

**Women in the plant world:  
the significance of women and gender bias for biodiversity  
conservation**

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## Introduction

Across the globe, and particularly in tropical regions rich in biodiversity, in villages, on farms, in homesteads, forests, common pastures, fields and borders, it is women who manage the majority of all plant resources that are used by humans. This means that they also hold the majority of all local plant knowledge and are those who are mainly responsible for the *in situ* conservation and management of useful plants, whether they are domesticated or wild. The simple explanation for this is that, throughout history, women's daily work has required more of this knowledge. Across the globe, it is women who predominate as wild plant gatherers, homegardeners and plant domesticators, herbalists, and seed custodians. In several world regions and among many cultural groups, they also predominate as plant breeders and farmers.<sup>1</sup>

In spite of this, world-wide, biodiversity conservation policies, programmes and guidelines usually omit reference to women or to gender relations. The majority of plant biodiversity research is also not gender sensitive, which can lead to incomplete or erroneous scientific results with respect to the diversity, characteristics and uses of plants, the nature of people-plant relationships in culturally-specific contexts, and the causes and potential responses to genetic erosion. In many regions, biological resources constitute the greatest part of women's wealth, providing them with food, medicine, clothing, shelter, utensils and income. Continued access to these resources is vital to women's status and welfare and therefore women's motivations represent *a principle driving force* to counter processes of

biological erosion. Only by giving serious attention to women's knowledge, use, rights and needs with respect to plant biodiversity can two of the major goals of the Convention on Biological Diversity be met: the sustainable use of its components and fair and equitable sharing of the benefits from its use (Howard, forthcoming 2003).

Gender research has clearly demonstrated the presence of "gender bias" in social and natural sciences. This means that scientists take prevailing gender norms in a society to be 'natural' and often incorporate these norms into their theories as unquestioned assumptions. It also means that scientists assume male predominance and take men's behaviour and knowledge to be 'standard' (e.g., men are the 'farmers', 'foresters', 'leaders', 'shamans', etc.) whereas women are given little importance or their behaviour is seen to be 'deviant' in comparison with men. Gender bias affects theories, the questions formulated, the methods used, and the research outcomes. The possibility to conserve the world's plant genetic resources, particularly those resources that are used by humans, is closely linked to gender bias in the scientific pursuit of knowledge about plants. Ethnobotany is "the study of the interactions of plants and people, including the influence of plants on human culture" (Balick & Cox 1996:i). This science has undergone a great resurgence thanks to the recent world-wide concern with biodiversity conservation. This briefing deals with ethnobotanical science and the way it is practised, and about biodiversity conservation and the way it is conceptualised and performed. It is about how gender bias affects scientific knowledge of the plant world and how this in turn affects our ability to shape that world in the ways that we

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<sup>1</sup> This briefing paper is based on results of the most comprehensive, worldwide review to date of scientific literature dealing with people-plant relationships that is ongoing at Wageningen University. More information about this review and the results are available through the author.

desire. The repercussions go far beyond simply creating biased scientific knowledge: they extend into related practices, policies, and interventions that are intended to change the interactions between people, and between people and their environments and they can distort the outcomes in ways that are unanticipated and not always desirable.

## 1. Woman the housewife

Women, in their nearly universal position as housewives performing domestic tasks, sustain an intimate and important relationship with plants. These tasks include, among many others, food preparation, preservation, storage and processing. In fact, the kitchen is quite possibly the most under-valued site of plant biodiversity conservation.

Culinary traditions are a highly important aspect of cultural identity. Foods are consumed for their nutritional content and also for their emotional, ritualistic, spiritual, and medicinal values. Food is a fundamental constituent of exchange and hospitality, which are in turn basic organising principles of many traditional societies. While the idea of what constitutes an adequate meal or dish may be influenced by men, women are generally considered as the 'gatekeepers' of food flows in and out of the home. Culinary traditions are perpetuated by the careful transmission of knowledge and skills from mother to daughter. Culinary preferences, as well as the post-harvest processes that are required in order to provide edible and culturally acceptable food, are probably the single most important reason for people's knowledge, selection, use, and conservation of plant biodiversity. For example, in the Andes, the cradle of the world's potato diversity, Zimmerer's research showed that agronomic conditions alone explain a very small percentage of the variation in cultivar diversity. Rather, the maintenance of different potato and maize species groups corresponds to different *culinary requirements*, e.g. freeze-drying, soup making, and boiling (1991). In Tuscany in Italy, Pieroni shows that women use more than 50 wild plant species to make traditional soups. As young Italian women enter the labour force and spend less time in the kitchen, he

fears that the knowledge that women hold about these wild plant resources will be completely lost (1999). In Swaziland, South Africa, the pressure on women's time as they become dependent upon wage labour is the main factor contributing to the abandonment of traditional coarse grain staples and indigenous vegetables in favour of refined wheat products and exotic vegetable varieties (Malaza 1994). On the other hand, in urbanised Quintana Roo, Mexico, immigrant Mayan women struggle to preserve their culture and biodiversity by transplanting a large number of varieties that are native to their homes in the Yucatan into their urban homegardens, mainly in order to maintain their Mayan culinary traditions. In this way, they maintain elements of their ethnic identity as well as conserve and diffuse plant genetic diversity (Greenberg 1996). What is highly significant and yet mainly overlooked in conservation efforts is the fact that, as culinary traditions are lost, the principle reason that people maintain a large amount of plant biodiversity are also lost. This is particularly and intimately related to change in women's position and status.

Which plants are selected, managed, produced, and conserved for food depends on a wide range of criteria related to culinary qualities and beliefs about health and nutrition. But domestic work entails more than cooking: it also entails processing, preserving, and storing plants, and which plants are selected for use is related to processing characteristics, storability, preservation methods, the technology available for these, and to local knowledge, labour, and fuel availability. Food processing and preparation are even more essential in most traditional societies because they make plants edible through detoxification, which requires in-depth knowledge of plant characteristics. The knowledge and skills required in the post-harvest food chain are complex and dynamic, and many studies show

that indigenous women's knowledge in food processing and storage often correlates with scientific knowledge. For example, women ferment plants using indigenous techniques that reduce spoilage and increase nutritional value, and they employ precise techniques to store and preserve plants that reduce the incidence of pests and diseases. Historical research carried out on the American Indian women gatherers of the Northwest Pacific Coast of the United States showed also that most plant resources were seasoned and processed by methods which required special techniques as well as storage (Norton, 1985). When harvested and stored in quantity, native plant foods were dependable, all season staples. Plants could only be harvested in a limited season and, without processing and storage, they would have been unavailable during a large part of the year. Food storage and preservation skills that depend upon ethnobotanical knowledge thus are vital to ensuring household food security and to ensuring that plants are useful to people and therefore subject to management and conservation. Nevertheless, it is rare that people-plant research or conservation policies and programmes consider the significance of women's domestic processing, storage and food preparation practices, knowledge or needs.

## **2. Woman the gatherer**

Through the mid-1960's, models of human evolution were based upon the idea that men and hunting were the driving forces in human evolution. It was assumed that men used tools, hunted the food and provisioned women who remained at the 'home-base' taking care of the children. Since then it has become widely recognised that, in most foraging societies (those dependent mainly on hunting, fishing, and gathering), both historically and today, the bulk of foodstuffs is provided by gathering

which is carried out primarily by women. "Woman, the gatherer" models of human evolution have emerged (Fedigan, 1986). But not only foraging societies are dependent upon wild plants: instead, wild plants are essential to human livelihoods throughout rural areas of the developing world. In all of these systems, women predominate as plant gatherers. According to one statistical analysis of 135 different societies with various subsistence bases (e.g., agriculture, animal production, hunting, fishing, and gathering), women provide 79% percent of total vegetal food collected (Barry and Schlegel 1982).

Wild plants provide food, fodder, mulch, medicine, fuel, and a multitude of materials for crafts and construction. They provide absolutely essential foodstuffs in times of food scarcity or famine. In plant gathering, the plants or plant parts gathered by men and women reflects the gender division of labour. Women gather plants that they are 'responsible' for, such as those needed to make sauces and relishes or those that serve as inputs for their own production such as basket and cloth making. Men and women have different needs and responsibilities for gathered plants, and different knowledge and preferences with respect to them. For example, research on gender differences in local knowledge and use of forest plants in Utter Pradesh, India shows that women have greater knowledge of the usefulness of plants than men and perceive their usefulness differently. Men's primarily use gathered plants for agriculture (fodder and mulch) and women uses are more related to the household - medicines, tonics, cleansers, fibre, food and tools. Much research also shows that men often collect plants from "men's spaces" and women collect from "women's spaces." For example, men are allowed to enter "sacred groves" or highland forests, whereas women's spaces include "disturbed" environments close to

the home, such as field margins, irrigation canals, roadsides, and fallows. But in many societies, women venture far from home to gather plants in relatively "wild" places such as forests and savannah, and some research demonstrates that men are not be permitted to gather in these "women's wild spaces." Conservation programmes can easily and unwittingly change access to spaces (e.g., 'nature reserves') without recognising how these changes may advantage and disadvantage women and men differently.

The idea held by many conservationists that plants growing in natural environments are "wild" is also often mistaken: many are not strictly either "gathered" or "wild" but are selectively managed and harvested. An example of how "wild plants" are managed by women in their natural environments is provided by Native American basket producers in California. Basket making was historically based on the collection of white root where 250-750 plants were needed to make a single basket (Stevens 1999). While harvesting, women left the plants and removed the weeds, thereby cultivating the bed and enhancing the habitat for the production of new plants (Dick-Bissonnette 1997). Women also cultivated the roots with digging sticks, encouraging the growth of long straight rhizomes. Upon harvesting, women left sufficient rhizomes in place to keep the patch viable for future use. This system was sustainable for hundreds of years. Nowadays, the available gathering sites have largely disappeared, so modern basket weavers are growing their own materials in homegardens (Stevens 1999). Another example of a similar system of women's wild plant management is provided by wild rice in the Great Lakes region of the US and Canada. As these territories were taken over by whites, and American wild rice became a world commodity, the benefits of wild rice management were wrenched away from indigenous women (Vennum 1988). But women's ethnobotanical

knowledge of wild plant management was essential for the survival of these tribes for at least several centuries, as well as essential to the relatively high status that women enjoyed in these societies.

Across the globe today, foraging resources are declining rapidly. Population growth, market expansion, and environmental degradation are increasing the time and labour invested in foraging activities, particularly by women, and women's gathering rights are being usurped. The reduction of foraged foods in the diet is leading to poorer nutrition and is reducing emergency food supplies, thus increasing reliance on food purchases and decreasing management, knowledge and use of local plant biodiversity.

### **3. Woman the gardener**

Homegardens are the oldest and most widely used cultivation systems on the planet. In most instances, they have far greater species diversity in comparison with cultivated fields, and hence should be recognised as the most important repository of agrobiodiversity. Tropical gardens are the most renowned form of homegardens and are the most complex agroforestry systems known. For example, in West Java, where some of the world's richest homegardens are located, 240 plant species were found in gardens in just two sub-districts (Soemarwoto, et.al. 1976). Most definitions of homegardens refer to their location near the home, their function as a secondary source of food and income for households, the predominance of family labour, and their multi-functionality as aesthetic, social and recreational spaces, as well as for provisioning of medicines, herbs and spices, fodder, building materials, and fuel.

The importance of homegardens for biodiversity conservation is only now being tentatively recognised. Gardens "...represent a 'genetic backstop',

preserving species and varieties which are not economical in field production and are planted small-scale.." (Ninez 1987). In swidden cultivation systems, useful varieties that would be lost due to clearing and burning are transplanted to homegardens where they may thrive (Okigbo 1985). One of the most important reasons to conserve plants *in situ* rather than in gene banks is to permit their continued evolution, and it is in homegardens where much of this evolution takes place. Many authors have noted that farmers first experiment with new crop varieties in homegardens to determine their productivity before they are planted in fields. The migration of the potato from South America to other parts of the globe occurred through homegardens, and the diffusion of maize began when Incan women settled newly conquered territories and brought maize seed with them to plant in their new homes (Ninez Ibid.). For example, when Alexiades investigated medicinal plant use among forest dwellers in the Venezuelan Amazon, he found that most medicinal plants are collected from fallow land and homegardens rather than from forests, which most researchers assume supply the largest proportion of medicinals. Homegardens are also essential to the transmission of knowledge across generations. For example, among the Maya in highland Guatemala, "Women educate children through the chores of the garden. They teach how to use farm tools, what plants need to thrive, and how to manage crops, especially through weeding and harvesting" (Keys 1999:89).

While the gender division of labour in homegardening varies across regions and cultures, the close link between gardens and the domestic sphere everywhere ensures that women tend gardens. It is clearly women who manage homegardens across the developed world as well as in tropical Africa and Latin America, and they make strong contributions to

homegardening in Asia, so that, globally, women hold the majority of knowledge, skills and responsibilities in homegardening. Like much of women's work, homegardening is relatively 'invisible' and is often disparaged as 'minor' or 'supplemental' to agricultural production. The fact that the majority of garden produce does not enter into the market, that many of the plants cultivated are traditional varieties known mainly to local people, and that the land areas involved are generally small and near the home, all contribute to the continuing invisibility and devaluation of homegardens, which in turn contributes to the invisibility and devaluation of women's contributions to plant biodiversity conservation.

Homegardens are a vital resource particularly for poor women since they permit them to provide additional food and income for their families. Many studies show that a woman's garden provides basic nutrition in periods of food scarcity and food supplies year-round. Homegarden food production is not necessarily supplemental and the amount of labour used may be large in certain parts of the year. Over much of sub-Saharan Africa and Latin America, women are the predominant managers of urban homegardens that provide a substantial source of the total livelihood for low-income households through sales of produce and supplemental food supplies. Ninez showed that this holds even in developed countries such as the United States, where a community garden can produce an US\$5000 of output with US\$500 in input. During the *Great Depression* and *World War II*, over 40% of all fresh produce in the US came from homegardens and they were even more important in Europe. In former Soviet countries today, homegardens provide a very substantial proportion of total household food supply and studies show that these are managed predominantly by women. It is clear that homegardens and their women managers have been largely neglected in

development planning and food security, and this neglect is now being largely reproduced in biodiversity conservation efforts.

#### **4. Woman the herbalist**

The World Health Organisation estimates that 80% of the world's population use plant medicines for their primary health care needs (Farnsworth et al., 1985). Between 25 and 40% of all modern pharmaceuticals are derived from plants. Research on folk medicine and medicinal plants is booming, but this has tended to focus on the knowledge of folk medicinal specialists: shamans, midwives and herbalists (McClain 1989). Shamans and "medicine men" are usually men who have great power and status in their tribes, although female priestesses are prevalent particularly in Africa and Asia. Herbalists, on the other hand, are specialists in treating illnesses through the use of plants and are frequently women; midwives are also herbal specialists and are usually women, although men can also be midwives. Women's ethnobotanical knowledge and medicinal roles are often unexplored by ethnobotanists who tend to make a beeline for the "shaman" or 'medicine men'. For example, Kothari (1996) shows that, across Latin American societies, shamans usually have great power and status, so it is hardly surprising that the term "shaman" is reserved nearly exclusively for men, and that female healers are often invisible. However, most illness episodes are not life threatening and are usually resolved in the domestic context without consulting traditional or modern specialists. Awareness is growing that the 'common' knowledge of lay women is actually that which *predominates* in traditional health care systems (McClain 1989:21; Good, 1987). Estimates of illness episodes managed solely within the domestic ("lay") domain range from 70

to 90 percent. Many reports have portrayed home treatment systems as rudimentary and relatively ineffective, but detailed accounts of illnesses and remedies employed at home indicate that, in many societies, family therapy is highly complex, including knowledge of the use of a wide variety of herbal remedies. Research in Latin America shows that the principal health care resources are herbal medicines and most instances of medical care involve women among the Quichua in the Ecuadorean Andes (where, for example, women can detail the effectiveness of individual herbs-illness combinations, and where a total of 350 plants are used), the Quechua in the Peruvian highlands, the Ese Eja, the Yanomami, the Siona, the Garifuna, the Q'eqchi' Maya, and the Caribs. Advice is sought outside the home only when these herbal medicines do not help. Knowledge of herbal remedies is often passed along the female line, and socialization processes result in the transmission of curing skills and knowledge mainly to girls as they learn to observe and treat minor illnesses while caring for siblings (Howard-Borjas 2001).

Men and women not only have different knowledge of medicinal plants: their knowledge is also structured in a different way, which is related not only to the division of labour, but as well to social power. Ethnobotanical research has often introduced a double bias: on the one hand it has relied on a limited sample of predominantly male informants and, on the other, it has structurally neglected female healers and the realm of domestic curing and herbalism. It is not surprising, then, that this bias is being largely reproduced by those concerned with biodiversity conservation.

## **5. Woman the plant breeder and seed custodian**

There would be no agriculture without seed and not nearly as much seed variability without seed custodians and plant breeders. Increasingly, these are large multinational corporations and international institutions that manage gene banks, and increasingly the world's agriculture is dependent upon them and on the purchase of seed. Traditionally, plant breeders and seed custodians are small farmers, and often if not predominantly women. Women in sub-Saharan Africa as well as in indigenous societies in Latin America and the Pacific are usually directly responsible for crop production. As crop producers, they consider all of those selection factors that are critical to farmers who produce in marginal environments and manage many varieties for many purposes. For example, in Rwanda, women produce more than 600 varieties of beans (Sperling and Berkowitz 1994); while in Peru, in one small village, Aguaruna women plant more than 60 varieties of manioc (Boster 1984). While both men and women are involved in crop selection and have highly specific knowledge and use a variety of criteria, these differ substantially between them, and women's criteria and knowledge are more often overlooked by formal plant breeders and conservationists. Women often have a broader set of varietal selection criteria in comparison with men since they use plant materials in more diverse ways: for example, rice not only provides food, but also straw for thatching, mat-making and fodder, husks for fuel, and leaves for relishes. Women's responsibilities for post-harvest processing and family food supplies means that women try to ensure that varieties are in line with culinary traditions, are palatable and nutritious, and meet processing and storage requirements. Several studies show that, even when women do not produce crops, men take their wives' preferences and criteria into account

when selecting varieties, but researchers mostly neglect this since they are not directly related to yield and pest and disease resistance.

Very frequently, women are responsible for tasks related to seed management including seed selection, storage, preservation and exchange. Informal seed exchange systems are often female domains, and include mechanisms such as the bride price, gift giving, and kinship obligations, as well as market and barter transactions. Women's predominance in seed management activities is often explained by the close relation that this has with post-harvest and domestic work. Others suggest a more cosmological explanation that may be found to hold across many traditional societies. In the Peruvian Andes, Zimmerer relates that women almost exclusively manage potato and maize seed. Men are forbidden to handle seed or enter seed storage areas (1991). The explanation for women's control of seed is to be found in Andean cosmology. In Quechua, plants that are useful to humans are all worshipped under the name of mother: Mama sara (maize), Mama acxo (potato), Mama oca (Mama cocoa). Andean thinking contains a dual concept of reality based on masculine and feminine principles. "Seed" also refers to semen, providing a metaphor between the "seed" that the male deposits in the womb and that which is sown in the field, collected, and later deposited in the home (Tapia and de la Torre 1993). Throughout human history and across most societies, women and fertility, and seed and fertility, are equated.

## **6. Women and rights to plant genetic resources**

World-wide, discussions are ongoing on about intellectual property rights to plants and the conservation of plant biodiversity. Most now

acknowledge that indigenous farmers and forest dwellers should have rights to the genetic material they have developed and be compensated for its use. However, what these international systems of rights and discussions have largely failed to acknowledge is that there are pre-existing (indigenous) systems of rights to these resources that socially regulate access to and control over their knowledge, exploitation, exchange, and use. These indigenous systems serve to manage and conserve plant biodiversity. Native peoples have their own concepts of intellectual property at individual or group level based on residence, kinship, gender, or ethnicity. Leading experts in this field acknowledge that little is known about these 'indigenous' rights regimes and that research in this area should be a priority.

Several studies show that, among indigenous populations, rights to gather plants are strictly regulated and are passed from mother to daughter. For example, gathered acorns were the most important dietary staple among California Indians, and "Oak trees and seed plots were owned by women and inherited matrilineally..." (Dick-Bissonnette 1997:235). Married daughters gathered seeds from their mothers' seed localities but not from their mother-in-laws' localities. Rights were established through continuous use and by marking out gathering locations. These rights were taken very seriously - if another woman tried to take resources ahead of a claimant, a fight would ensue that sometimes led to a family feud. Across the globe, among the Igbos in Nigeria, an indigenous vegetable, *Telfairia occidentalis* (fluted pumpkin), is grown in women's homegardens, and is considered to be a 'women's crop'. Women cannot cut *Telfairia* plants belonging to others - to do so desecrates the other's field and, to atone, the earth goddess must be appeased. This means that, to have access to

Telfaria, each adult female must plant her own field (Akoroda 1990). Price's work on women's traditional gathering rights to wild plants in Thailand stands as perhaps the most in-depth research to date on this topic (Price 1997).

If indigenous rights (and women's rights) to plants are not recognised, they can be readily usurped. Debates about rights to plant biodiversity and intellectual property and their outcomes cannot be considered as gender neutral since, while women constitute the majority of those gardeners, gatherers, herbalists, and plant breeders who have developed agrobiodiversity and identified useful plants, due to gender bias they are likely to be the last to have their rights recognised and therefore to benefit from related development or compensation schemes. Assuming that the rights or compensation given to 'indigenous groups' or 'farmers' will reach women is incorrect. Mechanisms of compensation that earnestly seek to benefit the provider of these resources and stimulate their continued conservation must carefully consider means by which the rights of women in particular can be respected.

## **7. Gender bias in ethnobotany and related sciences**

A significant methodological shortcoming of ethnobotanical research is that it often takes the plant knowledge of a few people to be representative of the knowledge of entire cultures. Most ethnobotanists tend to be blind to gender differences, even though the knowledge and use of plant biodiversity is everywhere gender-differentiated. There are three associated errors. The first is related to the failure to research women's knowledge and use of plants, which becomes an error of *omission*.

Ethnobotanists simply assume that males (particularly senior males) are adequate representatives of the collective ethnobotanical knowledge of their communities or that these males have superior ethnobotanical knowledge. The knowledge that women specifically hold is simply bypassed. Where women have more knowledge of plants than men do, not interviewing them means that these species and varieties will be omitted and therefore biological diversity will be under-estimated. The second error is one of *unreliability*. It is related to using sources that are not well informed, leading to the improper identification of plants, their management, characteristics, uses, or names. Numerous studies have shown that women are often more able to correctly identify these parameters in comparison with men, particularly with regard to plants that fall more directly into their domains. For example, most ethnobotanical publications on women's health issues have been written by foreign men who have interviewed native men who in turn report on behalf of native women. The third type of error is also very significant: an error of *interpretation* leading to a misunderstanding of people-plant relationships, since a critical component of these relationships is not revealed (see below). It is often difficult to determine whether the first two errors have been committed. Research is presented in such a way that it is impossible to know whether women have been included since references are to gender-neutral descriptors such as 'farmers', 'dwellers', 'experts', tribal names, etc.. In the majority of cases where it is made explicit that women were included in the research, the data are nevertheless not presented in a sex-disaggregated fashion that limits our ability to interpret such data with respect to gender differences.

Zimmerer carried out what is probably the most comprehensive research to date on Andean native cultivars and production systems, which

was at the same time gender-sensitive. In part because it was so comprehensive, it was also gender-sensitive. The vast majority of previous work on Andean agriculture is gender-blind. He studied the significance of gender differences in ethnobotanical knowledge with regard to potato cultivars and reasons for these differences. He showed that male farmers are less accurate than women are when naming species, apply fewer names, and incorrectly name uncommon taxa. Men know less about culinary properties that are key to conceptually distinguishing cultivars. Increasingly men are emigrating to take on wage labour, and the gap between men's and women's knowledge has increased.

## **8. Gender, biodiversity loss and conservation**

If women are predominant managers of plant biodiversity, then research should consider the ways in which they specifically may be affected by genetic erosion, such as the diffusion of modern varieties and increasing commoditisation of plant resources, decreasing access to common land, and changing consumption patterns. Gender relations are also changing and, with them, women's incentives and management practices, which in turn affect biodiversity management.

For example, decreasing access to land is one major reason for the erosion of genetic resources managed by women. When land becomes privatised, women may lose access to forests and fields where they gather wild plants; when men turn to cash cropping, women may lose access to gardens or fallow fields where they manage traditional varieties. A large number of case studies shows that, in sub-Saharan Africa, as cash crops

and particularly export crops are introduced, men began to usurp some of women's usufruct land to cultivate the new crops. Women have often been compelled to relinquish land where they produced indigenous varieties and contribute their own labour to men's exotic crop production (Wooten 1997, Shroeder 1997, Astone 1996).

There have been attempts to develop conceptual frameworks to assess why farmers conserve plant biodiversity on farms, but these have neglected to consider gender and other intra-household relations. Within this, the neglect of the division of labour and the total demand for labour represents a serious omission. Stephen Brush (et.al, 1992), probably the world's leading authority on agrobiodiversity conservation, thought that male-outmigration in the Andes might provide additional income that could be used to preserve traditional crops, but they also thought it could lead to genetic erosion since the farmers' knowledge would not be available to maintain these cultivars. They tested this hypothesis and found a negative correlation between on-farm diversity and off-farm occupations, which they thought was due to the fact that farmers earned more by working off-farm than by maintaining their native cultivars. But Zimmerer found in one of the same communities that Brush studied that cultivar loss was not due to the absence of the male farmer who has the principle expertise. Male emigration doesn't decrease the expertise available since women hold most of this expertise in the first place. Rather, the 'feminisation of agriculture' is occurring due to temporary male emigration. Women-headed farm households don't have enough labour available to maintain all of the diverse cultivars.

In another article, Brush (1995) laid out four factors that lead to farmers' conservation of traditional varieties: 1) land holding fragmentation means that farmers manage several fields and cultivate folk varieties in at least one or more of these fields; 2) marginal agronomic conditions mean that folk varieties perform better than improved varieties; 3) local varieties may sell better in local markets especially when farmers don't have access to farther-away markets; and 4) farmers' have preferences for maintaining traditional varieties. How could a gender perspective improve this framework? With regard to the first point, men and women often manage different fields, and they have different responsibilities for providing plant resources, different access to technology, labour, credit, knowledge, and markets. The pressures on plant resources in men's fields may therefore be quite different from those on women's fields, and for different reasons. With respect to point 2, it has often been shown that the land to which women have access is more marginal in agronomic terms than that to which men have access and that women will often produce varieties that men don't produce due to lower land quality. Women are the 'marginal farmers' *par excellence*. With respect to point 3, men and women often have access to different markets, where women mainly are able to access local markets where the demand for local varieties is often greater, and men have access to farther-away markets where the demand for modern varieties is greater. Finally, with regard to point 4, it is clear that women are principal guardians of culinary and medicinal values and that their varietal preferences are often more diverse than men's.

The Convention on Biological Diversity has as its third objective to ensure the "fair and equitable sharing of the benefits" from the use of biological diversity. This cannot be addressed at all without considering the

importance of women and gender relations in biodiversity management at local level, and the presence of gender inequalities and gender bias in local, regional, national, and international systems that develop norms and regulations around biodiversity conservation. There is nearly a total failure to acknowledge the importance of women or gender relations in the literature and in policy documents dealing with biodiversity conservation. It is therefore very likely that, at local and national levels where these things matter most, women's contributions and their welfare, needs and rights will also be overlooked. This means that the costs and benefits of biodiversity depletion and conservation will not be accurately understood or estimated. If women's values and uses in particular are overlooked, then the costs to women of genetic erosion and the benefits that they derive from conservation will also be poorly estimated. Drawing from historical experience, the costs and benefits to women are overlooked because their activities are often unpaid, linked to the domestic sphere, and 'invisible' to economists, planners, and scientists. Gender-sensitive approaches to the estimation of the costs and benefits of biodiversity conservation and to the assessment of their distribution and their impacts on human welfare are not an ill-affordable luxury - they are instead *sine qua non*.

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