benefit-sharing rules by breeders Right to a fair and equitable share in the benefits derived from commercial use of their varieties and knowledge Right to compensation in case of crop failure linked to the quality of breeders' seeds Right to access breeders' seeds through adequate regulatory measures if breeders engage in anti-competitive practices 	<ul style="list-style-type: none"> Right to register their varieties and related knowledge and obtain IPRs over varieties and knowledge developed by them (without restrictions on the access and use of seeds by other farmers for livelihood purposes) Right to grant Prior Informed Consent (PIC) over use of their varieties and knowledge through a proper institutional mechanism Right to regulate access to their varieties and knowledge in the absence of institutional PIC procedure Right to know about the uses of their varieties and knowledge such as through PIC process and 'disclosure requirement'

Source: Adhikari, K., 2008, p. 47.

Moreover, in the available background documents, gender is conspicuously absent, and will need to be integrated. One way of doing this would be to formally recognize women farmers' contributions to the development of varieties: in the identification of landraces, in selection and farmer-led breeding processes, in varietal enhancement (adding value to local varieties by enhancing traits like aroma or disease-resistance) and in the marketing of farmer-bred varieties (seed multiplication and sale of farmers' seeds).¹¹³

¹¹¹ A liability regime allows 'users' to access materials (without prior permission) on the condition that they provide compensation to the 'providers' of, for instance, a plant variety. See Mullapudi Narasimhan, S., 2008.

¹¹² Ibid, p. 21.

¹¹³ Personal communication with Kamalesh Adhikari, Director of SAWTEE, Kathmandu, October 2009.

5. A comprehensive framework to address gender in IPR and agriculture

The IPR laws examined above provide valuable provisions for the protection of Farmers' Rights, but they cannot be said to have been construed from a refined gender perspective. Although gender equity is integrated at various levels in the Indian legislation, many issues highlighted during the field study in India and Nepal stand completely unaddressed by IPR legal framework, including the far-reaching implications of commercial crops on women's control over agriculture.

What needs to be imagined is a more comprehensive legal framework addressing not only PVP but also seed law, access and benefit sharing, gene fund mechanisms, agricultural policy and food security — i.e., an ensemble of policies that should work towards the protection of biodiversity and women's empowerment over crops and seeds at the local level.

The food sovereignty model that is emerging at the international level, with inputs from a range of farmers' movements and organizations, deserves close attention. Food sovereignty "promotes community autonomy, i.e., women and men determining for themselves just what seeds they plant, what animals they raise, what type of farming they carry out, what economic exchanges they engage in, and what they will ultimately eat for dinner."¹¹⁴ Women have played a determining role in shaping the concept of food sovereignty.¹¹⁵

Food sovereignty implies "citizen participation and more direct forms of democracy in the governance of food systems."¹¹⁶ It hinges on the active engagement of citizens, and especially women, in local organizations that promote democratized, ecologically sound and farmer-centred innovations systems in food and agriculture. Food sovereignty also implies the implementation of radical agrarian reform and gender-equitable redistribution of right of access to and use over resources, including land, water, forests, seeds and means of production.

One of the first objectives of the proposed framework should be to minimize the adverse impacts of IPRs and modern crop improvement on the domains that are crucial to women's views, perceptions and practices in agriculture, including

- (a) Mixed cropping patterns that are integral to rural women's strategy for household food security;
- (b) Resource-poor environments, as many poor women farmers only have access to degraded lands (especially in dryland areas);
- (c) Intra-household dynamics, i.e., the ability of women to decide against cash crops that endanger their family's well-being and jeopardizes sustainability in the long run;
- (d) A preserved environment, with special regard for soil fertility and access to clean (unpolluted) water;
- (e) Biodiversity in farmers' fields, at the crop and varietal level;
- (f) Indigenous and local knowledge and skills related to farming, animal-raising, medicinal plants and so on;
- (g) The dynamics of local seed systems, with vibrant seed exchanges at the community level
- (h) Diversified rural livelihoods, with access to land for collection of wild plants, the preservation of home gardens and livestock.

Reducing the impact of IPR and related developments on women's roles in agriculture entails protecting small women farmers from the economic, ecological and social costs associated with commercial crops and hybrid or transgenic seeds. Within the ambit of IPR legislation, this could be done through various innovative provisions such as the following:

¹¹⁴ Pimbert, M., 2009.

¹¹⁵ Desmarais, A., 2007, *La Vía Campesina. Globalization and the power of peasants*, Pluto Press, London.

¹¹⁶ Pimbert, M., 2009.

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- (a) Introducing the criterion of ecological performance into the evaluation of breeders' varieties (prior to registration), e.g., low requirement for fertilizers (or compatibility with organic manure), inbuilt pest resistance, adaptability to low water requirement;
- (b) Initiating on-farm testing procedures to assess the performance of new crop varieties in resource-poor environments (rusticity) and their suitability to mixed cropping practices;
- (c) Developing testing procedures for varietal evaluation in farmers' fields with the involvement of women and women's criteria (including criteria such as taste and cooking quality in case of food crops);
- (d) Creating incentives for participatory breeding in farmers' fields;
- (e) Introducing a criterion of accountability to protect farmers not only from spurious seeds (as already exists in Indian and Nepalese laws), but also from genetic pollution from transgenes (with a view to averting the possibility of firms suing farmers due to the presence of unwanted transgenes in their fields);¹¹⁷
- (f) Providing adequate incentives and support for the development of open-pollinated varieties that can be re-sown (contrary to hybrids) in major food crops like rice, wheat and maize;
- (g) Reorienting public sector crop improvement towards crops grown by women farmers that have only received scant attention until now (minor millets, vegetable crops for home consumption).¹¹⁸

What is also needed to empower women in agriculture and protect household food security is a general streamlining of agricultural, crop improvement, food security and seeds policies with a view to strengthen women's role in farming systems across Asia. Options include participatory plant breeding, community seed banks and biodiversity registers, support for biodiversity-based farming and entrepreneurship, and integrating gender into decision-making processes at all levels.

5.1 Participatory Plant Breeding

Participatory Plant Breeding (PPB) attempts to develop crop varieties that are better adapted to the farmer's local environmental conditions and pay more attention to the diverse traits that farmers and consumers value in their specific localities.¹¹⁹ Experiences in PPB show that it increases the value of local diversity by utilizing farmers' knowledge and in situ genetic resources.

PPB on rice varieties is carried out in Nepal with support from the Pokhara-based NGO LI-BIRD (Local Initiatives for Biodiversity, Research and Development). Groups of men and women farmers take an active role in identifying local rice landraces, selecting criteria for improvement, evaluating varieties based on specific traits and multiplying the seed of locally-improved farmers' varieties of rice (table 8). Two rice varieties developed through PPB have been proposed for registration at the national level.¹²⁰ From the beginning of the project, women have been actively involved at every step of the breeding process.

¹¹⁷ This is with reference to the well-known case of Percy Schmeiser, a Canadian canola farmer accused in 1998 by Monsanto of having infringed its patented canola seed technology, the herbicide-resistant Round-Up Ready Canola, which came into Percy Schmeiser's fields through unwanted gene pollution (the farmer had been using his farm-bred seeds for several years). In 2001, the Federal Court of Canada ordered the farmer to pay Monsanto compensation of Can \$20,000. Many farmers throughout the United States and Canada have faced similar problems after the spread of patent-protected genetically modified crops in North America. Pionetti, C., 2005, pp. 192-193. See also Phillipson, M., 2001.

¹¹⁸ According to Dr. Nagarajan of the PPVFR Authority, as the private sector takes over breeding in major crops like maize, rice and wheat, the public sector will be in a position to channel its efforts towards minor food crops. But, given that private firms are highly likely to develop mostly hybrids for these major food crops, the public sector should continue to work on open-pollinated varieties or provide support for participatory breeding in farmers' fields.

¹¹⁹ Gyawali, S., et al, 2007.

¹²⁰ In the case of varieties developed through PPB receive attention on a wider scale, their protection through geographical indications may be worth exploring. India is taking steps to protect basmati rice and Darjeeling tea through geographical indications. See Marie-Vivien, D., 2008.

Table 8. Participatory Plant Breeding with support from LI-BIRD (Nepal)

Steps in PPB programme	Objective of each step	Method used
Goal setting	Setting breeding goal with target farmers	Market analysis of use values of local landraces through four-cell analysis
Generating diversity	Choosing parents Making crosses	Evaluation of potential parents on performance in 'diversity plots' (using a landrace as one parent) Controlled cross pollination between individual plants (self-pollinated plants). Crossing between selected landrace and complementary parent
Selection in segregating generations	Advancing and selecting in segregating generations Community empowerment	Generation advance, individual plant selection, bulk selection, stress-screening nurseries Training and field visits, interaction with breeders and farmers from other PPB projects, joint selection by farmers and breeders
Testing varieties	Trials in research stations and farmers' fields	Evaluation of fixed line varieties for yield, resistances, quality, milling, taste
Seed supply	Seed multiplication	Breeder, foundation and certified seed production (formal seed supply). Facilitation of informal seed supply (truthfully labelled and quality-declared seed). Market and popularization
Impact assessment	Evaluation of impact	Identifying adopters and adopted varieties; collecting feedback through surveys, group discussions, four-cell and molecular analysis

Source: Gyawali, S. et al., 2008.

5.2 Community Biodiversity Registers

Community Biodiversity Registers (CBR) refer to a "record kept in a register by community members of the genetic resources in a community, including information on their custodians, passport data, agro-ecology and cultural and use values."¹²¹ The participatory process of preparing a CBR empowers local communities and institutions to develop understanding of their own biodiversity assets and their value. In South India, a Community Media Trust composed of Dalit women and supported by the Deccan Development Society has been documenting the CBR process in several villages of Andhra Pradesh through videos and short documentary films.¹²² Documentation of farmers' varieties in India is supported by various organizations and networks, including the Honeybee Network database,¹²³ the Swaminathan Foundation and the National Innovation Fund.¹²⁴

In Nepal, LI-BIRD is one of the leading organizations promoting community CBRs in various parts of Nepal with four major objectives:¹²⁵

121 Subedi, A., B Sthapit, B., et al., 2007.

122 www.ddsindia.com.

123 www.sristi.org.

124 See Ramanna, A. and M. Smale, 2004, pp. 435–437 for more details on these initiatives.

125 www.libird.org.

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- protecting traditional knowledge and genetic materials from biopiracy
- promoting benefit-sharing
- monitoring genetic erosion
- establishing local ownership for development and conservation activities

CBRs are also about building up rural communities' knowledge of local agro-ecology, which can help farmers make more autonomous decisions in managing their farming systems (for instance, develop pest management practices based on the use of local resources to decrease dependency on expensive chemical pesticides, as is already done in many parts of Asia with success).

Yet, the lack of legal status for CBRs, both at the national and international level, remains an issue of concern. The World Intellectual Property Organisation (WIPO) has been elaborating a Draft Treaty on the *sui generis* protection of databases, which could be used by countries like India and Nepal to give legal status to CBRs, to monitor access to information on biological resources and to implement benefit-sharing provisions.¹²⁶

5.3 Community Seed Banks (CSB)

As shown by many studies, formal seed systems fail to meet the demands of small-scale farmers who typically desire multiple varieties of seeds of many crops, in small amounts, at the right time and at a reasonable cost, with variations from one season to the next.¹²⁷

Moreover, there is no formal system of supplying seeds of traditional varieties neither on India nor in Nepal. In Nepal, the formal seed supply system deals with a limited number of improved varieties that meet around 5 percent of seed requirements. In addition, genetic diversity is fast eroding as a consequence of agricultural modernization, increasing natural disaster like floods and droughts, and changing climatic conditions. Globally, efforts have focused on improving ex situ conservation of genetic resources (through international and national gene banks) which remain totally inaccessible to small farmers.

CSB refers to a seed bank established and managed by the community primarily for the purpose of conserving traditional varieties of different crops and improving local access to seeds for small farmers. As discussed above, traditional varieties are better adapted to local farming conditions than most HYVs, providing good economic returns in certain cases. They also tend to be more resistant to pests, diseases, droughts and floods, and are suited to low-input agriculture.

In Nepal, the majority of farmers farm uplands or lowlands with no irrigation facilities, and poor soil fertility. Most farmers cannot afford inputs for their crops, and many are unable to save enough seed for the following year due to food scarcity. In such cases, a reliable, localized and affordable supply of seeds of traditional varieties can be critical (box 6). This is why the CSB model is emerging as a reliable option for small-scale farmers in various parts of Asia and Africa.¹²⁸

CSBs thus serve to:

- improve easy access to farmers' variety seeds at the local level
- document knowledge of traditional varieties and maintain small amounts of seed
- promote a contact point for local seeds and information
- promote on-farm conservation of local crop diversity

In order to be more effective from an agro-biodiversity conservation perspective, national and regional networks of CSBs should be established.

126 Dhar, B., and Chaturvedi, S., 2001.

127 Shreshtha, P. et al., 2007.

128 See *Leisa Magazine*, vol. 23, issue 2, June 2007 for a description of various CSB experiences in Sri Lanka, The Philippines, Sudan, Tanzania. Available at www.leisa.info.

Box 6. Model Community Seed Bank in Bara district, Nepal

The Agriculture Development and Conservation Society (ADCS), a Nepalese farmers' organization, established a CSB in 2003, after finding out that the number of local rice varieties had gone down from 33 in 1998 to 14 in 2003. Initially, ADCS received financial support from Bioversity International, and technical training and management support from LI-BIRD, another NGO. ADCS obtained access to a small piece of (public) land for the construction of a seed storage structure.

Today, there are over 300 members associated with the CSB, 273 of whom are women. To date, they have collected and conserved 80 traditional varieties of rice and several landraces of finger millet, sponge gourd and pigeon pea. They provide seed on a loan basis to group members, and on cost basis to non-members. On a loan basis, farmers have to return the seed with a 50 percent increment after harvest.

ADCS also established a community biodiversity management fund (with initial seed money of 500,000 Nepali Rupees). This fund serves to provide low-interest loans to group members to start income-generation activities such as goat rearing, vegetable farming and small businesses. The loan beneficiaries are expected to grow at least one landrace for conservation and regeneration purposes. ADCS also maintains a 'diversity block' (a piece of land where many varieties are grown and tested) for each crop to create awareness about the value of traditional varieties and produce seed for next year. For each variety, a certain quantity of seed is saved so as to avoid further loss of local landraces as a result of natural disaster.

5.4 Promoting biodiversity-based agriculture

The maintenance of diversity-based systems is necessary for several reasons. First, when ecological parameters are factored in, mixed cropping systems have been shown to be more productive than monocrops.¹²⁹ Second, mixed cropping systems are in line with women's roles in agriculture and are key to meeting household food security throughout the world. Third, diversity-based farming systems are an invaluable asset in the context of climate change. Indeed, bio-diverse systems have more built-in resilience and their diversity provides the basis for adaptation to change. For instance, in Nepal, farmers from Begnas are hoping to develop drought-tolerant rice varieties using the genetic diversity of local landraces. Similarly, dryland farmers continuously work with local crop diversity in order to adapt to increasingly frequent dry spells and disturbed rainfall patterns.

Hence, diversity-based farming systems (including home gardens) need to receive policy support for the following reasons:

- to improve the viability of diversity-based farming systems through various incentives such as adequate pricing systems, subsidized access to manure-providing livestock and the development of adequate processing technologies;
- to support farmer-led research and innovation to increase the resilience of diversity-based farming systems to environmental and climate change;
- to provide support for women's entrepreneurship through value addition in local crops (for instance, aromatic rice varieties in Nepal),¹³⁰ local processing of various crop products, production and sale of vermicompost, cultivation and sale of medicinal and ornamental plants, and so on.

129 McNetting, R., 1993.

130 LI-BIRD supports a women's cooperative for the cultivation and marketing of local rice varieties (Anadi, sticky rice) and taro processed products in the Begnas area of Nepal. DDS has set up a shop (in the town of Zaheerabad) where Dalit women farmers market millet-based produce with a higher premium than in the regular market.

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The IAASTD Report for the East and South Asia and the Pacific highlights the need for government support to develop markets for various alternative practices such as 'green chemistry', biodynamic farming, integrated pest management, organic agriculture and diversified agro-ecological production systems.¹³¹

5.5 Governance and decision-making

The empowerment of women is central to the recognition of their roles in agriculture, biodiversity management and seed-related work. The creation of appropriate structures of governance, such as local committees at the community level, *with the full participation of women*, is a necessary step towards devolving power to the people with matters relating to protection of farmers' varieties, value-addition, granting access to genetic resources, negotiating arrangements.

As mentioned in the Indian PPVFR Act, it is also crucial that women partake in committees addressing conservation but also benefit-sharing issues, at the local, national and regional levels. Likewise, the representation of women in policy debates on agriculture, IPRs and trade has to increase so that the specific concerns and needs of women farmers can be met.

In India, the National Biodiversity Strategy Action Plan (NBSAP), which was elaborated between 1999 and 2002, is a good example of a policy document that ties together biodiversity conservation, community empowerment and socio-economic issues. Conducted in a participatory and decentralized fashion, the NBSAP process envisages the assessment and stocktaking of biodiversity-related information at various levels, including site-specific threats and pressures, social, political, economic issues, ethical concerns and ongoing conservation initiatives by various local groups.¹³²

The NBSAP process lays special emphasis on gender-sensitive decentralized planning, and it attempts to incorporate existing expertise and information available with various sections of civil society. Thus, one of the regional plans emerged out of a mobile biodiversity festival and a series of public debates with women farmers from marginalized sections of society. The plan explores the interlinkages between sustainable agriculture, seed diversity, secure livelihoods, locally sensitive markets, and cultural aspects of farming.¹³³

Ultimately, what is required is a reinforcement of women farmers' control over local resources, decision-making processes and policies. The measures proposed above are a step in this direction.

131 See www.agassessment.org/docs/IAASTD_ESAP_SDM_JAN_2008.pdf.

132 'Kalpavriksh, Towards the formulation of India's National Biodiversity Strategy and Action Plan, A Background Paper'. Available at www.rupfor.org/downloadq/BEG%20Background%20paper%20for%20IIED%20workshop.pdf.

133 For more details, see www.ddsindia.com/www/nbsapreport.htm.

6. Recommendations

The following recommendations provide avenues for integrating gender as a key component of IPR and seed legislation in developing countries.

1. Achieve a better understanding of the role of women in various farming contexts, and the stakes they have in maintaining on-farm diversity and seed-saving practices. This means answering questions like:
 - What are the major contributions of women to the farming sector?
 - Are there any sources of livelihoods that typically fall under women's domains? (all gathering work, tending of home gardens, etc.)
 - Are there particular dimensions of farming, gardening, tending animals that are typically under women's control?
 - Do women share the same vision of agriculture as men? Are there any differences between men's and women's conception of crop diversity? Food security? The basic aim of farming?
 - Who in the household hold key information on seeds and other inputs?
2. Develop a gender analysis of the impact of existing agricultural policies, seed laws, IPR regimes and trade rules on gendered practices in agriculture, with refined answers to the following questions:
 - How are women farmers affected by new technologies, especially in seeds?
 - Do women stand largely empowered/disempowered as a result of commercialization in the agricultural sector?
 - How do new forms of technological knowledge impact on gender relations?

What has to be kept in mind, here, is that any legislation that is gender-blind, i.e., which pays no attention to gender-disaggregated data (which provide essential clues on women's concerns) will tend to discriminate further against women, be it in terms of limiting their access to resources or technology, degrading ecosystems such as commons or forests that are significant to women or undermining bodies of knowledge used and transmitted by women to achieve security of livelihood.

More specifically, with respect to seed laws on registration, certification and varietal protection, it may be advisable to do the following:

- Exempt farmers' varieties from formal varietal registration systems;
- Allow farming communities to evolve registration systems for local varieties based on collectively-evolved criteria (instead of strictly enforcing the DUS criteria);
- Allow trade in seed of non-registered varieties within a particular region;
- Refrain from compulsory seed certification and provide spaces for alternative or non-formal certification schemes pioneered by farmers;
- Make biotechnology firms accountable for genetic pollution of conventional crops by GM seeds.

6. Recommendations

3. Develop a gender-sensitive understanding of farmers' rights not simply with respect to breeders' rights, but on their own terms. In other words, the aim should not be to merely create exemptions for farmers on breeders' rights but to develop a legal framework that supports informal seed systems and diversified cropping patterns and promotes household food security.

Concretely, this could be achieved through gender-sensitive provisions such as:

- formally recognizing women for their farming roles in both paid and unpaid work and as repositories of traditional skills and knowledge;
- ensuring that small women farmers can increase their productivity and share of income through access to gender sensitive technology, market, capital and secure property rights
- supporting women's leadership role in all seed-related initiatives;
- promoting PPB and women's involvement in PPB;
- promoting CSBs and creating regional networks of gene banks;
- reorienting public sector crop improvement towards crops and varieties favoured by women farmers towards meeting household food security;
- improving the viability of diversity-based farming systems through incentives such as adequate pricing systems for local crops, subsidized access to livestock and processing technologies suited to women's needs.

4. Projections by the Intergovernmental Panel on Climate Change (IPCC) show that climate change will increase occurrence of natural hazards, increase average air temperatures, change precipitation patterns, increase sea levels with resulting inundation of the coastal areas (low lying islands and deltaic regions are particularly vulnerable), increase soil and water salinity and provide new and more favourable environments for pests and diseases.¹³⁴ Climate change therefore increases the risk factor in farming systems, especially in marginal environments like drylands or mountains, with adverse implications for agricultural productivity and livelihoods.

Moving away from industrial agriculture and supporting multi-functionality in agriculture, with an emphasis on women farmers' knowledge and leadership, will not only contribute to reducing greenhouse gas emissions, but also increase the capacity of farming communities to adapt to climate change. Given the relevance of women farmers' biodiversity-related knowledge for climate change, it would be worthwhile to start setting up participatory knowledge management programmes informed and run by a network of women farmers at local and regional levels, cross-cutting all agricultural sectors.

5. Build-up processes of community empowerment with respect to seed, biodiversity and agriculture, with adequate and effective representation of women, as well as the capacity of rural communities to analyse, innovate and adapt using local skills and resources. Specifically, this means encouraging women to take leadership roles in farmers' organizations, community-based initiatives and decision-making processes at the local, regional and national levels.

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