CAPRi Working Paper No. 56 • OCTOBER 2006

Collective Action in Plant Genetic Resources Management: Gendered Rules of Reputation, Trust and Reciprocity in Kerala, India

Martina Aruna Padmanabhan, Humboldt University of Berlin

International Research Workshop on '*Gender and Collective Action*'
October 17-21, 2005 • Chiang Mai, Thailand

CGIAR Systemwide Program on Collective Action and Property Rights (CAPRi)
c/o INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

2033 K Street NW, Washington, DC 20006-1002 USA • T +1 202.862.5600 • F +1 202.467.4439 • **www.capri.cgiar.or**

ACKNOWLEDGMENTS

The author would like to thank the Deutsche Forschungsgesellschaft and the Indian Department of Science and Technology for funding empirical research in India. I am highly indebted to the people of Wayanad, who shared their knowledge with me and to the staff of the Community Agrobiodiversity Centre, Kalpetta, especially Anil Kumar, G. Girigan and Ravi for the most enjoyable fieldwork and discussions. Mina Swaminathan, M. Velatyutham and A.V. Nambi at the M.S.Swaminathan Research Foundation, Chennai, were generous hosts with inspiring ideas. I thank Lauren Pandolfelli and an anonymous referee for their most valuable comments.

ABSTRACT

Collective action aims at the joint management of common pool resources. Agrobiodiversity at the community level is conceptualized as a collective resource requiring the management of varieties, species and their interrelations within a farming-system. In the rice dominated agriculture in the uplands of Kerala, India, few community groups continue maintaining and thus conserving their high diversity in landraces. Faced with the challenges of devastating prices for rice, their traditional system of collective action to exchange seed material and knowledge is endangered. A new institutional mechanism to manage biodiversity is the People's Biodiversity Register, a mandatory documentation procedure to enable cost and benefit sharing under the Convention on Biological Diversity. The comparative analysis of these contrasting cases of an indigenous and an administered effort is concerned with the importance of the analytical category of gender for the rules structuring the actions of the groups. Gender is perceived as an institution, constructing regulations of access and conduct for its members, shaping the room to maneuver. Do the core elements constituting collective action, namely reputation, trust and reciprocity imply different consequences for men and women? Do the rules structuring group mobilization imply different consequences for men and women in the same given context and regarding the management of the same resource? Where do we observe differences and to which effect? Since action resources are very much determined by the existing construction of gender, the question is how does collective action enlarge or inhibit the choices of men and women. Based on 2005 empirical data, the paper analyzes the tribal community of Kurichyas and the People's

Biodiversity Register with special emphasis on the analytical category of gender concerning the core elements trust, reciprocity and reputation of collective action

Keywords: gender, India, agrobiodiversity, institutions, trust, reciprocity, reputation

TABLE OF CONTENTS

Collective Action in Plant Genetic Resources Management: Gendered Rules of Reputation, Trust and Reciprocity in Kerala, India

Martina Aruna Padmanabhan[1]

INTRODUCTION

Considering gender as an institution with different rules for women and men that shape their action resources, this paper focuses on the core elements that make collective action possible- namely reputation, trust and reciprocity- and assesses their differential implications for men and women. How does collective action to manage agrobiodiversity in two settings of complex biodiversity ecosystems influence gender as a social category?

In Kerala, South India we observe a diminishing biodiversity in traditional rice varieties, endangering future breeding activities. Despite this overall erosion, genetic wealth is maintained by a few tribal communities in Kerala, who cultivate and utilize landraces despite much more lucrative options of conversion to banana or areca nut cultivation. The conversion of rice fields into less diverse cash crop plantations like bananas, areca nuts and ginger is driven by the drastic difference in market prices. At the same time this trend is accompanied by a deterioration of the soil quality and breakdown of the irrigation system. The cultivation of cash crops has ecological and social consequences that concern the whole farming system and affect the water holding capacity of the soil. Furthermore, the gendered division of labor

[1] Martina Aruna Padmanabhan, Humboldt University of Berlin, Luisenstr. 56, 10099 Berlin, Germany (martina.padmanabhan@agrar.hu-berlin.de)

undergoes drastic changes, reducing women's crucial involvement to insignificance. Women hold a key position in the conservation of traditional rice varieties through their high involvement in fieldwork and their knowledge in utilization. While the cash crops receive institutional support through subsidies and extension, the governance of the traditional rice varieties remains reduced to certain ethnic groups with a limited scope of coordination. With the decline in agrobiodiversity the status of women is likely to decrease with cash cropping, making women's labor and knowledge redundant.

The transformation of rice cultivation towards cash crop production disenfranchises women from traditional roles and collective action coping strategies. Similar trends can be observed in Asia (Agarwal 1985) and Africa, (Schroeder 1993, 1997). As Carney and Watts (1990) have shown in the case of The Gambia around the cultivation of groundnut, the politics of production in peasant societies, observable in the contest over gendered access to property rights, are injected into the household and are deeply engendered. Agarwal (1997) analyzed collective forest management and found that unlike the old systems of communal property management which recognized the usufruct rights of all villagers, the new institutions represent a more formalized system of rights based on membership. Under the new initiatives, membership is replacing citizenship as the defining criterion for establishing rights in the commons with implications for equity. Mosse (1997) critically questions `community management' approaches to common property resources, which run the danger of producing ahistorical and apolitical constructions of `locality', and impose a narrow definition of resources and economic interest.

Reflecting on the gender dimensions of environmental collective action, Agarwal (2000) draws attention to the distinctness of women's social networks, their higher

dependence on these networks and the commons in general, and their potentially greater homogeneity relative to men in the example of community forest groups. She outlines how neglecting gender as an analytical dimension can lead to a flawed assessment of the success of community institutions in terms of participation, distributional equity and efficiency. Consequently, this may cloak opportunities for forming and sustaining successful environmental management groups through women's more substantial involvement.

Women often play an active role in the protection and conservation efforts of natural resources, but their presence in management groups is often nominal. Collective actions often are 'men's groups' with, at best marginal female presence. The question of voice has a critical bearing on the functioning of the groups and the distribution of costs and benefits. Participation in collective action groups can indirectly affect intrahousehold benefit sharing in so far as relative contributions affect perceptions about claims (Sen 1990), increasing the legitimacy of women who are seen to be involved. Women's lack of participation also affects the efficiency of the collective effort; imperfect information flows hamper communication, leading to an inaccurate assessment of resource depletion and a resistance to rules enforcement. Non-involvement of women weakens the implementation of sanctions and undermines conflict resolution. The non-incorporation of women's specific knowledge on species-varieties and their different preferences for plants can also be a significant factor for failure in collective resource management, relevant for the current case of biodiversity management at hand.

Agarwal (2000) stresses gender differences affecting group formation in respect to relations of trust and reciprocity, moral norms and values as they play a central role in enhancing cooperation and reducing free riding (Fukuyama 1995). Women's attitudes toward

conservation stem from the gender division of economic resources and the division of labor. Property rights affect the extent of the dependence on common pool resources and the distribution of responsibilities affect the degree and character of the dependence. This double dependence on nature translates into a more conservationist attitude. With less involvement of women in collective action concerning natural resources, there can be a gap between the women's interests and their ability to act on those interests.

Often women's collective action arises out of everyday cooperation and networking with the advantage of flexibility. However, it should be noted that the division of formality and informality along gender lines, with formality being linked with authority and informality divested of authority, systematically disadvantages women and reduces institutionalization. Women are prevalent in sporadic, situation and resource specific 'agitational' collective action (Agarwal 2000), but rarely find entry into regular decisionmaking forums of these movements. Agitational collective action can complement, but not substitute for, institutions that monitor natural resources, as we will see in the case of the 'People's Biodiversity Register'. Effective participation involves attending meetings, speaking out and having influence on decisionmaking.

This comparative study of two types of collective action for the management of agrobiodiversity focuses on the norms of reputation, trust and reciprocity. The paper is structured as follows. It describes the social dilemma in biodiversity management, especially for the resource agrobiodiversity. It then introduces and discusses the analytical variables shaping collective action and the core relationships of reputation, trust and reciprocity. Next, the contrasting collective action cases of the agricultural tribe of the Kurichyas and the People's Biodiversity Register in Wayanad Kerala are presented, contextualized and analyzed.

Finally, policy recommendations and conclusions are drawn for the future of collective action and its consequences for women in biodiversity management.

THE SOCIAL DILEMMA IN AGROBIODIVERSITY MANAGEMENT

Agrobiodiversity provides humanity all of its food and many medicines, industrial products and a wide range of goods and services, plus genetic material for agriculture, spiritual and socio-cultural practices. It plays a major role in the sustainability of agricultural production and in providing livelihood security for the poor. Among other agriculturalists, tribal men and women have not only conserved such genetic wealth, but have added value to them through selection and information.

While the maintenance of high levels of agrobiodiversity serves as a “global life insurance” against risks in natural resource management, collective action could be perceived as a proactive precaution against the idiosyncrasies of individual human behavior. The focus of this paper is on the management of knowledge to solve the problem of information sharing on agrobiodiversity. Collective action aims at the solving of social dilemmas, where individuals have to choose actions in an interdependent situation. It this context, we could understand the social dilemma as a conflict between the individual rationality and optimal outcome for a group. Contrary to classical game theoretical situations, people in the natural world do not make decisions independently but rather engage in a discourse where they share or withhold information. Likewise they are confronted with different enforcement mechanisms by local institutions and larger government structures, which are in place to improve the likeliness of people behaving in a predicted way (Ostrom 2005b).

The resource agrobiodiversity

Natural and semi-natural ecosystems (de Groot et al. 2002) can be organized according to their functions, goods and services into four different categories:

- Regulation functions: Maintenance of essential ecological processes and life support systems, such as water and climate regulation.
- Habitat function: Providing habitat for wild plants and animals as a nursery or refugium.
- Production function: Provision of natural resources for food, genetic resources and medicines.
- Information function: Providing opportunities for cognitive development in the form of landscapes, cultural features and spiritual values.

The complexity of biodiversity and its subsequent challenge for investigation and recommendations rests on three dimensions describing veritable claims to biodiversity governance. Jungcurt et al. (2005) pointed to the multiple levels of human-nature interaction and the importance of recognizing the specific features of the plant resources at stake and the institutional environments of actors. First, biodiversity describes the biological components of a complex system of ecosystem functions. These functions are the basis for the delivery of ecosystem goods and services. Human interaction with ecological systems to appropriate these services occurs at different natural and human scales. Institutional analysis has to account for this complex web of interaction and must integrate several scales of social analysis.

Second, human benefit from biodiversity covers a broad range of ecosystem goods and services that differ widely with respect to their properties as seed, food or an agroecosystem in the case of paddy. Public goods require different governance structures than private goods. Depending on the type of appropriation (the way it is used) physically identical units may serve as different goods or services with different properties. These variances in properties and the ways they affect transactions lead to the development of a plurality of governance structures affecting a specific component of biodiversity or a set of ecosystem functions. Furthermore, the behavior of actors not only depends on their direct relationships with the ecological system, but also on the broader institutional, social and cultural context. The context has a strong influence on the actor's logic of action. Therefore specific governance structures will lead to different actor responses depending on the context and its impact on the logic of action.

As Jungcurt et al. (2005) have noted, common pool resources are characterized by low feasibility of exclusion and high rivalry in consumption (e.g. common pasture) and are often managed through reciprocal relationships. The relevant attributes of some goods vary depending on the type and context of use. For example, seed materials are a form of genetic resources that is used as an intermediary product for food production. In the short term, seed has the character of a private good since it can be planted only once in a given vegetation period. In the long run, however, due to its self reproducing capacity, seed may be better characterized as a club or even a public good since with multiplication and thus larger amounts, its rivalry for consumption decreases with time and access to a small quantity may be sufficient to reproduce and use a specific variety (Smale et al. 2004). For users in the biotechnology sector, seed of a given variety is a source of potentially valuable genetic

information. However, prior to its revelation through research activities this value is highly uncertain. As soon as it is decoded and its value identified it becomes an information resource that has the characteristics of pure public good (Janssen 1999, Swanson and Goeschl 2000). Institutions for biodiversity governance must thus include a variety of governance structures for transactions relating to goods and services with different properties even within a single plant.

The cases to be analyzed and compared in this paper are concerned with seed and knowledge management. The transfer and exchange of both features of biodiversity – as seed and the related characteristics conveyed in the information – are at the core of this enquiry and of maintaining and conserving agrobiodiversity.

ANALYTICAL APPROACH: VARIABLES SHAPING COLLECTIVE ACTION

The institutional set up for knowledge management in local agrobiodiveristy is shaped by variables influencing collective action. The number of participants, the features of the resource at stake, the heterogeneity of actors, the prevailing communication patterns and the sequence of cost and benefits arising form involvement in the collective effort influence the performance. The core variables are reputation, trust and reciprocity, bringing individuals together to form a group to solve the social dilemma. Ostrom (2005a) has identified, through numerous empirical studies and deduction from various natural and social science theories, important variables shaping collective action. To analyze collective action as a means to solve social dilemmas, in this case to conserve and use agrobiodiversity, a number of variables have to be checked to arrive at an understanding of the situation.

- Number of participants

The number of participants involved in the collective action is decisive for the types of mechanisms of control, monitoring and communication that are likely to be successful. It appears relevant to consider the number of actors involved in creating, transferring and sustaining the knowledge associated with intransparency caused by the secretive nature of the simple grain over its genetic potential. According to the number of knowledge holders and actors involved, motoring mechanisms have to be adjusted and sustained.

- The features of the resource and related transactions

The features of transactions are determined by the physical attributes of the natural resource at stake and have a great influence on the shape of social and institutional arrangements. By their idiosyncratic properties like the genetic information, as a food item or in their ecological aspects of an agricultural plant, the resource itself shapes the forms of institutions and the options for collective action. For example, in agrobiodiversity we observe substractive and non-substractive consumption. While the non-substractive cultivation of certain crops may diminish other varieties by crowding out, the substractive consumption of a certain seed as food will help to maintain its conservation in the long run through the resulting demand.

- Heterogeneity of actors

Differences in wealth, i.e. social, human, economic, environmental, and physical capital that can be translated into action resources, are indicators of heterogeneity among actors. In many cases, these differences can be captured by the variable of gender, although since this variable does not account for differences among women and men, respectively, the intersections of gender, age, caste, marital status, ethnicity, clan, and life-cycle positioning,

should also be considered. Nevertheless, the focus on gender is a key analytical category in this paper since we might expect greater cooperation among women due to lower divisiveness. Agarwal (2000) suggests less class and social divisiveness among women, even when households are differentiated, for three reasons: Women's class position is much more precarious than men's because it is linked to marriage, which can be dissolved by widowhood or divorce for all women. Women share significant communalities that cut across privilege and status such as housework and childcare and women are usually less connected than men to local power structures. This and the greater permeability of women's networks could make for better prospects for collective action among women than among men in heterogeneous communities.

While other sources of heterogeneity may also have an effect on collective action, as noted above, gender is likely to influence social interaction between persons and thus improve the quality and accuracy of an analysis of collective action. In particular, the variation in the gendered composition of the group may affect its performance; women may contribute more in all-female groups, whereas men may demonstrate more commitment in mixed-sex groups. Sell (1997) explains this discrepancy according to the actor's expectations of the degree of influence they can achieve within a group.

Other sources of differences between actors involved in collective action might have positive effects on its success. For example, while wealthy participants, irrespective of their gender, might generate trust and help to overcome motivation problems in the very beginning of group formation, an unequal distribution of benefits among participants immediately reduces trust.

- Communication patterns

The possibility of face to face communication and the general character of information sharing and decisionmaking are likely to influence the coherence of the group because the direct response in a dialogue can work like moral suasion; i.e. when people become aware of the emotional impact of their actions on others.

- Sequence of costs and benefits

The shape of the production function, be it decelerating or acclerating, which reads as the need for high initial costs in the very beginning of a collective effort or for investments in a later stage when benefits are already visible, influences the challenges to overcome the social dilemma of joining individuals in a collective effort.

Core relationship of collective action: Longterm Interaction

While the above mentioned variables significantly influence the institutional environment for collective action, the core of this cooperative effort grows out of long term relationships, since only these repeated interactions allow for a somewhat reliable estimation of the future actions of actors. The core relations of reputation, trust and reciprocity point to the human longing for predictability and security in relationships between people. Information about past actions of someone is a major reason for people to approach the other with positive expectations. A good reputation builds trust, a fundamental assessment for entering cooperation. While at face value a person may appear trustworthy, this assumption undergoes a monitoring process to either prove or reject a good reputation. The second core relationship trust, points to entry and exit mechanisms and the importance of withdrawing trust as a veto power. Reciprocity is the glue that strengthens linkages in networks. “The strength of weak

ties" (Granovetter 1973) changes situations of interconnected decisionmaking from that of the isolated prisoners dilemma to one of an assurance game.

Reputation: Triangulation

The first core relationships of collective action already points to the problem of uniting different actors towards one goal, but at the same time highlights the importance of these various people as potentials and sources for all kind of resources. Here we are concerned with information exchange to predict the likeliness of behavior in people. Reputation works basically as a triangulation of information in a comparative fashion over a third party.

A ⟷ B over C

Actor A communicates with actor B to assess qualities and probabilities of actor C. For example, actor B, who has a strong reputation for maintaining a high fertility of seed during storage, is likely to be in the position to rate actor C's abilities on that particular capability. Actor B will either reinforce or devalue the inquiring actor A's perception. This control system is only possible with repeated interaction. Thus, what could be denounced as gossip is actually a vital function of human interaction to increase security within relationships. This system of cross-checking and triangulation, an evaluation according to prevailing norms, is also a discourse on values, in which they are negotiated, shifted or maintained (Padmanabhan, forthcoming). A second important aspect of reputation is the question of evaluative criteria. Very often the conduct in relationships does form cornerstones in this assessment procedure. The relationships actor C maintains with actors A and B, and also with other actors, are key for the mutual credibility. Especially in Islamic societies, the reputation of one family member

is closely linked to that of the others. Men and women mutually depend upon their spouses' reputation to gain access to resources; in fact, reputation is an asset in itself to be guarded.

Trust: Individual assessment

The second core element of collective action, trust, builds on the general notion of reputation. Nevertheless, the situation is more specified and reduced to the individual assessment by actor A of actor B. This interpersonal trust is the thread that ties networks together and enables people to put aside differences in asset endowment to arrive at a collective action (Jones 2004).[2] Trust has been found to overcome heterogeneity; therefore it is important to consider when paying attention to gender relations, a significant social indicator of difference.

$$A \longrightarrow B$$

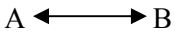
Trust is dynamic. Like agrobiodiversity, it grows with successful utilization. Nevertheless, it seems to be bound to institutional lifecycles (Jones 2004) associated with predictable dilemmas owing to the sequence of cost and benefit streams in collective action. In an early stage of collective action, the need for high investments might accrue. The early investment by wealthier people has proven to increase trust also in the less better off. If this initial bottleneck is overcome, the future process can build on increased trust. This trust appears as a pacifying factor, allowing for the creation of different roles within a collective action. The character of trust encompasses ratio and emotions. It is not only a decision based on rational assessment of an actor's reputation and double checking via personal interaction, but also an emotional need and strategy to reduce the avalanche of (contradictory) information

[2] See Jones 2004 for a review on theories of trust and their empirical testing.

to a definite feeling. A basic human need is the urge for social security in the sense of belonging. Trust is necessary to relieve us from the constant weighing and counterweighing of pros and cons against a person or an action. This simplifies the decisionmaking processes of actor A and lays the foundation for long term interaction with actor B.

Reciprocity: Interaction

The third core element of collective action moves from assessment of past actions to the likeliness of a return of actions. Whereas reputation and trust entail a mix of moral and emotional judgments, reciprocity is concerned with the factual outcome of actor A if he engages in collective action with actor B. Moving beyond processing of information, we arrive at a situation where the interaction between actors, or the collective, and the outcome of this interaction is up for valuation.



Reciprocity is the adequate response between actor A and B in reaction to a former event, where Actor B acted in favor of Actor A. The valuation of adequateness encompasses notions of likeliness, quality, timeline etc. of returns and is not neccessarily mirroring the first action, but must appear as contextually sufficient as a major criterion to consider reciprocity as fullfilled. This is tied to the prevailing norms of reciprocal behavior that turn the positive or negative evaluation of a particular action into a “warm glow” effect of enhancing an actor’s reputation and trustworthiness versus the simple fulfillment of a mere “duty”, as Ostrom (2005) has pointed out. The norms and the experience of expectations kept combine to affect the orientation towards reciprocity in a way of positive self-fulfilling prophecy. These highly differentiated norms of reciprocity appear as a fair arrangement among actors for the common

good. Nevertheless this requirement of fairness to make exchange a success embodies most often the double-sided rules of "equals should be treated equal and unequals unequal" (Ostrom 2005a). In light of gender relations, this rule implies a degree of variation (for example, in mere eligibility for returns) that has to be addressed carefully. A double standard of assessing work as eligible for payment results in lower wages or none at all for women. The prevailing norm and thus the legitimacy can have a significant impact on the success of collective action. Schroeder (1993) has shown that violating norms of fair reciprocity by increasing women's unpaid workload undermines collective action. The norms guiding reciprocity are learned, and therefore differ and have to be shared. To reach a common understanding of the meaning of these rules, interaction provides the base for reciprocal behavior. Ostrom (2005a) highlights the need of exchange in opposition to supposedly independent acting individuals:

"Humans learn norms, heuristics, and full analytical strategies from one another, from feedback from the world, and from their own capacity to engage in self-reflection and imagine a differently structured world. They are capable of designing new tools – including institutions – that can change the structure of the worlds they face for good or evil purpose. Multiple models are consistent with a theory of bounded rational human behavior, including a model of complete rationality when paired with repetitive, highly competitive situations".

COLLECTIVE ACTION IN WAYANAD, KERALA

The district of Wayanad in Kerala is a biodiversity hot spot in the Western Ghats. Nevertheless, the pace of varieties and species erosion is alarmingly high in genetic and

landscape diversity. The shift in cropping patterns from subsistence to mono cropping has led to fast erosion of crop diversity (Balaravi 2005). Paddy cultivation replacement by banana and ginger crops has posed serious threats to the typical wetland ecosystem in a district of high altitude (1400 m/NN) and heavy rainfalls (2300mm/y). It has irreversibly altered the habitat of the district because paddy fields act as small reservoirs and as percolation and aquifer recharge and are used to maintain the water table of wells even during summer. Water depletion and drainage occur when banana or areca nut palm plantation become permanent. The rice farming system of Wayanad can on the whole be described as a cultural heritage.

In the following section, two contrasting cases of organizing such agrobiodiversity through collective action are presented. While some features of their structures and their involvement of men and women in the management of agrobiodiversity and related knowledge differ sharply, the cases share a common goal: joint efforts to contribute to the common resource of diversity within a wider agro ecosystem. The problem of coordinating individual efforts towards this larger aim is nevertheless pursued by different rules and mechanisms. In this analysis the focus is set on the core relationships, binding together actors in collective action to make the joint outcome more likely. Satisfying the demand of the core values is a precondition, as we will see, to make it happen in the long run.

The contrasting cases

Building upon previous research visits, the main data collection was carried out between April 2004 and September 2004. The qualitative data was collected with the assistance of an interpreter and facilitator. Since not much documentation was available then, grey literature and press releases were consulted to access the situation. Based on this outline,

expert interviews with key persons in involved NGOs and the relevant communities were carried out. With not much effort the five male experts could free themselves form other obligations and represent their official position in interviews. The same patterns appeared in the realm of focus group discussions in mixed and single-sex groups The interaction with groups in the Kurichya community took place within the large compounds of the joint family and was characterized by a constantly floating group size of between 9 and 15 persons and a dissolving of single-sex groups into mixed and vice versa. The four expert interviews with women subsequently turned into group discussions, when other women joined the conversation. In the case of the People's Biodiversity Register, the office holders and members were visited in their homes and four men and three women could be interview in a more stable situation. A literature study supplemented the data base to arrive at the contrasting cases of the biodiversity management practices of an old tribal and a new government institution.

Agricultural tribe: The Kurichyas

Though the land under paddy cultivation in the district of Wayanad has decreased from 21,770 ha in 1990 to 8,725 ha in the year 2000 (Narayanan et al. 2004), the tribal people of the Kurichyas are still famous for their elaborate rice-farming systems and water management practice (Girigian 2003). The agrobiodiversity of rice is closely connected to the characteristics of land resources for paddy cultivation and integrated water management systems (Padmanabhan 2005). The Kurichyas are the first agricultural tribe from the plains of Malabar who colonized Wayanad (Pramod et al. 2003) before the Green Revolution. The name 'Kurichya' is interpreted as 'hill people' ('Kuri' meaning hill, and 'chian' people). The

central agrobiodiversity is represented by the varieties of paddy landraces. Market prices for rice have long been undercutting production costs, inducing (mostly illegal) shifts to other, more profitable crops. Despite this dynamic, the Kurichyas still cultivate paddy for their subsistence and not for the market. The production unit is the extended family which secures long term arrangements and a high frequency of transactions. The Kurichyas follow a rigid matrilineal system and land is held as a common property by the clan. They form the largest tribal community of Wayanad district and occupy the highest social status among tribes of Wayanad. Though the matrilineal tradition was legally abolished in Kerala with the Marumakkathayam Act in 1936, informal rules of descent along the female line continue to organize family groups. They live in large extended families of 50 people or more and cultivate a vast spectrum of crops, including different local traditional rice varieties, under the guidance of the eldest husband. The joint family lives in a single house with separate rooms for each woman, into which the respective husbands move in. The Kurichyas have a rich tradition of medicine and religion, and are also excellent agriculturalists (Pramod et al. 2003).

Paddy rice forms their staple food and is regarded as the mother plant and plays an important role in purification and puberty rites. The Kurichyas conserve a large number of plants in their home gardens, especially those required for religious purposes, many of which are crop plants. Sacred groves conserve more than 100 different species and destruction is avoided through sacred taboos and beliefs. The Kurichyas cultivate paddy rice on the commonly held land under the guide of the *pittan*, or headman, to achieve food-security. The land is not divided into individual fields. Only seldom do women ask for a separate plot on the family holding to build a house for their nuclear family. The farming system aims at the survival of the collective. Kurichya women play a crucial role in paddy cultivation, since

neither mechanization nor outside labor is used. The Kurichyas believe that the application of chemical fertilizers and pesticides will negatively affect soil fertility. A clear cut gendered division of labor exists and most efforts and time consuming activities of transplanting and weeding are left to the women (Girigian 2003). Swaminathan (MSSRF/FAO 2000) summarizes the Kurichyas' situation as one where the "…custodians of genetic wealth are increasingly confronted with severe economic problems that are rendering the maintenance of their traditional conservation ethics difficult."

Among the Kurichyas, the most senior husband has the right to sell, mortgage or lease property (Menon 1996), while the headman decides the crops to be planted in the common fields and insists on planting paddy for home consumption in order to provide food security (Anil Kumar et al. 2004). Beside the common fields, there are "private" fields for the spouses, which are held in the name of the wife and are cultivated according to the gendered division of labor between husband and wife. Banana plants used to be located only at the fringes of the irrigated fields close to the forest and do not interfere with the paddy fields. In a few joint households subplots have already been converted into banana plantations, following the general trend of other formerly paddy growing communities in Wayanad. Among Kurichyas, the possibly of converting the paddy fields into banana plantations has been discussed by the younger men, the next generation of decision makers. The joint family acts as an informal institution governing the use of family land. Within this joint family system the rights of the women are maintained by valuing collective food security more than individual short-term income strategies. The viability of the joint family as a multifunctional farming system with strong effects on equality among group members is questioned by the younger generation, especially by young men. The joint family landholdings are endangered by tempting

possibilities of private cash crop production that would transform them into private property, leaving the women with no work, no food and no support network. However, the headman is still interested in keeping hands occupied and mouths fed, thus putting the goal of food security for all members above the economic gains for a limited number of family members.

The tendency towards the nuclear family is accompanied by loss in biodiversity. As Hagedorn (2005) indicates the family farm system could serve as an integrating institution also for the reinforcement of jointness between commodities and non-commodities. Thus, strong incentives are needed to avoid future disintegration into private plots and nuclear hearthholds and to strengthen the joint family institution and its services for agrobiodiversity management. In order to understand the implications for gender equity, the strong plea in favor of an integrated perspective has to be accompanied by an analysis of the negotiations between women and men farmers.

With the prominent role of livelihood issues for the Kurichyas, the need for collective action beyond one's community has evolved. Institutional innovation is needed to engage all farmers in sustainable land use, sharing both costs and benefits. Within the Kurichya community, a tremendous social shift has been induced by the threatening conversion of paddy fields into banana plantations. Banana cultivation drastically changes the division of labor for women because while they play a prominent role in paddy cultivation, female workers are not involved in banana cultivation. Besides losing their work on the paddy fields, the possibility of accruing additional benefits from the rice fields, like catching crabs and fish, vanishes. When paddy fields are converted into banana plantations, working women are deprived of their jobs and their agricultural knowledge of local paddy varieties becomes redundant. Women would like to keep the paddy fields for employment and direct food

security and to support their moral claims to surpluses. The change in crop and cultivation practices has long lasting effects on the status of women, now being deprived of direct contributions to survival as observed in other communities.

People's biodiversity registers

"People's Biodiversity Registers" (PBD) or "community" biodiversity registers, are a record of knowledge, perceptions and attitudes of people towards biodiversity, its use and conservation. A formal chronicling of a community's knowledge serves two tangible purposes: (1) The documented knowledge is available for use in the public domain and; (2) It validates the use of traditional knowledge in the commercial domain" (AFPRO 2003). In many states, people's or communities' biodiversity registers at the *panchayat* level, the smallest administrative unit, have been promoted and pioneered mainly by NGOs working in the area of natural resource management and sustainable agriculture. The process of raising awareness, collecting knowledge and establishing documentation procedures at local *panchayat*, district and national levels aims at creating registers for biodiversity. These registers are attempts to fulfill the duties to comply with the Biological Diversity Act 2002 and the Biological Diversity Rules 2004 of India. In signing the Convention on Biological Diversity (CBD) 1992, India recognizes the sovereign right of states to use their own biological resources. The convention stresses the contribution of local and indigenous communities to the conservation and sustainable utilization of biological resources through traditional knowledge, practices and innovations. It provides for equitable sharing of benefits with such people arising from the utilization of their knowledge, practices and innovations (National Biodiversity Authority 2004). Stakeholders in this effort are identified as including

the Central Government, State Governments, institutions of local self-government, and industry. The convention concludes that "one of the major challenges before India lies in adopting an instrument which helps realize the objectives of equitable sharing" (National Biodiversity Authority 2004).

Among the institutions of local self government to be developed and implemented to realize future access and benefit sharing, the People's Biodiversity Registers play a key role. Although the National Biodiversity Authority (NBA) upon which the enforcement rests only became functional in April 2005, a lively discourse in the academic and development arena has critically accompanied different actors' approaches to fulfilling the obligations of the CBD. One central effort at the local level has been close interaction with the custodians of genetic wealth. NGOs and academic organizations alike were involved in the consultation and crafting of the Biological Diversity Act2002 and the Biological Diversity Rules 2004. At the same time, efforts were undertaken to develop straight away new institutions and gain experiences with the practical application of Biodiversity Registers to secure local communities rights to the biodiversity they have been guarding and developing for centuries. In an attempt to prove the origin of certain plants and allow for the identification of specific keepers as a precondition for benefit sharing, local biodiversity registers have been established. No binding procedure has been fixed yet, and approaches vary as do terms.

The Biological Diversity Rules 2004 specifies the constitution of Biodiversity Management Committees (BMC) for local bodies within its area of jurisdiction. In addition to stipulating committee size as a maximum of six persons under a chairperson, it fixes one third of the seats for women and not less than 18 percent for scheduled tribes. This means that at least three women will serve on the board and two will be members of a tribal community.

"The main function of the BMC is to prepare People's Biodiversity Register in consultation with the local people. The Register shall contain comprehensive information on availability and knowledge of local biological resources, their medical or any use or any other traditional knowledge associated with them (National Biodiversity Authority 2004). The BMC further serves "[...] to maintain data about local vaids[3] and practitioners using the biological resources" and "maintain and validate the People's Biodiversity Register. The Authority will take steps to specify the form of the People's Biodiversity Registers and provide guidance and technical support. At the time of this research, the last three mandates of the NBA are still to be fulfilled. This highlights the situation of an evolving institution that this case study looks at. In this highly dynamic phase of taking formal rules to the field and turning them into operational rules, this investigation is only able to draw conclusions based on the limited set of observations in a fast moving institutional environment.

The Wayanadan Agriculture and Rural Development Association (WARDA) is a pressure group consisting of elected members of local bodies, political leaders, government officials, farmers, NGO representatives and social workers. Its activities focus on policy advocacy at the local and regional levels, awareness, education, networking and capacity building. WARDA initiated the first attempts to engage in all the activities necessary for setting up and maintaining such a Biodiversity register. It has taken up the subject of legislation in biodiversity and plant varieties conservation as a focal theme for education and training and is networking with *panchayath raj* institutions (MSSRF 2005a). One attempt within this mission is to coordinate the documentation of traditional knowledge to give effect

[3] Practitioner of Ayurvedic medicine.

to the provision in recent Indian legislation such as the Protection of Plant Varieties & Framers Rights Act 2001 and the Biological Diversity Act 2002.

Setting examples for benefit sharing arrangements in close cooperation with the knowledge providing communities is imperative for conserving their dying traditional wisdom as well as the plants valued for their uses. This depends critically on the ability to link such knowledge to innovations of its uses. The steps to mobilize communities and individuals to register claims of knowledge, document ethno-medical expertise and build a database are current concerns (MSSRFb 2005). The aim of WARDA's intervention is to enable tribal men and women to benefit from two Indian Acts, namely the Protection of Plant Varieties & Framers Rights Act 2001 and the Biological Diversity Act 2002 since they address newly constituted rights. Diverse crop varieties and medical plants are found in Kerala, however their documentation evolves into a major exercise as a given species may bear different vernacular names in different places. The challenge remains of how to utilize such kinds of contradictory or rather coincidental knowledge claims with the continuing consent of the knowledge holders. To establish a sound database, which will serve as the evidence for future claims in possible cost and benefit sharing endeavors, knowledge needs to be collected at district level or according to the ecological zone including details from seed collection, value addition and marketing. In preparing the registers at *panchayat* level, expert knowledge holders like local traditional healers, elderly men and women, herbal collectors, raw-drug dealers and ayurvedic doctors will be contacted.

This new legislation form the Central Government meets a situation of policy devolution in the State of Kerala. The people's plans (Veron 2001) are the main stake of local planing by the *panchayat raj* to decide over local development. The Biodiversity Management

Committees fall under this jurisdiction of the devolved planning process and are heavily influenced by them, as we will see.

FINDINGS: IMPACT OF COLLECTIVE ACTION ON GENDER

To give an overview of the circumstances under which the governance of biodiversity takes place, the central variables shaping collective action in the district of Wayanad in the cases of the traditional cultivators of Kurichya and the Peoples' Biodiversity Registers are summarized (Table 1).

Table 1—Variables shaping collective action

	Traditional cultivators. Kurichyas	People's Biodiversity Register
Number of participants (core)	112 (2 x 56)	Ca. 120
Features of transaction	Knowledge and seed	Knowledge and specimen
Heterogeneity with focus on gender	Traditional head of a hamlet *pittan* complemented by his wife	Interaction facilitated by NGO bringing people together across gender, class and caste
Communication pattern	Face to face Formal oral request	Face to face One way documentation
Sequence of cost and benefits	Steady stream of monitoring costs and exchange benefits	High initial costs, unforeseeable returns

Source: Padmanabhan 2005

The Kurichyas organize their collective action of seed management around the central figure of the *pittan* and his wife, implying that in each of the 56 hamlets at least two persons, one of each sex in complementary functions, will monitor and sanction the exchange of seeds and knowledge. The communication pattern of a face to face dialogue is central to the exercise of this procedure and follows strict sequences and formal, but oral, applications of

interests. This continuous practice of monitoring, evaluation and possible sanctioning requires a constant effort of rule supervision, but at the same time grants a controlled flow of genetic material central to the survival of the rice farming system. The accumulated knowledge produces returns and contributes towards investments in knowledge management and transmission.

The People's Biodiversity Register is a collective endeavor in process. Centered around the initiating NGO and their facilators, who have been working in the district on biodiversity with tribals and women's self-help groups processing local herbs into medicines for sale, the meetings throughout the year focused on the identification of specimen through transects, group discussions and expert interviews. The documentation and selection of samples for the register by a fluctuating group of people brought together men and women from different strata of the society. These carefully orchestrated meetings worked in sex-segregated groups and strategically approached knowledge holders known to them from previous work to maintain a gender balance. These efforts were met with the investment of time by the participants to contribute towards a return in the far future. The collective movement culminated in an awareness rally, joined by 120 demonstrators marching to draw attention to the cause of the People's Biodiversity Register.

The findings on these two distinct institutional arrangements to maintain biodiversity are presented according to the core principle of collective action. Reputation, trust and reciprocity act as central analytical categories to dissect the group formation with special reference to gender. Accordingly, we will first consider the case of the traditional cultivators, the Kurichyas, where women's comparative high status is endangered by the possibility of shifting from subsistence paddy cultivation to cash crop production. The core variable

'reputation' reveals gendered channels of triangulating information on relationships, while trust requires gendered and generation- specific control and sanction mechanisms to maintain social cohesion and flow of seeds. Reciprocity encompasses strong norms of sharing for all Kurichyas, while the moment of choosing or rejecting modernity remains a men's choice.

The second case study on People's Biodiversity Registers (PBR), evoked by the National Biodiversity Act 2004 and still in the implementation phase, points to the danger of a disembodiment of knowledge from its holders. Reputation is a core element for attracting local experts on biodiversity to the evolving institution, whereby the referential system might be shifted or even lost to outsiders. Trust enables long term collective action, but might imply different degrees of risk for men and women. Reciprocity in the PBR requires higher stakes from women for an insecure bet on the future.

Traditional cultivators: endangered womens's status

The collective action of interest among the Kurichyas is the governed exchange of seeds and information. Every three years, a new variety needs to be planted in the fields because the old variety will drop in yields and be replaced by homegrown seeds with the side effect of degeneration of specific traits. In order to avoid this downward trend, new seed material will be sought after. Within their traditional varieties, the Kurichyas distinguish between three groups according to the characteristic of maturity. Those varieties with a long maturity will unfold their full potential within 10 months, while medium maturity varieties range between six and seven months and short duration traditional landraces range between three and four months. Early or late maturity of the paddy plant is an important criterion for men's selection of seed material because it may allow for growing another crop after the

harvesting of a short-maturity one. Another important quality of seed material for the Kurichyas to have knowledge of is its suitability for specific soils, of which they entertain a highly differentiated system of categories taking into account soil texture, drainage capacity and nutritional status (Anil Kumar et al. 2004).

Reputation: Gendered channels of triangulating relationships

The *pittan*, the guardian of the paddy as seed, still prefers to cultivate the traditional varieties, because the high yielding varieties are less tolerant to ecological stress and require more fertilizer. The traditional varieties are preferred by the *pittans* because they provide more fodder for feeding the animals, which are important for traction and milk, and because they have a unique and appreciated taste. The *pittans* are very well aware of that fact and consciously decide to continue growing and thus maintaining these landraces. As a community, they shoulder the burden and the cost of conserving the traditional varieties. Pressed by the immense workload and the urge to literally feed themselves with the rice they grow, they have already anticipated a threshold for this private conservation policy: in case the coming modern varieties yield thrice as much, they will no longer be willing to realize these opportunity costs. Therefore, information on yield remains crucial.

This information on specific properties and expected quantity is necessary to assess the quality of a crop as a seed for three groups of persons who are involved in seed exchange: Those are (1) the Kurichya household headed by the *pittan* representing an *arthara* of two to three households, (2) which sum up to a *tharavar* (hamlet), represented by the *carnivar* as the leader of a hamlet and (3) other non-Kurichya farmers, who are interested in obtaining seed for their own use. All three position holders are interested in exchanging seed either between

households within *tharavars* or with an outsider. If a fellow Kurichya of another *tharavar* is interested in a particular variety, the exchange will be conducted on a 1:1 rate; for outsiders the exchange rate is 2:1. The outsider is supposed to provide double as much from his very own seed material to receive the desired landrace or family he favors. He is basically perceived as a guest, who places a request that cannot be easily denied. The object of exchange is the grain still in its husk to allow for safe treatment of the seed before storage. While the transfer of seed between the Kurichyas is a common affair, the extension of this system to outside communities occurs less often and is much more closely monitored to control seed material flow from outside. Nevertheless, the governance structure allows for this give and take and reinforces the norm of reciprocity, which is at the heart of Kurichya identity. Kurichyas perceive themselves as generous people, who are able to give away precious resources like seeds. This attitude brought them before colonialism into contact with Arab traders, interested in the wealth of spices grown in their gardens. Today, the asymmetric trade relations are assessed with more suspicion and a shift from a general attitude of sharing to more concern for individual property is observed. Before an exchange of seeds between *tharavars* occurs, a constant stream of information passes between the settlements. Since the Kurichyas are obliged to marry outside of their clans, many *tharavars* are connected by marriage. Between these hamlets, visits are conducted back and forth by men and women to keep in touch. In the case of special labor needs, working groups join the other *tharavar*. These interactions provide plenty of opportunities to exchange experiences and to observe varieties in the field and discuss them. If a variety in a field attracts a visitor's attention, he or she will search for more information, either directly from people of the same sex involved in the farms cultivation or via a third person, e.g. a friend.

After having collected information informally, the *carnivar*, the leader of the particular hamlet, is to be contacted officially. He will not only be in a position to provide further information as a senior knowledge holder, but also he is the official contact with whom to place the request for a seed supply. The *carnivar* is the person whom is responsible for knowing about all affairs in the *tharavars* and therefore he controls the flow of seed material, a foundation on which Kurichiyas well-being has rested for the longest time. The *carnivar* will be approached before the harvest takes place only by male members of the household interested in the seed. Though men and women will have exchanged views and opinions on the material beforehand, the men-only meeting stresses the political character of seed exchange. Just as an exogamous marriage arrangement is mandatory for the future of the tribal community and its clans, the passing on of genetic material is crucial for stabilizing the cultivation practice –if it remains controlled and appraised. The *carnivar* will be asked about more particularities, yield and the availability. It is a precondition to arrange for a meeting in advance, so that time allows for cross checking of applicants and negotiation with the head of the household that grows the desired crop in the particular hamlet under the *tharavar*. After negotiations and inquires with the *carnivar*, the *pittan* of the *arthara* will invite the seed-seeker as a guest during harvesting time. The requested amount of seeds will be earmarked for fulfilling the request.

The *pittan's* wife is also consulted in every kind of seed exchange. While the *pittan* handles official and outside contacts, the *pittan's* wife acts as the guardian and custodian of women's knowledge. Her central position in such rites as childbirth and puberty rituals marked by special rice dishes underlines her role as a guardian in rites of transition. She is responsible for coordinating all necessary steps of work among the women in the house as the

next senior person to the pittan. The wife of the *pittan* is in charge of supervising the actual handling of the seed, and she will look after the storage of the seed. This begins with organizing the other women within the household to weave bamboo baskets to store the seeds. Her knowledge regarding herbs, which will be applied against post harvest pests, is central for fulfilling her role. The seed is stored separately according to variety and the containers are distributed in different corners. It is her responsibility to maintain and keep an overview on that system of risk diversification. This delicate expert knowledge is shared between the *pittan*, his wife and a second capable women in the house. They will handle the seed material for the house and also measure and clean the seeds for exchange. The weighing and quality selection for the guest's demand is in their hands, as they are the ones who actually select the extra quantity of seed to enter the network of seed exchange. Although only men will approach a house for seed, they are well informed of the demands and supplies of others fields through informal channels of kinship and marriage. The women exchange information among themselves and share and transfer the knowledge, although they will not be allowed to directly approach the *pittan* for seeds.

In considering the future of this seed exchange mechanism, estimates of its institutional effectiveness differ between the older and younger generations of women. The older women are optimistic and certain that the system will continue along with rice farming, since their cultivation secures a high quality of food with a unique taste that is also appreciated by outsiders, who offer premium prices. Younger women are more skeptical of their own role in this network and consider cropping decisions about whether to maintain traditional varieties as the domain of men. In economically difficult times, households had to pledge part of the paddy harvest in order to survive. The additional cultivation of ginger and

banana at the expense of traditional rice has already improved their situation by keeping them free from debt for five years.

Trust: Control and sanctions as gender and generation specific

This system of controlled seed and knowledge exchange does not work in a sanction-free environment. The Kurichyas have established a delicate structure of collective action for the coordination of plant genetic material that is intertwined with the wider institutional arrangements of the rice-farming system, encompassing a commonly held property in land along with a delicate water harvesting system. While the norm of sharing and generosity prevails among the hard-working Kurichiyas, the boundaries within which norm-conforming behavior grants support in every aspect of life by the group are clear cut. To protect the group and its values from disintegrating, different levels of sanctions are available. The most telling sanction in the case of a marriage alliance with a partner outside the Kurichya community is excommunication. Due to the unaccepted marital alliance and the subsequent loss of all social ties and access to the common property, the group withdraws it support and ceases to be generous. With this drastic step, the collective ranks its survival before the happiness of the individual, regardless the gender.

In cases of property rights over land, we observe a range of reactions. While some households integrate the younger generation's demand for cash by extending the area of cash crops like ginger and banana, other families hope to maintain coherence by giving out separate individual plots and allow for the building of separate nuclear family houses. In the case of breaking the laws of seed exchange, no drastic measures are taken, but the moral harm inflicted on the offenders weighs heavily by affecting their reputation negatively. "The

commons member who degrades the environment for immediate benefit will share the eventual loss in productivity, but the primary constraint on such behavior is the threat of lost status and reputation in the community. The private market participant, on the other hand, obtains status and reputation through the marketplace success and is constrained only by threat of punishment under the law" (Swaney 1990). The *carnivar* has to be aware of the seed movements within his mandate area to adhere to his responsibilities. If he is by-passed in the transaction, severe action will be taken. It is believed that illegitimately accessed seed, i.e. varieties exchanged without the knowledge of the *pittan,* are cursed with a bad omen and will not fetch a good yield.

The *carnivar* in the matrilineal system of the Kurichyas will select his successor if he no longer feels capable of handing the various tasks of representing the community among the other *tharavars* and to visitors. He will select among the sons of his sisters. In the past, the representative and coordination responsibilities were smaller. The *carnivars* would visit one another among the pittans of the 56 Kurichya hamlets in the Wayanad district if a need arose. Today, the urge to improve their governance has resulted in the foundation of a coordination committee at the district level that comes together twice a year. Within their *varmsham,* the vicinity of three to four matrilineal connected hamlets, *carnivars* meet on a regular base to reach decisions on long term relationships. The most important ones are marriage alliances, which have to be considered according to clans, and relations to other castes. It is indicative of their less seriousness nature and their local significance that disputes over seeds and the violation of knowledge control will be dealt with at the lower *atharvar* level and not concern all 56 hamlets. The governance structure is devolved in this very aspect. A too tight governance structure might inhibit the desired flow of seeds. The fact that women have no formal decisionmaking power regarding the selection of varieties points to their dependency

concerning land use. Consequently they have only limited power to decide over the transformation from subsistence to cash crops. Thus a collective effort with discriminating rules.

Reciprocity: Norms of sharing and choosing

Kurichya farmers were anxious to know about the progress of the passing of the "Protection of Farmers Plant Varieties Act" in competition with the "Seed Act". While the first recognizes the traditional farmer as the intellectual property rights holder of numerous landraces in compliance with the Convention on Biodiversity (CBD), the later intends to grant more exclusive rights to breeders in accordance with the General Agreement on Trade and Trade related issues (GATT). The Kurichya farmers fear the disappearance of traditional rice varieties if their system of seed management is no longer in compliance with the law, and the law forbids the transfer of seed to others and forces them into seed purchase.

Kurichya farmers use the very same system of seed exchange through which they are approached by outsiders for the medium and short maturity varieties, to access high yielding varieties. In the drier areas of Wayanad, where the ecological situation is harsher, families were forced to pledge their harvest on the still growing crop to traders in order to obtain cash to manage the lean season. These households exchanged their traditional varieties for high yielding varieties from their neighbors. To be able to cultivate this new acquisition they had to decide against a number of landraces and stop cultivating them on their land.

As a joint strategy, the Kurichyas selectively adopted the fruits of the green revolution and maintain their right to reject the sway of progress; i.e. they made self-conscious, collective decisions to reject and accept. The institutions and rules of channeling seed flows –

that determine production structure – are fundamentally decisions based on *Wertrationalität* (Weber 1947), meaning that they are rational decisions that are made to uphold or promote absolute religious values (Kraybill 1989). The Kurichyas decided how modern they want to be and try to regulate this via the Kurichya steering committee. The group leaves the individual with fewer choices, since the collective choice is to preserve the identity as Kurichya people. While collective action thus restricts individual choice, the realm of choices tends to be larger for men because instead of a blind conformity to tradition, Kurichya men decide which traditions are worthy of respect.

Result: Women's status linked to level of agrobiodiversity managed

The shrinking demand of agrobiodiversity and especially rice varieties contributes to the diminishing of the social status of women, whose central labor input in sowing, transplanting, harvesting and processing in paddy cultivation secures them status. This influences the core relationships of collective action, namely reputation, trust and reciprocity. The social category of gender is a major organizing principle in collective action for seed management. It reinforces and strengthens the role of Kurichya people as long as women can fulfill their responsibilities. Collective action in agrobiodiversity management requires different responsibilities of men and women. The actual work varies to a significant extent, but is thus complementary, though this is subject to change with the conversion of the farming-system from paddy for subsistence to cash crops for the market.

Kurichya men and women have divided roles and responsibilities. The work of the *pittan's* wife in her managerial position of organizing the women for work to support the seed exchange underlines the complementarities of the work. Women's involvement in

agrobiodiversity management knows two major arenas beyond the actual handling of seed and related information: the site of the field, where rice cultivation takes place and the kitchen, where rice consumption is prepared, are the places where the conservation and utilization of traditional rice varieties occur.

The status of women in specific systems of plant cultivation, and the regard of their work and knowledge as well as the subsequent rooms of maneuver and access to other action resources suggests that their social position is linked to the level of plant genetic diversity the women are handling. The literature on the collecting of wild foods in the forests (Narayanan et al. 2004; Price 2003) stresses the enormous dependence of the tribal and gatherer communities on women's ethno-botanical knowledge for well-being and survival. The intricate abilities to recognize, collect, and process edible plants throughout the year secures women a well respected status and considerable decision-making power. In communities whose major cultivation strategy is one of horticulture, where a large number of species and varieties are cultivated in a complex setting of mixed cropping and layering of horizontal spaces, women's knowledge is required daily to utilize the interaction of plants in the confined area of a garden for consumption or marketing.

The garden, especially the traditional homestead garden found in almost every household in Kerala, acts like a continuum between the wild and the cultivated by harboring plants that have been brought in from random collections. Therefore the diversity of species and varieties remains high and is correlated with a high esteem for the female managers and knowledge holders. The parallel of a high female to male sex ratio and the prevalence of gardens for daily supplies hints to this causal relation, though it has not yet been followed up in this particular case in a rigid way. The number of crops in agricultural systems sinks

dramatically and is concerned with a number of very specialized plants, which on a varieties level might show a high diversity again. With the reduction of necessary knowledge, the futility of complex interlinkages between cropping patterns and a sharp seasonality of the application of that knowledge, women's virtuosity becomes less visible and less central to survival. Thus, the status of women in agriculture is endangered with sinking diversity. This appears as more pronounced when productions systems turn from complex natural resource management strategies into mono cropping following the goal of market access. Modernity does not automatically involve more rights for women and an increase in their status. In this case, we observe the opposite effect because women's status is associated with their roles as preservers of biodiversity and when that biodiversity is challenged by younger generations of men those men do not accord women a high status.

National Biodiversity Act: People's biodiversity registers

The collective interest of the People's Biodiversity Register is the documentation of knowledge on biological heritage for the creation of awareness in the population and for the production of evidence for future cost and benefit sharing strategies. The recording and documentation fall under the responsibility of the locally elected political board, the *panchayat*. It is mandatory for the local government to install a PBR to fulfill its obligations towards the Act. Since it is a requirement by the Central government, but the rules and procedures have not yet become routine, we observe a likely beginning of collective action. This top-down procedure has to be filled with actors and interests to transform the formal governance structure into a cooperative action. Nevertheless the rather abstract political frame does provide incentives to start organizing the common pool resource agrobiodiversity. The

legislation triggered the *panchayat* to commission the local NGO to start working on the establishment of the register. Technical help and training were given to facilitators and enumerators for conducting interviews with local knowledge holders.

Reputation: Shifting and losing the referential system to outsiders

The work towards the People's Biodiversity Register was a case of interaction between the NGO facilitators and the expert knowledge holders of tribal communities like the Paniya, the Kattunaikka, the Kuruma and others. The documentation work on the people's biodiversity revealed the intimate relation between biodiversity, knowledge and its utilization (Narayanan et al. 2004). Much of the biodiversity found in gardens and in the wild have multiple uses and medical value. There are wide differences between the various tribal and non-tribal communities, and within the communities, regarding the knowledge of biodiversity. The utilization of the landscape varies between community groups. In respect to gender it became clear, especially among the knowledgeable tribal population, that women play a key role in the conservation and management of food species. They are taking effective steps for the sustainable management of various landscapes. Especially through the collection of wild food, they have gained immense knowledge of the multiple uses of wild plants. Processing knowledge –the key to turning biodiversity into a valuable food or medicine – is the strong hold of tribal women. In addition, women tend to know more than men about leafy greens and fruit trees.

The high reputation women gain is associated with the importance of their knowledge in achieving food security. With declining availability of wild food, reduced utilization has lead to a related erosion of women's knowledge. The transformation of this applied

knowledge, which used to have an immediate felt impact on women's well-being, into a documented register is unlikely to result in the same status for women. The collective recognition of women's contribution to survival contributed to tribal women's freedom of movement and decisionmaking power. With a radical change in their audience from tribal community members to the bureaucrats and specialists appreciating and recording their knowledge, the collective no longer comprises the audience, where reputation is to be gained, and thus the mechanism of this core element of collective action is rendered dysfunctional. The shift to cash crops favors the employment of men to the disadvantage of women as does the shift to cash economy, where decisionmaking is tilted in favor of men, leaving women without their productive roles in paddy cultivation.

Traditional knowledge is dynamic and fluid. It is constantly growing as evidenced by the knowledge gained by women within one generation about invasive alien species regarding their habitat, occurrence, food value, edible properties and methods of processing and conservation. At the same time the erosion of traditional knowledge continues, accentuated by changing attitudes and by the non-availability and non-utilization of several varieties.

While some reputation might be gained in the long run by the interaction of tribal women with formal administrative structures, the reputation of the evolving governance structure, PBR, needs to be considered. The reputation of the institution is tied to the individual reputation of the facilitators. Since the PBR is an institutional innovation and no former experiences could be made with or heard about, the facilitators are taken as the governance structure they are representing. Former actions of the actors now in the role of documenting botanical knowledge for an evolving register and the existing institutions he or

she was associated with are essential to the success in the documentation procedure and the evaluation by the tribal community

The continuous quality of interaction turns out to be the key evaluative criteria (Padmanabhan 2003) for tribal people to comply with the idea of a PBR, building upon a long lasting process of reputation gained. This reliable long term investment through development projects and communication is at the heart of fulfilling this core element of collective action. The foreseeable conduct in the interactions of the larger governance structure determines the viability of the PBR. This reliable interaction is the element tribal people have started to evaluate as an indicator for the reliability of the emerging governance structure. The facilitators might even assuage skepticism and fear of government-induced acts of control. Continuity and predictability as an evaluative criterion is a necessary, but not sufficient condition to establish a working relationship with marginalized communities. Since the crafting of a new institution like the PBR *per se* is a venturing into unknown relationships, the linkage to already existing structures gains in importance. While the institutional set up of an NGO requires a cooperative and flexible working style to achieve voluntary cooperation, government organizations (GO) are *per definition* more stable, interpersonal and permanent. Since the installation of PBRs is at the heart a sovereign duty of the state in the form of its lowest political and administrative body, i.e. the *panachayat* through its Biodiversity Management Committee, the long term reputation of the PBR relies on the complementary advantage of the NGO and the GO sector in terms of social reputation and long term perspectives. Up to now, the heterogeneity of actors in this collective effort in terms of insider and outsider and the stress on women's knowledge has been helpful, but whether it is sustainable remains to be seen.

Trust: Different risks implied for men and women

It has been recognized during the collecting and documenting of the knowledge that great care and sensitivity toward the knowledge and the knowledge holders is necessary. The protection of the knowledge holders and recognition of them as custodians is necessary to avoid abuse and exploitative usage. The detailed documentation of sensitive biodiversity poses the challenge of ensuring and guarding indigenous rights. With the step to bring this local knowledge into the light and at the same time into the reach of other interested parties, the need for a system of safeguards, controls and possible sanctions becomes acute.

We thus observe the importance of trust in different dimensions. The ultimate investment of trust was demonstrated by the trust the tribal people placed in the representatives of the NGO and the governance structure behind it, contributing towards its reputation. Here we observe the need to develop norms of sharing and control that will increase the trust in this institution. Previous contact reinforced the trustworthiness of the outsiders. Especially women, who shared their specialized knowledge, contributed with an extra effort to share their strategic information. With the disclosure and official documentation, they enter a system beyond their control. Be it for good or bad, for protection or exploitation, remains to be seen.

For women, these developments bear further dimensions of social and political risk in comparison to men. The political domain and formal encounters even among tribal communities are a male duty and privilege. As we have also seen in the case of the Kurichyas' seed management, the official representatives for outside contacts are the duty and privilege of men. The way women influence management decisions follows parallel, but less obvious networks and interventions. With the official installation of women in the Biodiversity

Management Committee through reserved seats, they enter the public sphere. As the experience of women's quota in the *panchayat* has shown (Reddy 2006) women's participation is often reduced to merely their physical presence or women members are actually represented by their spouses. It remains to be seen, whether they can articulate their interests in this setting. By entering the public sphere, women violate notions of decency and appropriate behavior in a presumably democratic, but still socially hierarchical setting, which feeds back to their own reputation. The second dimension of risk women take in trusting the PBR with their practical knowledge of plants, their sites and usage is a social one regarding the revelation of associated tactics and strategies. As women influence decisions outside of the public sphere, they enjoy a comparative advantage they gain from their highly specialized knowledge, which is transmitted along gendered lines. With the documentation of it, involuntarily they reveal strategic options and hidden action resources. In sharing these patterns of biodiversity utilization to other heterogeneous groups of communities and men, they run the danger of losing strategic fall-back positions. Trust appears to be a double-sided coin for women, as their role as keepers of knowledge becomes less critical as their knowledge is documented.

This trust and the consequent long term investments by the knowledge holders -as the initial providers of knowledge – and the consequent up-dating of the knowledge base is only one aspect that is important for the success of this institution to tackle the social dilemma of biodiversity erosion. Since the PBR is an enacting body of the Biodiversity Management Committee – established by the elected local government, the *panchayat raj*, it is at the same time very dependent on the local political situation. While the PBR is supposed to be established once and function continuously, the Biodiversity Management committee is a

political body, whose members will be selected by the current government. Here lies the major challenge to the continuation of a trusting relationship between indigenous people and people representing the formal governance structure. With every new election, the BMC will be on disposal. As long as the lively election campaigns, for which Keralites as politically aware and articulate people are known, are thriving, the PBR is defunct. The likely influence the current political climate will have on the long term project of documenting biodiversity cannot be foreseen. With ongoing local elections, PBR meetings came to a halt and went into hibernation. The "People's Plan", the local decisionmaking body for rural development, will decide which priorities to pursue, and thus resources will be set aside for establishing such a fragile new institutional structure. With this dependency on the current political climate, the investments of trust into the working relationship with the facilators and the training given for the documentation are endangered. Paradoxically, the collective effort, backed by a strong legislation from the central government, is questioned at its core by local participation in politics.

Reciprocity: Higher stakes for women in the bet on the future

The long term goal of providing evidence for possible access and benefit sharing deals in the future requires a strong investment of the knowledge holders at the beginning of this collective action. With the formalization of the documentation, it remains an open question whether the knowledge held by women will one day translate into benefits that reach the women. This remains a major problem, since bureaucracies tend to discriminate against women' claims, especially in the case of women marginalized by caste, class or educational status.

The methodology of collecting information on biodiversity knowledge and initiating a dialogue was developed by the local NGO and scientists working in the area of medical plants. Joint transects to identify relevant species while crossing an area were used to break the ice. Separate walks were undertaken with men and women of three different age groups: above 40; 15 to 40 and; below 15 years of age. In the tribal hamlet, a high diversity of plants in the home gardens was found, brought in by the inhabitants from their gathering tours for wild food in the forest and transplanted. What actually can be observed in this case of collective action is an intervention into an endangered system of knowledge application and transmission, to safeguard it for goals not intrinsic to the indigenous population at first glance.

Result: Disembodiment of knowledge

To what extent is gender an organizing principle in this case of collective action? Because this is a case of collective action at a very early stage, we can not yet predict how the PBRs will evolve, once the intervention of the facilitators has diminished. No working rules grant a continuous consideration of women's knowledge and their claims. Rather, the ideology of equal access to participation in a register called "People's" might hide the problems of marginalized tribal women confronted with a highly politicized biodiversity bureaucracy. Nevertheless, this collective action challenges the gendered social roles by coaxing women to come forward and share their knowledge with outsiders, which would be against the norms of traditional agrobiodiversity management practices.

The PBRs are concerned with conservation of knowledge, not with seeds or plants. By documenting the knowledge in written form, the role of the knowledgeable person diminishes. It no longer is significant who holds the knowledge or what her sex or age is. Rather, the

knowledge gets disembodied and acquires a different, interpersonal quality. Whether this transformation of the knowledge serves the long term interests of the women in biodiversity management remains to be seen in such a young effort of collective action.

POLICY RECOMMENDATIONS

The insights gained by the analysis of gender and collective biodiversity management vis-à-vis the core variables of collective action, namely reputation, trust and reciprocity, have implications for policy formulation. Three fields of action for further policy improvement in the context of local biodiversity resources can be identified. First, the need to secure local women's intellectual property rights has to be recognized. Second, women's property and access rights to assets, especially to land in the context of sustainability and poverty reduction, have to be considered. Third, the consequences in the political arena and for the existing devolved governance structure have to be drawn.

Local intellectual property rights

With the onset of a large scale effort to document existing knowledge on biodiversity, its utilization and sites in "Peoples Biodiversity Register" the question of control over this knowledge arises. With the transfer from the local expert to the local bureaucrat, the knowledge transforms from the oral to the written, from vernacular languages into Malayalam or English. Through this procedure, the local intellectual capital enters another sphere of knowledge management. Especially in the case of illiterate local experts, the knowledge moves beyond their control. While the initial idea was to construct evidence to prove the origin, individual or community ownership, the tool might evolve into the contrary direction.

The “Peoples Biodiversity Register” requires clear working rules, procedures and control mechanisms on the ground to diminish the likeliness of this instrument being turned from a key to conservation into a thief’s picklock.

The formal registration of plants by interviewing local experts has another far reaching effect. The particularities of the person giving testimony on the wealth of biodiversity are recorded to ensure the possibility for claiming benefits in the far future. The entering of a list of potential beneficiaries rather than the actual conservation of the plant is the concern. The identity of the person is no longer as significant as the tacit knowledge becomes redundant. This disembodiment of knowledge results in another different, interpersonal quality with the consequence of degendering and decontextualising living knowledge traditions. This transformation of knowledge appears as a threat to the long term interests of the women in biodiversity management. The idiosyncratic ways of women organizing, transmitting and keeping the tacit knowledge alive by application need institutional support matching their existing collective efforts, so that they can maintain identity.

Property rights to land

The case studies of the Kurichyas and the PBR highlight the relevance of women’s property rights. Since women’s status is linked in both incidents to high levels of diversity, this has implications for policies regarding access to land. Within the jointly held land in the Kurichya households, women have usufruct rights and enjoy benefit streams through subsistence production. With the trend to a separation of single, individual plots the question of property rights arises. With the cash crop production already alienating women from work and direct returns, the danger of losing access with the disintegration of the club good arises.

Apart from the fields, the homestead garden is the prominent site for conservation of biodiversity. The possibility of legal rights to these home gardens directly in the name of the woman and not mediated by a male relative could secure continuity in knowledge and practice. With women's greater dependence on biodiversity for status and income streams, their interest in sustainable management would be supported institutionally.

Political economy and governance structure

The decentralization and devolving of responsibility for development planning to the local level in Kerala has implications for the evolving governance structure for biodiversity. Since the PBR is the executive outcome of the elected Community Biodiversity Committee, it is prone to influences by the current political agenda. While the conservation of biodiversity and its documentation in PBRs is an ongoing long term process, the governance structure makes it vulnerable to shifts within short notice of the political will of the local constituency. Consequently, the National legislation, which paved the way for treating biodiversity in a collective approach, is highly dependent on the local currents of political interests. As women's participation in the official political arena sometimes has only token status, so their options for intervention are limited. A clear and independent reporting mechanism to higher levels must be in place to challenge the primacy of local short term interests.

With the installation of PBRs, the development of the political economy of biodiversity bureaucracy sets in. At the very beginning and supported by NGOs, stakes and positions are distributed and working rules get established. Depending on the continuity of transfers for the maintenance of this biodiversity administration, a dynamic of budget maximizing bureaucrats and votes maximizing politicians will shape the rules of the game.

How long the interests of women knowledge holders will be regarded and treated accordingly in this power field remains to be seen. Although the ideology of decentralization with a strong emphasis on participation suggests equal access to services, the installation of an ombudsman may reduce the problems of representation for marginalized tribal women confronted with a highly politicized biodiversity bureaucracy.

CONCLUSIONS: GENDER AND CORE RELATIONSHIPS OF COLLECTIVE ACTION

The People's Biodiversity Registers are a first step to improve the position of indigenous biodiversity experts and conservers by backing their claim and manufacturing an instrument of evidence. Since every facilitating organization promotes different modes of documentations and the procedures are not yet finally approved, the direction of this collective action remains to be seen. The high initial costs and the unclear future of eventual returns and benefits, as well as the distribution of them, throw a skeptical light on long term success. Especially for marginalized tribal women, the identity of the knowledge holder might become redundant, since the knowledge is fixed and available. This separation, as well as the lack of conservation efforts of the actual plants and seeds, continues to present an institutional challenge. Both the preservation of plants and a sense of ownership need to evolve, but they also need to be upgraded in their ability to negotiate with the environment beyond the collective action. The core elements of reputation, trust and reciprocity are indispensable building blocks and assets to maintain group identity as an action resource.

In the case of Kurichya traditional farming, women enjoy a high status because of their complementary involvement to men in seed and knowledge management. The shrinking

demand of agrobiodiversity, especially of rice varieties, contributes to women's diminishing social status. These exogenous factors on the action arena for collective action will influence the core relationships of reputation, trust and reciprocity.

The case of People's Biodiversity Registers is a very young institutional arrangement as compared to the elaborate rules of the Kurichyas. Giving this circumstance, the conclusion drawn has to keep in mind the short period available for trial and error and thus learning processes allowing for change and improvement. Nevertheless, the status of women within this new institution appears endangered and dependent on massive intervention by well meaning third parties, vulnerable to abortive political processes.

In both cases, collective action plays a major role to govern the common pool resource biodiversity, especially knowledge-related properties. While the gate keeping of the Kurichyas is able to control, but not restrict, the viable flow of genetic material, the institutional set up is not positioned to recover the costs of their maintenance. Since this has not been the goal for a long time, the price competition endangers the sustainability of the whole landrace farming system. The institution for knowledge management, with its complementary task for men and women farmers, requires institutional innovations to deal with the threat of shrinking social coherence and thus, the vanishing support for the costly maintenance of an elaborate cultural heritage, the rice farming system in Wayanad.

Further empirical research is required to evaluate the future development of collective efforts to manage biodiversity. In the face of a governance structure in the making, investigation into new coping strategies and pockets of resistance to disenfranchisement by women are needed.

REFERENCES

AFPRO 2003. Stories of change. Learning from the AFPRO-SDC experiences in natural resources management in Maharastra and Andhra Pradesh. New Delhi, India: Action for Food Production

Agarwal, Bina 1985. Rural women and high yielding rice technology in India. In IRRI. Women in rice farming. Aldershot: Gower.

Agarwal, Bina 1997. Environmental action, gender equity and women's participation. *Development and Change* 28 (1): 1-44.

Agarwal, Bina 2000. Conceptualising environmental collective action: why gender matters. *Cambridge Journal of Economics* 24. 283-310.

Agrawal, Arun 2001. Common property institutions and sustainable governance of resources. *World Development* 29 (10): 1649-1672.

Anil Kumar, N., Girigan, G., and Nambi, V Arivudai 2004. Vayals. A traditional classification of agricultural landscapes. In LEISA INDIA. Vol. 2.

Balaravi, S. 2005. Crop diversity conservation, enhancement and tribal empowerment in Kerala, in MSSRF. 2005. 2004-2005 Fifteenth Annual Report M.S. Swaminathan Research Foundation. Centre for Resrach on Sustainable Agriculture and Rural Development. Pp 207-208.

Carney, J. & M. Watts 1990. Manufacturing dissent: Work, gender and the politics of meaning in a peasant society. *Africa*, 602:207-241.

de Groot, R. S., M. A. Wilson, and M. Roelof and J. Boumans 2002. A typology for the classification, description and valuation of ecosystem functions, goods and services. *Ecological Economics* 41(3): 393-408.

Fukuyama, F. 1995. *Trust: The social virtues and the creation of prosperity*. New York: Free Press.

Granovetter, M. 1973. The strength of weak ties. *American Journal of Sociology* 786: 1360-1380.

Hagedorn, K. 2005: The dichotomy of segregative and integrative institutions and its particular importance for sustainable resource use and rural development. Working Paper. Humboldt University Berlin.

Janssen, J. 1999. Property rights on genetic resources: economic issues. *Global Environmental Change-Human and Policy Dimensions* 94: 313-321.

Jones, Eric C. 2004. Wealth-based trust and the development of collective action, *World Development* 32 (4): 691-711

Kraybill. Donald B. 1989. *The riddle of Amish culture*. John Hopkins. Baltimore, MD

Menon, M. T. 1996. Encyclopedia of Dravidian Tribes. Kerala, India: International School of Dravidian Linguistics.

Mosse D 1997. The symbolic making of a common property resource: History, ecology and locality in a tank-irrigated landscape in South India. *Development and Change* 28: 3 467-504.

MSSRF. 2005a. 2004-2005 Fifteenth Annual Report M.S. Swaminathan Research Foundation. Centre for Research on Sustainable Agriculture and Rural Development.

MSSRF. 2005b. Gender, Rice and Food Security. A report on the international Year of Rice Programmes. M.S. Swaminathan Research Foundation.

MSSRF/FAO 2000. Gender dimensions in biodiversity management and food security: Policy and programme Strategies for Asia. Chennai, India.

Narayanan, M.K., P. M Ratheesh, Swapna, and N. Anil Kumar, 2004. Gender dimensions of wild food management in Wayanad, Kerala. Community Agrobiodiversity Centre, MSSRF. Chennai, India.

National Biodiversity Authority. 2004. The Biological Diversity Act, 2002 and biological diversity rules, 2004. National Biodiversity Authority. Chennai, India.

Ostrom, Elinor 2005a. The complexity of collective action theory. Paper presented at the TransCoop Workshop "Problems of Polycentric governance in the Growing EU" Humboldt University Berlin, Germany, June 16-17, 2005.

Ostrom, Elinor. 2005b. *Understanding institutional diversity*. Princeton, N.J.: Princeton University Press.

Padmanabhan, Martina 2003. Landfrauen und NGOs in Südindien. Zwischen Partizipation und Paternalismus. Münster: Lit.

Padmanabhan. Martina Aruna 2005. Institutional Innovations Towards Gender Equity in Agrobiodiversity Management: Collective Action in Kerala, South India. CAPRi Working Paper # 39. Washington, D.C.: International Food Policy Research Institute.

Padmanabhan. Martina. The making and unmaking of gendered crops in Northern Ghana. *Singapore Journal of Tropical Geography*. Forthcoming.

Pramod, C., Sivadasan, M, Anil Kumar, N. 2003. Ethnobotany of religious and supernatural beliefs of Kurichya of Wayanad District, Kerala, India. Ethnobotany 15(1-2): 11-19

Price, Lisa L. 2003. Farm women's rights and roles in wild plant food gathering and management in north-east Thailand. In *Women and plants. Gender relations in biodiversity management & conservation*, ed. Howard, P. London: Zed Books

Reddy, Srinivas Srigiri 2006 Determinants of collective action at community level: Results from a study of watershed management in India. Paper presented at the Forschungskolloquium 18.05.2006. Humboldt University of Berlin.

Schroeder, Richard A. 1993. Shady practice: Gender and the political ecology of resource stabilization in Gambian garden/orchards. *Economic Geography* 69 (4): 349-365.

Schroeder 1997. Re-claiming land in The Gambia: Gendered property rights and environmental intervention. *Annals of the Association of American Geographers* 87 (3): 487-499.

Sell, J. 1997 Gender, strategies and contributions to public goods. *Social Psychology Quarterly* 60 (3): 252-265.

Sen, A. 1990 Gender and cooperative conflicts. In *Persistent inequalities: Women and world development*, ed. Tinker I. New York: Oxford University Press.

Smale, M., M. R. Bellon, D. Jarvis, and B. Sthapit 2004. Economic concepts for designing policies to conserve crop genetic resources on farms. *Genetic Resources and Crop Evolution* 512: 121-135.

Swaney, J.A. 1990. Common property, reciprocity, and community. *Journal of Economic Issues* 24 (2): 451-62.

Swanson, T. and T. Goeschl 2000. Property rights issues involving plant genetic resources: implications of owner-ship for economic efficiency. *Ecological Economics* 321: 75-92.

Véron, R. 2001. The "new" Kerala model: Lessons for sustainable development. *World Development* 29 (84): 601-617.

Weber, M. 1947. The theory of social and economic organisation. New York: Free Press.

List of CAPRi Working Papers

01 Property Rights, Collective Action and Technologies for Natural Resource Management: A Conceptual Framework, by Anna Knox, Ruth Meinzen-Dick, and Peter Hazell, October 1998.

02 Assessing the Relationships between Property Rights and Technology Adoption in Smallholder Agriculture: A Review of Issues and Empirical Methods, by Frank Place and Brent Swallow, April 2000.

03 Impact of Land Tenure and Socioeconomic Factors on Mountain Terrace Maintenance in Yemen, by A. Aw-Hassan, M. Alsanabani and A. Bamatraf, July 2000.

04 Land Tenurial Systems and the Adoption of a Mucuna Planted Fallow in the Derived Savannas of West Africa, by Victor M. Manyong and Victorin A. Houndékon, July 2000.

05 Collective Action in Space: Assessing How Collective Action Varies Across an African Landscape, by Brent M. Swallow, Justine Wangila, Woudyalew Mulatu, Onyango Okello, and Nancy McCarthy, July 2000.

06 Land Tenure and the Adoption of Agricultural Technology in Haiti, by Glenn R. Smucker, T. Anderson White, and Michael Bannister, October 2000.

07 Collective Action in Ant Control, by Helle Munk Ravnborg, Ana Milena de la Cruz, María Del Pilar Guerrero, and Olaf Westermann, October 2000.

08 CAPRi Technical Workshop on Watershed Management Institutions: A Summary Paper, by Anna Knox and Subodh Gupta, October 2000.

09 The Role of Tenure in the Management of Trees at the Community Level: Theoretical and Empirical Analyses from Uganda and Malawi, by Frank Place and Keijiro Otsuka November 2000.

10 Collective Action and the Intensification of Cattle-Feeding Techniques a Village Case Study in Kenya's Coast Province, by Kimberly Swallow, November 2000.

11 Collective Action, Property Rights, and Devolution of Natural Resource Management: Exchange of Knowledge and Implications for Policy, by Anna Knox and Ruth Meinzen-Dick, January 2001.

12 Land Dispute Resolution in Mozambique: Evidence and Institutions of Agroforestry Technology Adoption, by John Unruh, January 2001.

13 Between Market Failure, Policy Failure, and "Community Failure": Property Rights, Crop-Livestock Conflicts and the Adoption of Sustainable Land Use Practices in the Dry Area of Sri Lanka, by Regina Birner and Hasantha Gunaweera, March 2001.

14 Land Inheritance and Schooling in Matrilineal Societies: Evidence from Sumatra, by Agnes Quisumbing and Keijuro Otsuka, May 2001.

15 Tribes, State, and Technology Adoption in Arid Land Management, Syria, by Rae, J, Arab, G., Nordblom, T., Jani, K., and Gintzburger, G., June 2001.

16 The Effects of Scales, Flows, and Filters on Property Rights and Collective Action in Watershed Management, by Brent M. Swallow, Dennis P. Garrity, and Meine van Noordwijk, July 2001.

17 Evaluating Watershed Management Projects, by John Kerr and Kimberly Chung, August 2001.

18 Rethinking Rehabilitation: Socio-Ecology of Tanks and Water Harvesting in Rajasthan, North-West India, by Tushaar Shah and K.V.Raju, September 2001.

19 User Participation in Watershed Management and Research, by Nancy Johnson, Helle Munk Ravnborg, Olaf Westermann, and Kirsten Probst, September 2001.

20 Collective Action for Water Harvesting Irrigation in the Lerman-Chapala Basin, Mexico, by Christopher A. Scott and Paul Silva-Ochoa, October 2001.

21 Land Redistribution, Tenure Insecurity, and Intensity of Production: A Study of Farm Households in Southern Ethiopia, by Stein Holden and Hailu Yohannes, October 2001.

22 Legal Pluralism and Dynamic Property Rights, by Ruth Meinzen-Dick and Rajendra Pradhan, January 2002.

23 International Conference on Policy and Institutional Options for the Management of Rangelands in Dry Areas, by Tidiane Ngaido, Nancy McCarthy, and Monica Di Gregorio, January 2002.

24 Climatic Variablity and Cooperation in Rangeland Management: A Case Study From Niger, by Nancy McCarthy and Jean-Paul Vanderlinden, September 2002.

25 Assessing the Factors Underlying the Differences in Group Performance: Methodological Issues and Empirical Findings from the Highlands of Central Kenya, by Frank Place, Gatarwa Kariuki, Justine Wangila, Patti Kristjanson, Adolf Makauki, and Jessica Ndubi, November 2002.

26 The Importance of Social Capital in Colombian Rural Agro-Enterprises, by Nancy Johnson, Ruth Suarez, and Mark Lundy, November 2002.

27 Cooperation, Collective Action and Natural Resources Management in Burkina Faso: A Methodological Note, by Nancy McCarthy, Céline Dutilly-Diané, and Boureima Drabo, December 2002.

28 Understanding, Measuring and Utilizing Social Capital: Clarifying Concepts and Presenting a Field Application from India, by Anirudh Krishna, January 2003.

29 In Pursuit Of Comparable Concepts and Data, about Collective Action, by Amy Poteete And Elinor Ostrom, March 2003.

30 Methods of Consensus Building for Community Based Fisheries Management in Bangladesh and the Mekong Delta, by Parvin Sultana and Paul Thompson, May 2003.

31 Formal and Informal Systems in Support of Farmer Management of Agrobiodiversity: Some Policy Challenges to Consolidate Lessons Learned, by Marie Byström, March 2004.

32 What Do People Bring Into the Game: Experiments in the Field About Cooperation in the Commons, by Juan-Camilo Cárdenas and Elinor Ostrom, June 2004.

33 Methods for Studying Collective Action in Rural Development, by Ruth Meinzen-Dick, Monica Di Gregorio, and Nancy McCarthy, July 2004.

34 The Relationship between Collective Action and Intensification of Livestock Production: The Case of Northeastern Burkina Faso, by Nancy McCarthy, August 2004.

35 The Transformation of Property Rights in Kenya's Maasailand: Triggers and Motivations by Esther Mwangi, January 2005.

36 Farmers' Rights and Protection of Traditional Agricultural Knowledge, by Stephen B. Brush, January 2005.

37 Between Conservationism, Eco-Populism and Developmentalism – Discourses in Biodiversity Policy in Thailand and Indonesia, by Heidi Wittmer and Regina Birner, January 2005.

38 Collective Action for the Conservation of On-Farm Genetic Diversity in a Center of Crop Diversity: An Assessment of the Role of Traditional Farmers' Networks, by Lone B. Badstue, Mauricio R. Bellon, Julien Berthaud, Alejandro Ramírez, Dagoberto Flores, Xóchitl Juárez, and Fabiola Ramírez, May 2005.

39 Institutional Innovations Towards Gender Equity in Agrobiodiversity Management: Collective Action in Kerala, South India,, by Martina Aruna Padmanabhan, June 2005.

40 The Voracious Appetites of Public versus Private Property: A View of Intellectual Property and Biodiversity from Legal Pluralism, by Melanie G. Wiber, July 2005.

41 Who Knows, Who Cares? Determinants of Enactment, Awareness and Compliance with Community Natural Resource Management Bylaws in Uganda, by Ephraim Nkonya, John Pender, Edward Kato, Samuel Mugarura, and James Muwonge, August 2005.

42 Localizing Demand and Supply of Environmental Services: Interactions with Property Rights, Collective Action and the Welfare of the Poor, by Brent Swallow, Ruth Meinzen-Dick, and Meine von Noordjwik, September 2005.

43 Initiatives for Rural Development through Collective Action: The Case of Household Participation in Group Activities in the Highlands of Central Kenya, By Gatarwa Kariuki and Frank Place, September 2005.

44 Are There Customary Rights to Plants? An Inquiry among the Baganda (Uganda), with Special Attention to Gender, by Patricia L. Howard and Gorettie Nabanoga, October 2005.

45 On Protecting Farmers' New Varieties: New Approaches to Rights on Collective Innovations in Plant Genetic Resources by Rene Salazar, Niels P. Louwaars, and Bert Visser, January 2006.

46 Subdividing the Commons: The Politics of Property Rights Transformation in Kenya's Maasailand, by Esther Mwangi, January 2006.

47 Biting the Bullet: How to Secure Access to Drylands Resources for Multiple Users, by Esther Mwangi and Stephan Dohrn, January 2006.

48 Property Rights and the Management of Animal Genetic Resources, by Simon Anderson and Roberta Centonze, February 2006.

49 From the Conservation of Genetic Diversity to the Promotion of Quality Foodstuff: Can the French Model of 'Appellation d'Origine Contrôlée' be Exported? by Valérie Boisvert, April 2006.

50 Facilitating Collective Action and Enhancing Local Knowledge: A Herbal Medicine Case Study in Talaandig Communities, Philippines, by Herlina Hartanto and Cecil Valmores, April 2006.

51 Water, Women and Local Social Organization in the Western Kenya Highlands, by Elizabeth Were, Brent Swallow, and Jessica Roy, July 2006.

52 The Many Meanings of Collective Action: Lessons on Enhancing Gender Inclusion and Equity in Watershed Management, by Laura German, Hailemichael Taye, Sarah Charamila, Tesema Tolera, and Joseph Tanui, July 2006.

53 Decentralization and Environmental Conservation: Gender Effects from Participation in Joint Forest Management, by Arun Agrawal, Gautam Yadama, Raul Andrade, and Ajoy Bhattacharya, July 2006.

54 Improving the Effectiveness of Collective Action: Sharing Experiences from Community Forestry in Nepal, by Krishna P. Achyara and Popular Gentle, July 2006.

55 Groups, Networks, and Social Capital in the Philippine Communities, by Marie Godquin and Agnes R. Quisumbing, October 2006.