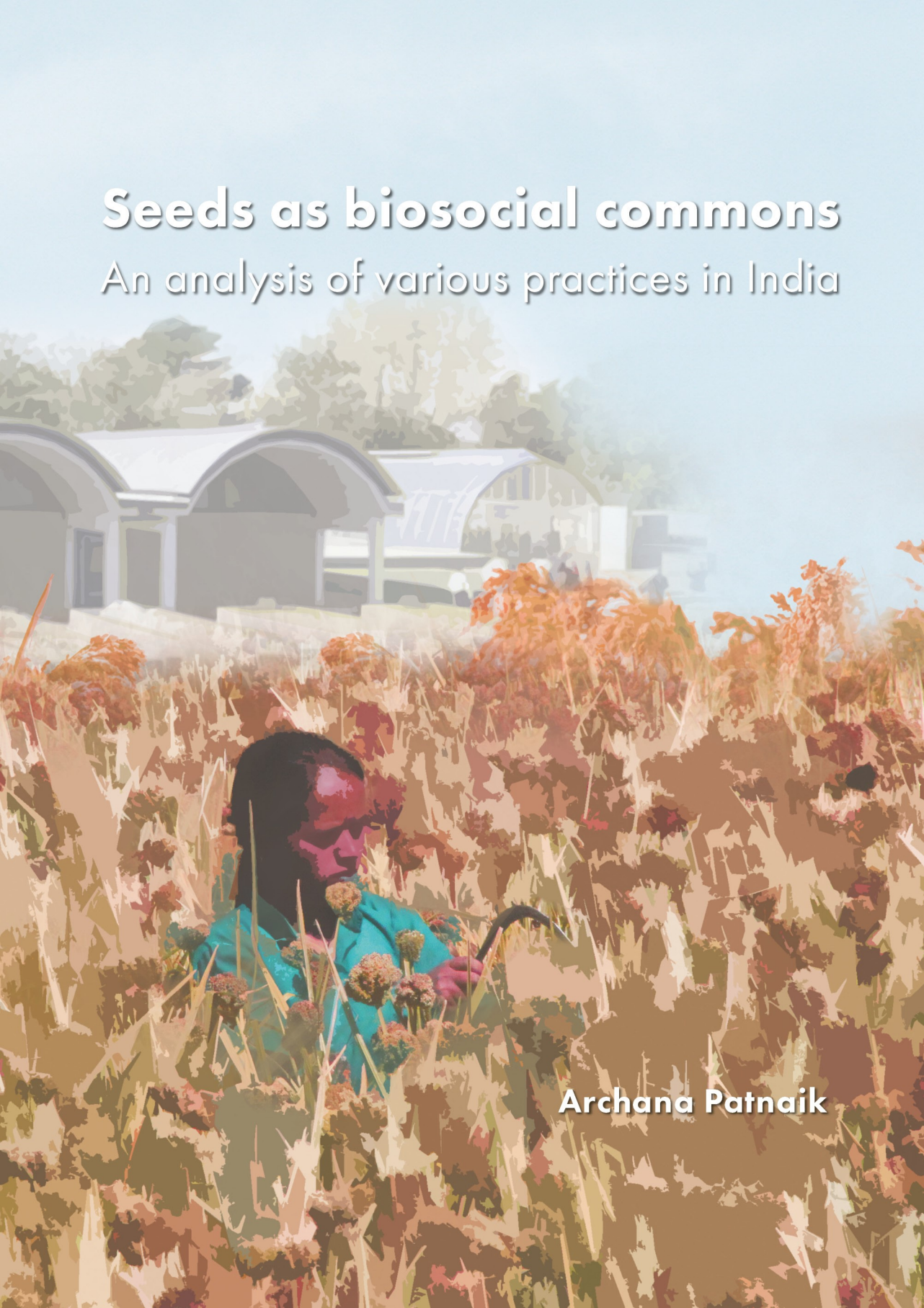
Seeds as biosocial commons

An analysis of various practices in India



Archana Patnaik

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Archana Patnaik

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To my four pillars of strength.....

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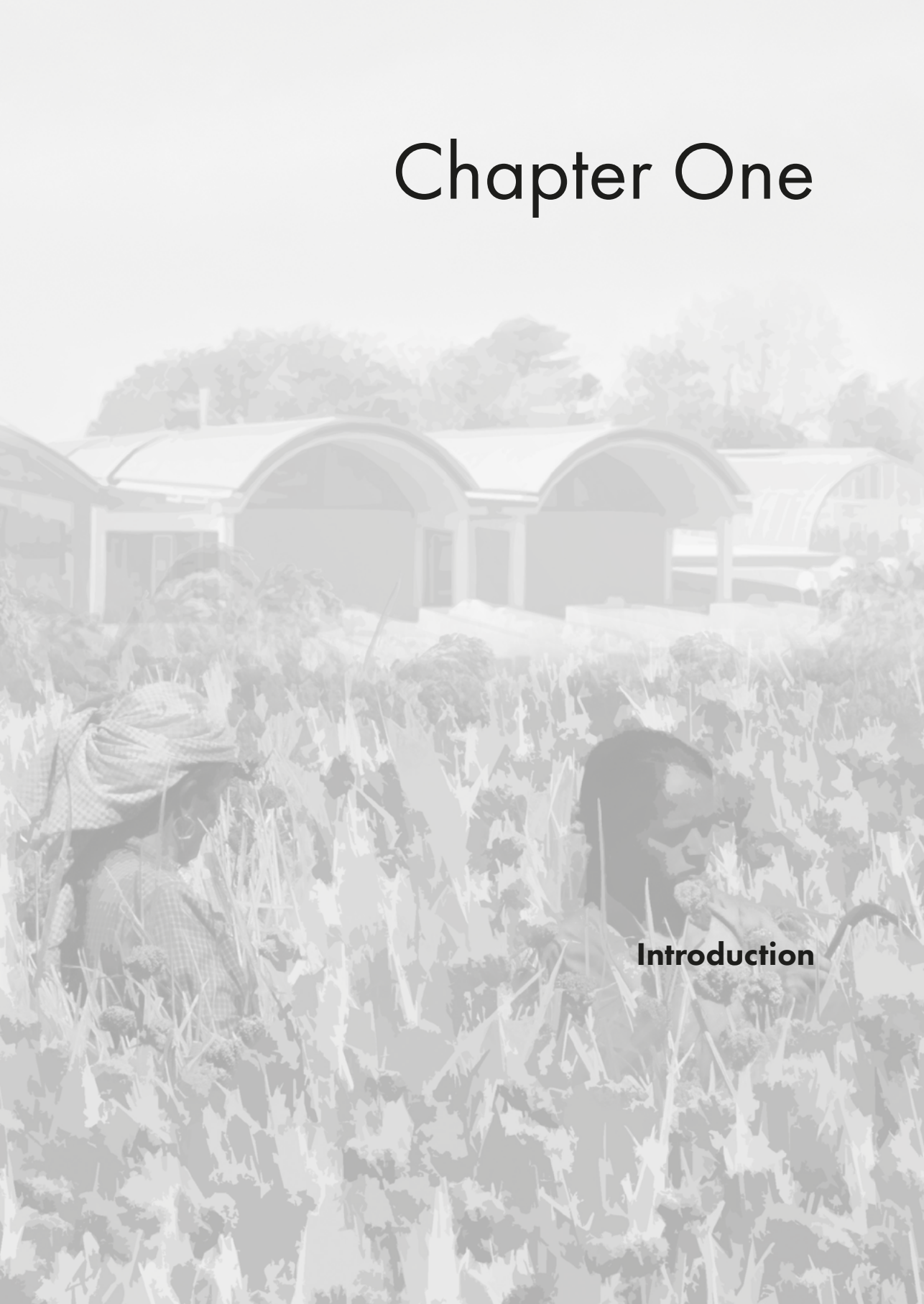
Abbreviations

Automated Telly Machines (ATMs)
Biological Diversity Act (BDA)
Central Rice Research Institute (CRRI)
Centre for Sustainable Agriculture (CSA)
Common-pool resource (CPR)
Common-pool resources (CPRs)
Community Seed Banks (CSBs)
Consultative Group on International Agricultural Research (CGIAR)
Convention on Biological Diversity (CBD)
Deccan Development Society (DDS)
Deoxyribonucleic acid (DNA)
Distinct Uniform and Stable (DUS)
Focus Group Discussions (FGDs)
Food and Agriculture Organisation (FAO)
Genebank Information Management System (GBIMS)
General Public License (GPL)
General Public License for Plant Germplasm (GPLPG)
Genetically Modified (GM)
High Yield Varieties (HYVs)
Indian Agricultural Research Institute (IARI)
Indian Council of Agricultural Research (ICAR)
Information and Communication Technology (ICT)
Institute of Management & Advance Global Excellence (IMAGE)
Institutional Analysis and Development (IAD)
Intellectual property rights were introduced (IPRs)
International Rice Research Institute (IRRI)
International Treaty on Plant Genetic Resources (ITPGR)
International Union for the Protection of New Varieties of Plants **(**UPOV**)**
Karnataka Rajya Raitha Sangha (KRRS)
Kerala Agricultural University (KAU)
Krishi Vigyan Kendras (KVKs)
Loka Samabaya Pratisthan (LSP)
Material Transfer Agreement (MTA)
Millet Network of India (MINI)
National Bureau of Plant Genetic Resources (NBPGR)
National Genomic Resources Repository (NGRR)
Non-Governmental Organisation (NGO)

Non-Governmental Organisations (NGOs)
Open Source Seed Initiative (OSSI)
Open Source Seed Network (OSSN)
Open Source Software (OSS)
Organic Farming Association of India (OFAI)
Plant Breeders' Rights (PBR)
Plant Genetic Resources (PGRs)
Protection of Plant Varieties and Farmers' Rights (PPV&FR)
Public Distribution System (PDS)
Seed vending machines (SVMs)
Seed Village Programme (SVP)
Self-Help Groups (SHGs)
Tamil Nadu Agricultural University (TNAU)
The Netherlands Organisation for Scientific Research (NWO) WOTRO
Trade-Related Aspects of Intellectual Property Rights (TRIPS)
United States of America (USA)
Value for Cultivation and Use (VCU)
World Trade Organisation (WTO)

Chapter One



Introduction

1.1 Introduction

The case of plant genetic resources (PGRs) is complex and challenging as a resource for study. PGRs have been defined as '*genetically determined traits in useful plants that can be characterized, evaluated, and utilized by farmers to meet essential ecosystem requirements*' (Eyzaguirre and Dennis, 2007: 1490). This instrumentalised definition recognises that PGRs contain an informational component (the genetically determined traits inscribed in the deoxyribonucleic acid [DNA]), a physical component (the plants), and a societal component, the assumptions about the socio-economic functioning of the seeds (useful for farmers) within their physical environment (ecosystem requirements).

PGRs are also perceived as being composed of both tangible and intangible components, where the material seeds are the tangible components housing the DNA that carries genetic information (the genetic code), which is intangible in nature (Roa-Rodríguez and van Dooren, 2008). This study refers to these perspectives and their associated discourses. It considers PGRs in form of seeds as a composition of tangible, physical and intangible, informational components shaped within a societal context. Figure 1.1 offers a pictorial representation of these different components (tangible and intangible) of PGRs and serves as a starting point for our research.

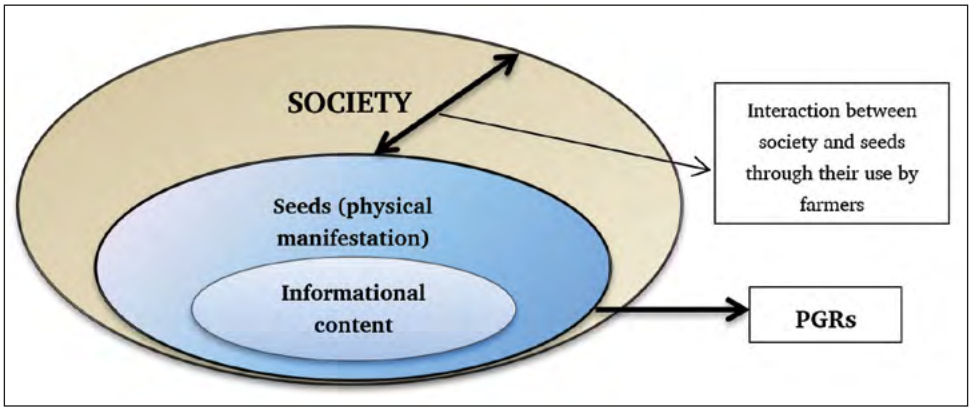


Figure 1.1 Different components of PGRs within a societal context.*

**The size of the circles does not represent the percentage of each component.*

Perceiving seeds as the tangible component of PGRs in which cultural and societal interests are inscribed, some scholars view them as politicising products (Gupta, 2013; Kloppenburg, 2014; Ruivenkamp 1989, 2005; Shiva, 2000b; van der Ploeg et al., 2004), indicating the ability of seeds to influence the relations in society among different stakeholders. This happens when societal interests (Figure 1.1, outer circle) interact with the informational content of seeds (Figure 1.1, inner circle). Similarly,

other scholars' view the political-economic interests of industrialised agriculture can be inscribed into the seeds as a specific informational content (Kloppenburg, 2005; Richards et al., 1997; Ruivenkamp, 1989, 2005, 2008; van Dooren, 2009). On the contrary to this politicised perception of seeds, there are scholars who view the interactions between society (Figure 1.1, outer circle) and informational content of seeds (Figure 1.1, inner circle) as providing opportunities for its transformation into intellectual commons (Dedeurwaerdere, 2012; Deibel, 2014; Kloppenburg, 2010, 2014; Vroom et al., 2007). Connected to this optimistic vision, other scholars emphasise that the informational content can also be reconnected to indigenous knowledge, values and traditions attached to location-specific forms of cultivating crops (Figure 1.1, middle circle) (Aistara, 2011; Altieri, 2009; Shiva, 2001, 2005b). In short, PGRs in the form of seeds are discussed from various angles and operate within various socio-political contexts influencing the ways seed function (as politicising products, intellectual commons, or carriers of values and tradition) within a society at large.

Along with the complexity with which PGRs interact and function within society, the combination of tangible and intangible components incorporated in the idea of PGRs also makes it difficult to bring them under a single, overarching property governance regime (Roa-Rodriguez and van Dooren, 2008). In fact, PGRs were treated as a common heritage for mankind, prior to, the introduction of plant patenting (concomitant with the beginning of the industrialisation of agriculture in the first half of the twentieth century), and then, the extension of intellectual property rights (IPRs) (Brush, 1996; Kloppenburg, 2005; Raustiala and Victor, 2004; Roa-Rodríguez and van Dooren, 2008). With the introduction of IPRs, therefore, PGRs were reduced to properties to be owned under legal ambit and no longer perceived as a heritage for mankind to be governed and managed collectively (Aoki and Luvai, 2007; Kloppenburg, 2010, 2014). The introduction of IPRs in particular created a divide between the tangible and intangible components of resources in general leading to debates on the enclosure of the intangible resources (including genomes and cell lines), which was termed a '*second enclosure movement*' (see Boyle, 1992: 37). Stimulating, however, also a new debate on PGRs as commons. It is within this developmental context of dividing resources into tangible and intangible components and enclosing the resources that the idea of commons have been modulated, contested and re-defined. Referring to these debates on commons this study is fundamentally concerned with PGRs as commons. It is particularly interested in investigating the processes for commonisation of seeds. By studying seeds I aim to contribute to the larger debates on PGRs as commons.

I refer to commonisation as a dynamic '*process through which a resource gets converted into a jointly used resource under commons institutions that deal with excludability and*

subtractability' (Nayak and Berkes, 2011: 133), where excludibility refers to issues around resource access and subtractability to issues around resource use through consumption. Therefore, the important issues for the present study are that of access, use and management of seeds. Specifically, it focuses on the conservation, use and management of seeds within different institutional settings through in situ and ex situ conservation banks. It looks at issues related to in situ and ex situ conservation banks, including the interaction of the different (tangible and intangible) components of PGRs, especially seeds for understanding the processes of commonisation. To understand these processes I discuss in the following section various perspectives that are formulated by different scholars on PGRs and commons broadly in order to develop a framework for this study. Thereafter, I formulate my research problem and research questions.

1.1.1 Different perspectives on PGRs and commons

Various perspectives on PGRs and commons have been described and re-defined by different scholars under a legal ambit, providing an interesting mix of ideas and concepts relevant to this study. For example, PGRs have been characterised by Aoki and Luvai (2007:67) as '*limited commons*', taking into consideration the various provisions of international treaties and agreements that restricted the free flow of PGRs.[1] Parallel to this, other scholars have conceptualised PGRs as '*global commons'* (see Dedeurwaerdere, 2012:33; Halewood, 2013:7-8; Herdt, 1999; Schmietow, 2012). For these scholars, the PGRs (seeds, material and related knowledge) that do not come within the purview of the IPRs have the characteristics of public goods and function as global commons. Further, scholars like Boettiger and Wright (2006:45) urged the protection of PGRs as '*protected commons*', where free access to these PGRs would be ensured. Advancing their argument, Boettiger and Wright (2006) gave the example of open source models[2] as a possible solution for creating a protected commons for different stakeholders. Similarly, some scholars emphasise the production of commons in PGRs through the use of open source mechanisms (see Aoki and Luvai, 2007; Benkler, 2004; Dedeurwaerdere, 2012; Deibel, 2013; Kloppenburg, 2010, 2014; Srinivas, 2006).

Summarising this, I find that the discussion which started from defining what is and what is not commons about and within PGRs eventually led to the development of

1 For details refer to Aoki and Luvai (2007) who have reflected on the PGRs and commons considering international treaties like the International Treaty on Plant Genetic Resources (ITPGR), Convention on Biological Diversity (CBD) and Trade-Related Aspects of Intellectual Property Rights (TRIPS).

2 According to Boettiger and Wright (2006) in an open source model the source code remains open and protected using various licenses creating a protected commons. For detail discussion please refer to Boettiger S and Wright BD. (2006) Open Source in Biotechnology: Open Questions Innovations Case Discussion: CAMBIA-BiOS. *innovations* 1: 45-57.

concepts that furthered the idea of commons. Despite employing different terms, concepts and ideas, all these scholars have focused on how PGRs can be governed and managed to function as commons within different socio-political contexts. That work is continued here on an empirical level with investigation of the commonisation of PGRs, especially seeds in specified ex situ and in situ conservation banks in India.

When reflecting on the governance of PGRs and the process through which they are common-ised, Roa-Rodríguez and van Dooren (2008) highlighted the difficulty to bring PGRs under one governance regime. The complexities were generally exacerbated through the introduction of IPRs, which established the governance of different components of PGRs (Drahos, 2006; Roa-Rodríguez and van Dooren, 2008). In this regard Drahos (2006) formulated a governance model considering these complexities and distinguished commons within PGRs under positive-negative and inclusive-exclusive categories.[3] Thus, referring to these various studies, this research sets out on the assumption that there is no uniform or generalised way to analyse commons within PGRs as a whole; certainly, there is no single approach that is universally accepted as standard. However, the different socio-political contexts and the various characteristics of the resources provide a basis from which a (necessarily specific) analysis of commonisation of PGRs may be conducted. In short, the unique context is the starting point from which more general considerations may emerge.

The Figure 1.2 depicts the ways in which different scholars have analysed the complexity of PGRs, PGRs interaction with IPRs, and the commons produced during this process. Borrowing from the aspects of PGRs as limited commons and protected commons, the left side of the Figure 1.2 reflects the ideas and practices of patenting, producing disconnection and enclosure, while the right side refers to collective practices in the form of common heritage, enabling knowledge commons and global commons.

Drawing from the perspectives of the scholars discussed (above), Figure 1.2 characterises PGRs within the socio-political context considering their complex characteristics. The right side of the Figure 1.2 refers to landrace varieties[4] (seeds) emphasising the biological and social benefits[5] of seeds, while the left side of the Figure 1.2 refers to the application of IPRs in limiting the biological and social benefits of seeds but also providing for protected and limited commons.

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3 For details see Drahos P. (2006) A defence of the intellectual commons. *Consumer Policy Review* 16: 101.

4 Landrace varieties are defined 'as local farmer's variety, of a particular crop' (Cromwell and Oosterhout, 2000: 218) 'which has not been improved by a formal breeding programme' (Louette et al., 1997: 24).

5 Here, biological benefits refers to the functioning of seeds in improving and sustaining life forms through its genetic qualities and social benefits refers to its function of supplying food, enabling cultural practices, maintaining ecological balance and biodiversity.

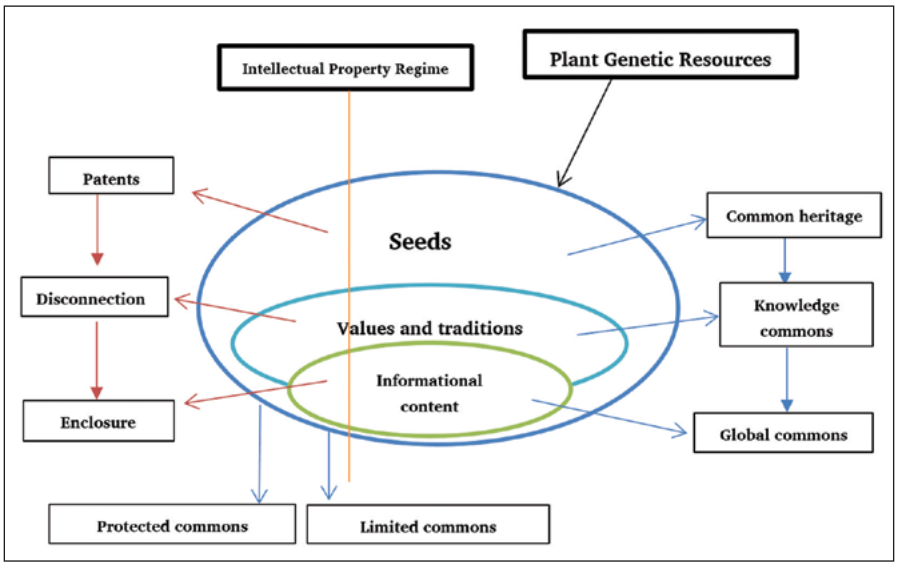

Figure 1.2 Plant Genetic Resources (PGRs), Commons and the Intellectual Property Regime.

These interactions between the PGRs and IPRs not only point to property relations but also to the different social relations affected and produced by this interaction. Thus, this study follows Wagner and Davis (2004) in emphasising the importance of studying the embedded social and cultural relations within which the resources function as commons. I analyse the processes of commonisation of PGRs, especially seeds reflecting on social and cultural relations rather than exclusively focussing on the property relations, as was done by most of the scholars referred to (above).

If I consider the management and governance of PGRs then I find as discussed previously that on one hand there are efforts to use PGRs for a further development of a commodification within the global food chains. On the other hand, there are also efforts aiming to install an 'other' (alternative) development through their commonisation. There are also many positions in between these oppositional stances. For reflecting on the processes of the commonisation of PGRs, especially seeds this study looks at two methods for their management and governance. The first method concerns the institutionalised conservation of seeds along with intangible (informational content) through an ex situ genebank, and the other is through the (inherently more informal) conservation of seed through in situ seed banks. Roughly, I refer to seed bank for in situ facilities (at villages, generally) and genebank for ex situ facilities (at scientific institutes). It is to be noted that since the tangible-intangible component of PGRs play an important in the management and governance of PGRs as commons, thus I take both the practices of managing

seeds. It should also be emphasised that the in situ seed banks also deal with the intangible components insofar as this is housed in seeds (so implicit), while the ex situ genebank comprise a storage of seeds from which the informational resources are produced (where the intangible is made explicit).

This study, therefore, analyses processes for the commonisation of PGRs through the different conservation practices, the socio-political contexts and the social and cultural interactions between the resources and the different stakeholders. Broadly, it reflects on the following:

1. The actual practices of conserving, producing and managing PGRs in their biosocial[6] context, focussing on the interaction between the resources, users and various stakeholders;
2. The ways in which the conservation (in situ or ex situ), production and management of PGRs (seeds and their informational content) are interwoven with their commodification or commonisation.

The first of these enables the second, and thence, this research aims to contribute to debates around the commonisation of PGRs, especially considering the landrace varieties.[7] I find focusing on the landrace varieties as important since these varieties are important to the farmers and operate within a societal context (Cromwell and Oosterhout, 2000; Louette et al., 1997).

1.1.2 Commonisation of seeds as biosocial commons

In order to understand the commonisation of seeds under different conservation and management practices, this research approaches seeds as biosocial commons. The concept of biosocial commons refers to those resources that have both biological benefits (improving and sustaining life forms through genetic qualities) and social benefits (supplying food, enabling cultural practices, maintaining ecological balance and biodiversity) which are enjoyed by and employed for the community through the collective arrangements. Seeds are conceived in terms of biosocial commons here drawing on van Dooren's (2009: 375) definition of 'biosocial' in an agricultural context, as '*the way in which humans are inextricably entangled with various non-humans in both the cultivation of crops and the making of agricultural socialities, knowledges and practices*'. In brief, the working definition of biosocial commons in this thesis refers to those common resources where communities interact with the resources

6 Here, I draw on van Dooren's (2009: 375) definition of '*biosocial*' in an agricultural context, as '*the way in which humans are inextricably entangled with various non-humans in both the cultivation of crops and the making of agricultural socialities, knowledges and practices*'. I will describe this in the next section.

7 'Plant scientists have conventionally included primitive cultivars, landraces, and wild and weedy relatives of crop plants under the rubric of plant genetic resources' (Kloppenburg and Kleinman, 1987: 190). For this study I analyse landrace varieties and their commonisation.

continuously creating various kinds of social relations. This interaction not only helps the community to derive the biological benefits from the resource but also the social benefits built upon the collective practices of the community. Through this study I intend to explore additional mechanisms to characterise and analyse seeds as biosocial commons. This investigation does not limit itself to an analysis of the tangible or intangible characteristics of the PGRs in form of seeds and its informational content or to just the governance and management of these resources as commons. These aspects are broadened by reflecting on the biosocial interactions between farmers and the resources, studying the socio-political and cultural relations between the human and non-human and the collective arrangements through which the PGRs in the form of seeds may become biosocial commons. Thus, the study prioritises an analysis of social and cultural relations instead of property relations. It is on this basis that the next section looks at some of the different methodologies used by various scholars to study resources as commons in order to draw from them analytical approaches that can be used here to investigate one resource type (seeds) as a biosocial commons.

1.2 Analytical methodologies for the study of natural resources as commons

Prior to the 1980s, natural resources were studied as specific units managed by various organisations under different conditions (Coward Jr, 1980; MacKenzie, 1979). Then, from the mid-1980s, natural resource management was studied as a socio-ecological system and analysed as commons applying transdisciplinary methods.[8] Thus, the study of natural resources transformed from the study of natural resources as units of analysis to that of socio-ecological systems managed as commons. Since then, different scholars have studied natural resources as commons, with commons defined in different ways. For example, Benkler (2003:6) defined commons as '*a particular type of institutional arrangement for governing the use and disposition of resources*', concentrating especially on information as the resource, whereas Barnes (2006: 4) treated commons as a generic term referring to '*all the gifts we inherit or create together' in relation to capitalism and its effects on society*'.

Scholars have not only defined commons differently but also studied them differently. In *Capitalism 3.0: A guide to reclaiming the commons*, Barnes (2006:65) argues, that scholars should look at commons as a '*sector*' like the corporate sector which will help in restoring the degradation of the common resources. In order to achieve this he suggests, a balance between the public and private sectors through the '*common*

8 For a detail discussion on the transformation see van Laerhoven F and Ostrom E. (2007) Traditions and Trends in the Study of the Commons. *International Journal of the Commons* 1: 3-28.

property trusts' based on market logic can function as commons (Barnes, 2006:84-85). The employment of an economics discourse in the word sector and common property indicates his direction of thought where he analysed commons as sectors to be owned by collectives. Toly (2005), meanwhile, urged scholars to use commons as tools to address important questions that are related to the relationship between technology, environment and society. According to Toly (2005: 26), '*commons serves not only as an important form of relations but also as a dialectic and experimental tool*'. In his study, he used biodiversity commons as a tool to analyse bioprospecting. The key aspect here is that of functionality, as expressed in the word tools and its usage.

Although these scholars have emphasised different aspects or connotations of commons in their varying methodological approaches, there is nevertheless a measure of agreement in their formulation. They all refer to commons as systems that exist in society alongside the capitalistic mode of production and in which collective goals are furthered and enhanced. This study, however, aims to approach the commonisation of PGRs, especially seeds in terms of biosocial commons, that is, as entities which contribute to the production of biological and social benefits for the stakeholders through the collective management of the resources. Therefore, to study seeds as biosocial commons I turn to the various ways in which scholars have analysed collective management in common-pool resources (CPRs).

In relation to CPRs, scholars like Oakerson (1986, 1992) developed frameworks to study collective action that were further developed by Ostrom et al. (1994) in their Institutional Analysis and Development (IAD) framework. The IAD framework provides guiding principles to analyse common property institutions for sustainability and robustness. Ostrom et al. (1994) directed scholars to analyse CPRs and their governance to find mechanisms for the effective management and governance of the resources based on property relations. According to the framework reducing the two problems associated with CPRs management, namely, subtractability and excludability can lead to effective management of common resources.[9] Although IAD is a systematic framework, it neglects historical and political factors affecting management and governance of a common resource (Agrawal, 2003; Whaley and Weatherhead, 2014). In addition to this, it emphasises the institutional factors that lead to the successful governance of resources, which is not the objective of this study. Using the IAD framework would not be appropriate for this study as I aim to study embedded social and cultural relations within which the resources function as commons. Thus, referring only to the institutional mechanisms following

9 Subtractability is related to appropriation of common resources by an individual affecting other individual's chances of gaining from the common resources and excludability concerns the difficulty of excluding individuals from using a common resource which makes it vulnerable to overuse (see Ostrom E, Burger J, Field CB, et al. (1999) Revisiting the commons: local lessons, global challenges. *Science* 284: 278-282).

the IAD framework would undermine the effort to investigate the processes of the commonisation of PGRs. This study distances itself from the IAD framework which would make an effect on the holistic understanding of the phenomenon.

Commons have also been analysed by CPRs scholars focussing on the enclosure of tangible properties of common resources and analysed mostly under the rubric of the tragedy of the commons (Allen, 1982; McCloskey, 1972, 1991). Hardin's (1968) formulation in terms of a tragedy was the first study to apprehend that common resources are vulnerable to over-exploitation and depletion without formal rules governing their use and benefit. However, this analytical framework was countered by scholars like Ellickson (1991) and Ostrom (1990), who reflected the widespread, effective governing of commons through local, informal group/community arrangements rather than state law leading to the efficient management of common resources. It was Ostrom's (1990) work in particular that became a stepping stone for the study of commons resources. Parallel to this, scholars also reflected on commons through a tragedy of anticommons framework, which arises from the exclusion of stakeholders from an effective resource use due to the multiple rights involved in its use (Buchanan and Yoon, 2000; David, 2001, 2004; Heller and Eisenberg, 1998; Lessig, 2001; Murray and Stern, 2007; Parisi et al., 2005; Ramanna and Smale, 2004; Srinivas, 2006). These various studies despite borrowing from different frameworks approached the analysis of commons from the point of property relations.

A different approach to these studies was proposed by Wagner and Davis (2004), whose analytical framework prioritised social and cultural relations. From this perspective, commons are embedded within the larger social and cultural systems within which they are instituted and operate. Since, the present study aims to analyse the commonisation of PGRs, especially seeds considering their biological and social benefits as biosocial commons such an approach provides a better conceptualisation of the phenomenon. From the above reflections on the ongoing scientific debates I approach the process of commonisation of seeds contextualised within the larger cultural and social relations in which they are embedded. This study will not limit itself to the theories and concepts developed within commons studies, but also, reflect on the scientific debates on commons within other fields of study. Thus, theories and concepts developed within commons studies and scientific debates on commons within other fields serve as useful tools in providing better understanding of the process of commonisation. The various theoretical tools from different fields of study will serve as a tool box.[10] In the next section I describe briefly the theoretical framework which is further elaborated in each chapter.

10 Toolbox here is used as a metaphor following Foucault (1974; cited in Patton, 1979), who urges scholars to treat his works as little toolboxes for understanding of different contexts and questions.

1.3 Theoretical and conceptual framework

This study looks at processes for the commonisation of PGRs, especially seeds focussing on the larger social and cultural systems within which these resources are embedded. Thus, the study distances itself from the IAD framework (as discussed earlier). Indeed, some scholars have already suggested that the management of plant seeds under commons frameworks needs to be re-formulated or re-considered (Hess, 2008). Hess (2008:38) categorised resources that blur the difference between tangible and intangible properties as '*new commons*'. Here, new does not mean that these resources did not exist before; rather, it '*evokes a sense of awakening, of reclaiming a lost or threatened crucial resource*' (Hess, 2008: 38). Other scholars have emphasised that most of the new commons are manmade, geographically unlimited and with a non-confining membership (Halewood et al., 2013). There is a similarity here in the case with seeds insofar as they travel distances through seed networks (Aistara, 2011; Pautasso et al., 2013) and the informational content of the seeds also travels through research networks (Dedeurwaerdere, 2012; Halewood et al., 2013). These networks are manmade and geographically unlimited with fluid membership. In the case of the informational content within seeds are intangible, but, equally seeds exhibit tangible characteristics (Aistara, 2011; Demeulenaere, 2014; Kloppenburg, 2014; Nazarea et al., 2013; Raustiala and Victor, 2004). Considering the complex mix of both the characteristics present in seeds I consider them belonging to a category of new commons and analyse them as biosocial commons. The empirical analysis used here thus refers to concepts and frameworks from commons literature, seed network theories, and an access framework as toolbox for understanding the ways in which seeds become or remains commons through the collective actions of the participants in gene/seed banks.[11] The various theoretical tools employed are as follows:

- Commons literature: to understand the interrelations between the common resource management and various stakeholders (scientists, farmers, women's self-help groups, Non-Governmental Organisations [NGOs]) within the biosocial context of ex situ and in situ conservation practices.
- Seed network theories and concepts from commons: to understand the relationship between the PGRs and their socio-political use for commodification or commonisation.
- Access framework and commons literature: to go beyond the politico-legal institutions that regulate access to the PGRs and to introduce an analysis of social relations and institutions that are perceived as facilitating or inhibiting the abilities of different stakeholders to access these PGRs as commons.

11 The theoretical framework is further discussed in detail in each chapter.

1.3.1 Commons literature

An important input for this analysis has been the scientific literature investigating the interrelation between PGRs and scientists in the ex situ genebanks. van Dooren's (2010) study focussed on the dynamics surrounding PGRs stored as seeds (tangible) in genebanks. He described the functioning of genebanks as facilities for transforming seeds into genetic information resources and thus effecting a disconnection of the resources from their biosocial environments. Other scholars like Hayden (2003, 2005) have reflected on the informational content (intangible) of the PGRs within the ex situ conservation practices. Hayden (2003, 2005) highlighted the politico-economic dimension of the transformation of genetic resources within ex situ directing attention to the transformation of these resources fostering their commodification. Contrary to this assumption, Dedeurwaerdere (2012) reflected on the transformation of the genetic resources stored in the ex situ genebanks into the global intellectual commons.

These scholars in their analysis of genetic resources conserved at ex situ have all emphasised in different ways the disconnection of the resources from their biosocial environment and their transformation. However, they failed to provide an empirical analysis of the process through which the disconnection and transition of seeds into informational resources takes place within the ex situ genebanks. This gap in these studies works against the attempts of researchers to analyse the factors that lead to the disconnection between the resources and their biosocial environment, which might be useful in analysing the commonisation of PGRs. This research aims to fill that gap by describing the process through which transition of seeds in the ex situ genebanks from natural resources into intellectual commons occurs, bringing out the specific factors involved in the disconnection of the resources from their biosocial environment.

In order to bring out the factors that may enable a reconnection here, an empirical understanding of the relationship between the scientific practices of seed conservation, factors that lead to disconnection and further the commonisation of PGRs is essential. Here, the commons literature and science and technology studies (STS) are important points of reference. The commons literature emphasises the study of resources that are managed or can be managed under a common governance, providing frameworks and concepts to analyse these (see Benkler, 2004; Chan and Costa, 2005; David, 2001; Dawson, 1998; Drahos, 2006; Harvey, 2004; Hess, 1995; Hess and Ostrom, 2005; Reese, 1995; Reichman and Uhlir, 2003; Seal, 2005; Suber, 2006). In a similar manner, literature on STS focuses on the relations between scientific practices and social context (see Haraway, 1989; Latour and Woolgar, 1979; Latour, 1996; Law, 2004). This thesis utilises insights, approaches, concepts and theories (relevant tools) from both the fields.

A core concept in this study is the biosocial relations, which illustrates the relevance of studying seeds stored in genebanks from the perspective of the entanglement of the biological aspects and social aspects.[12] This approach urges to adapt a multi-facetted analysis referring to a holistic picture of resource management, which requires the consideration of a wide range of social, political and scientific factors. In this sense, I also distance myself from those studies in which scholars refer only to the technical and political interventions emphasising the capitalisation and the conversion of resources into commodities that are held in common (see Bakker, 2007; Harvey, 2003; Kloppenburg, 2005; Prudham, 2007; 2009).

In this study the focus is on the biosocial relationship between the resources in question (seeds) and the biosocial context (the relations between farmers, scientists, breeders). Thus, attention is paid to the politics involved in the management of these resources as emphasised by some scholars (see Agrawal and Ribot, 1999; Escobar, 1998) and its implication for their commonisation. The multi-facetted analysis of the biosocial relations of conservation banks starts with an analysis of the Central Rice Research Institute (CRRI), in which I investigate the ongoing interactions between the scientific practices of storing and conserving seeds as a specific resource, analysing broadly through this the commonisation of PGRs (Chapter 2).

1.3.2 Seed network theories and concepts from commons

Many scholars have analysed seed networks as a form of resistance against the increasing monopolisation of seeds and the closely related aspect of biodiversity impoverishment. Informal seed networks not only maintain PGRs in form of seeds as commons but also consider seeds as a catalyst around which activities of resistance emerge and new modes of production are installed. For example, Aistara (2011) analysed seed saving and exchange practices among Costa Rican farmers as creating a space for resistance, while Da Via (2012: 230) explained seed networks in Europe as '*a concrete expression of the practice and politics of re-peasantization*'. Similarly, Bezner Kerr (2013) described on-farm seed saving activities by Malawian small holder famers as a form of achieving food sovereignty. It is from these perspectives of seed networks as forms of collective resistance that I focus on collective activities, elaborating on the relations between the community management of resources and commonisation of PGRs, especially seeds.

Referring to collective activities by communities defending their natural resources, many scholars have investigated the practices of resistance of communities to protect

12 Here biological aspects refers to the specific characteristics of the resource in question and social aspects refers to the social relations built upon the relations stakeholders construct among themselves in relation to the resources in question.

their common resources. These studies can be traced back to the works of scholars like Blaikie (1985), Schmink and Wood (1987), Guha (1989) and Peluso (1992) that explain how natural resources like forest, fisheries, soil and land are enclosed by private or public agencies and in which local communities try to prevent and defend the commons. Other scholars have analysed environmental struggles by communities from economic, ecological and livelihood perspectives. For example, Blaikie and Brookfield (1987) focussed on the link between resources (land) and capitalism, studying the conflict over these resources between the communities and the state. Other scholars have added a gender dimension in their analysis of community struggles (see Agarwal, 1994, 1998, 2000; Correa, 1995; Nightingale, 2002; Rocheleau and Edmunds, 1997), while environmental economists and ecological economists have emphasised the issues of environmental justice and livelihood for poor communities (see Muradian et al., 2002; Escobar, 2006).

While these scholars have focused on the resistance aspect of common resource management, Beitl (2012) differed from them. In her study of an Ecuadorian fishery she emphasised the use of a political ecology framework for a better understanding of the socio-political dimensions in which the social relations of commons are embedded. Her analysis of commons was based on establishing the relations between resources, local institutions and the (mangrove) environment. From these studies I find investigating the relationship between resources, environment and local institutions as essential. Investigating this relationship will help in developing insights into the practices of resistance of the communities and more generally into the socio-political dimensions of a study of PGRs as commons.

In order to understand the socio-political dimensions of PGRs as commons this work focuses on the politico-economic content of seeds which has been considered in various studies. Some scholars have referred to farm-saved seeds which enhances the autonomy of farmers in Europe (Da Via, 2012; Schneider and McMichael, 2010; van der Ploeg, 2008). Similarly, scholars in India have highlighted the importance of community-saved seeds in challenging the caste hierarchy (Kumbamu, 2012). Such considerations are important for this study and will be reflected in the study of community seed banks (CSBs) operated by Dalit caste women in south India (Chapter 3). Alongside these debates Kloppenburg (2010) has focussed on the social transformative capacity of seeds through its repossession from the monopolistic and corporate control. In this respect, I will also analyse alternative methods of conserving and producing seeds by restoring local varieties by different initiatives in India reflecting on issues of repossession (Chapter 4). Concrete examples are considered by Kloppenburg (2014) in relation to the alternate strategies to repossess seeds through an open source seed initiative (OSSI). OSSI aims to transform seeds

from functioning as politicising products for monopolies into means of creating alternative strategies to enclosure or commonisation, the focus here. Indeed, a case study including OSSI and a similar initiative in India, the Open Source Seed System (OSSS), will be analysed. Thus, taking all these debates into consideration, this study will analyse the repossession of seeds, creating alternative strategies leading to a commonisation of PGRs.

1.3.3 Access framework and commons literature

Aiming to go beyond the analysis of commons based on property relations, this study will remain incomplete without a critical reflection on the debates on access to PGRs and commons. Access, as different scholars have pointed out serves as an important factor in determining whether PGRs remain as commons or not (Brush, 2007; Davalos et al., 2003; Deibel, 2013; Halewood et al., 2013; Ramanna and Smale, 2004; Srinivas, 2006; Kloppenburg, 2010). The debates on access to resources, however has two generic approaches and can be differentiated as the rights and as the ability perspectives. These perspectives investigate opportunities for access within the IPRs framework, in the former case, or, in the latter, by examining the abilities of farmers to create their own forms of accessibility. It is the ability perspective rather than rights perspective within the access theories that enables this study to develop insights into issues of access apart from property relations that facilitate or inhibit commonisation of the PGRs. The ability perspective opens possibilities for the development of new insights into the issue of access to PGRs. This research is more interested in the ways farmers gain access to the PGRs considering the socio-cultural factors rather than the legal mechanism. A focus on PGRs through ability perspective will help in understanding the different webs of social relations used in accessing resources.

Some scholars have reflected on the different abilities of the stakeholders than the property relations that determine access to the resources. Nightingale (2011) reflected on the community obligation, identity patterns, similarly Blaikie (1985), McCay and Acheson (1987) established how informal social ties, ideologies etc. played an important role in determining access of stakeholders to the resources. Taking the rights perspective would neglect these variables and also similar variables like the resistance movements that also determine an individual access when resources are held in common. For all these reasons, this study applies an ability perspective to develop insights into the commonisation of PGRs, reflecting on the ways PGRs are accessed by small and marginal farmers and how access to PGRs can be facilitated.

Summarising the debates discussed, commons literature has guided focus on the disconnection of PGRs from their biosocial environments. The seed network studies have informed the importance of studying community efforts to resist the prescription of specific developmental models. Similarly, the social transformative capacity of seeds is highlighted by scholars through the strategies of repossession by the communities. Finally, the debates going beyond the IPRs framework have indicated the need to develop insights in the abilities of groups of farmers to regain their access to the PGRs. It is for these reasons that this study reflects on four distinct but important issues of disconnection, collective resistance, strategies of repossession and the abilities of stakeholders to understand various processes of commonisation of PGRs, especially seeds as biosocial commons.

1.4 The research problem

A sustainable use of resources, including PGRs, has been the concern of many scholars due to the introduction of the IPRs (Aoki and Luvai, 2007; Kloppenburg 2010, 2014; Ramanna and Smale, 2004). It has been convincingly argued that the conservation and use of PGRs plays a key role at a societal level, in the sense that PGRs form the building blocks for developing food security (Esquinas-Alcázar, 2005). In addition to this, PGRs are essential for plant breeding and agricultural production (Fowler and Hodgkin, 2004) to meet the growing food demand of an increasing population (Esquinas-Alcázar, 2005; Hoisington et al., 1999). However, as Roa-Rodríguez and van Dooren (2008: 181) have discussed, the usage of PGRs has changed from '*space in which these resources were, by and large, open to all and could not be enclosed by any individual, towards a space in which resources are readily available for appropriation for commercial interests in a way that limits and sometimes prohibits the rights of other users*'. This assessment of the changed usage of PGRs as implying an underutilisation of the resources and risk to food security also challenges the important societal role of PGRs. Thus, it has become crucial at this point of time to study PGRs, in respect of their conservation, management and use as commons. Through this study, I aim to deliver insights into the processes of commonisation of PGRs as biosocial commons. This will provide insights into the ways PGRs are and can be organised as commons as opposed to the restrictive systems of IPRs.

1.5 General research question

The general research question posed, therefore, is:

- How do processes of commonisation of PGRs, especially seeds as biosocial commons emerge in the Indian context?

1.5.1 Specific research questions

- This research investigates to the processes of commonisation of PGRs, especially seeds, the interaction among different stakeholders and the societal assumptions of this. It is guided by the following, chapter-linked, specific research questions:
- How does the disconnection of seeds from their biosocial environment take place in ex situ genebanks, and what are the implications for this on the commonisation of seeds? (Chapter 2)
- How does collective resistance of the community through community seed banks (CSBs) contribute to the commonisation of seeds? (Chapter 3)
- How do the various practices of repossession of seeds lead to their commonisation? (Chapter 4)
- How does the ability of different stakeholders affect their access to seeds, and what are the implications of this for the commonisation of seeds? (Chapter 5)

Through these research questions, I describe and analyse how PGRs (seeds) are conserved, managed, governed, utilised and whether and how opportunities for a commonisation of PGRs, especially seeds as biosocial commons emerge.

1.6 Empirical methodology

In order to address the broad research question, the study follows an in-depth qualitative research approach. I follow a case study methodology for the research design. Case studies provide for a holistic and in-depth investigation of a research problem (Yin, 2013a), which will assist in the in-depth understanding of the research phenomenon. A case study methodology is applied in this study to analyse the different aspects of PGRs and to understand the various processes of their commonisation.

Various techniques, such as interviews with respondents, focus group discussions (FGDs) and participant observation are used for primary sources of data, with published and unpublished documents, reports and official websites as secondary sources. The exact timing of field visits was largely determined by the approval of

the relevant institute or organisations, as was the length of time spent in the field. In total, a hundred and eight interviews and five FGDs were conducted. The interviews conducted ranged in length from forty minutes to two hours, while the FGDs each comprised fifteen members.

The study analysed four cases that are presented in Chapters 2 to 4. These comprise one case of an ex situ genebank and three in situ seed banks, all in India. The first case (Chapter 2) is of a public ex situ genebank – the Central Rice Research Institute (CRRI) and looks at the disconnection of PGRs. The second case (Chapter 3) reflects on the collective activity of resistance through the governance and functioning of community seed banks (CSBs) instigated by the Deccan Development Society (DDS). The third and fourth cases (Chapter 4) involve two small initiatives – Loka Samabaya Pratisthan (LSP) and Sambhav, with a relatively wide outreach that foster collective action for seed banks and for repossession.

Together, the four cases reflect different aspects of the commoning of PGRs and also contribute to an understanding of the process of commonisation of seeds, particularly in India. These are brought together in Chapter 5 for an investigation of PGRs accessibility through the abilities of stakeholders (primarily small and marginal farmers).[13] The study uses a particular mix of study techniques most suitable for analysing the problem addressed by each case or combination of cases, these various techniques of data collection and analysis are explained in detail in the relevant chapters.

1.7 Selection of India as research site

India was selected as regional site for this study as a part of a project funded by The Netherlands Organisation for Scientific Research (NWO) science division (WOTRO) that had the objective of reflecting on issues of commons in India. Thus, the various cases were selected from India and reflected on the opportunities for a commonisation of PGRs, especially seeds as biosocial commons. Several institutes and organisations across India were approached for the study and the most willing and appropriate cases among them were selected.

1.7.1 The Central Rice Research Institute (CRRI)

The first case study focuses on the Central Rice Research Institute (CRRI) in India, with analysis of the institutionalisation of seeds in an ex situ genebank. CRRI stores

13 Here small and marginal farmers are identified based on their landholding which is less than two hectares.

(rice) germplasm[14] of national and international importance. It has been involved in various national and international programmes (related to rice) and plays an important role in the institutionalisation of PGRs from all over India (again, especially rice). This also implies that PGRs conserved at CRRI undergo a particular institutionalised process of conservation, which is important for reflecting on issues related to the disconnection and commonisation of PGRs. Through this case study, I describe the specific process through which seeds become informational resources at CRRI and provide information not only on the transformation of seeds as such but also on the biosocial context in which the transformation occurs.

Located in the Cuttack district of the east Indian state of Odisha (see Figure 1.3), the CRRI collection consists of some thirty thousand varieties of rice germplasm maintained at the National Bureau of Plant Genetic Resources (NBPGR) regional station, CRRI campus. This collection is the result of many programmes and collaborations with several national and international institutes. In fact, the Food and Agriculture Organisation (FAO) has identified CRRI as one of five world centres for the maintenance of rice germplasm.[15] This reflects the importance of the institute in managing PGRs within its genebanks in India providing possibilities for analysing the institutionalisation of PGRs and implication of this for the commonisation of PGRs.

CRRI as an institute has an experimental farm spread across 117 hectares and divided into 15 blocks replicating different rice ecologies in which various experiments related to PGRs are conducted.[16] The administrative facilities and laboratory section are housed in a large, two-floor building at Cuttack that controls the functioning of CRRI as a public research institute. The administrative head (director) of CRRI manages the institute and works in its main building, which also includes the Oryza Museum, where the collection of different rice varieties along with their ecosystems is housed. Taken as a whole, the institute reflects arrangements that are centralised and formal in nature; for example, it maintains certain protocols for visitors to visit the institute through record maintenance and prior consent from the director or authorised personnel. As a public research institute, CRRI has a specific focus on granting access to the institute and defining related protocols. These institutional procedures and protocols have also been followed here for the collection of data related to conservation and management of PGRs at CRRI.

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14 '*Germplasm is a living tissue from which new plants can be grown*' for example, seeds which '*contains the information for a species*' *genetic makeup*', for details see SeedQuest website http://www.seedquest.com/keyword/seedbiotechnologies/primers/germplasmresources/introduction.htm (accessed on 20th April 2016).

15 For details refer to CRRI website, at http://crri.nic.in/Research/Divisions/GeneticR.htm (accessed on 15th September 2015).

16 See the CRRI website, at http://www.crri.nic.in/ (accessed 11th July, 2015).

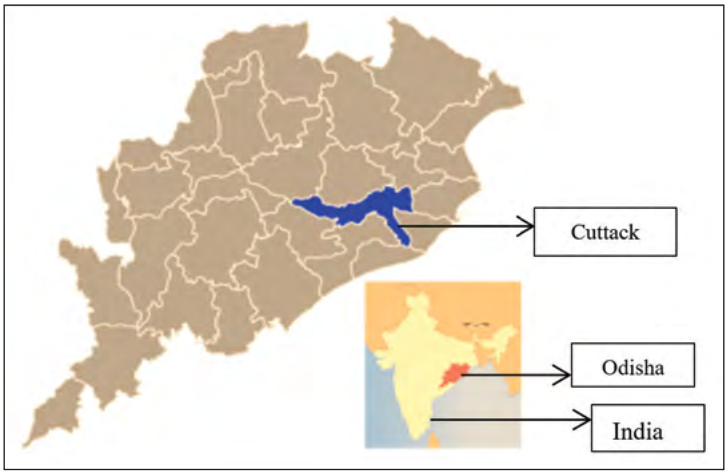


Figure 1.3 Geographical position of Cuttack district in Odisha state, India. [17]

1.7.2 The Deccan Development Society (DDS)

The second case focuses on the collective resistance of a community and commonisation of seeds. For this, the Deccan Development Society (DDS) was selected, as it has initiated community seed banks (CSBs) aimed at re-establishing local food self-sufficiency and securing community access to and control over food production. Over 25 years old now, DDS focuses on combining agro-ecology with issues of livelihood. The DDS research field is located in Zaheerabad, a sub-district[18] of Medak in the southern state of Telangana (previously in Andhra Pradesh). Currently, the organisation is spread across seventy-five villages in sub-districts (mandals) of Jharasangam, Raikode and Nyalkal, in addition to Zaheerabad (Figure 1.4).[19]

DDS as an organisation has its project office at Medak, which is nearly three hours' drive from the main city of Hyderabad, where the airport is located. This represents the geographical positioning of DDS in the interior parts of Telangana. The DDS project office is located in a small house in one village with some decoration on the front door. Next to the project house, there is a small area in the courtyard with different idols of the gods that the community worships. This place of worship is decorated with a garland made of millet and hung in front of the doors. Considered auspicious by the community, this site and associated practice reflects

17 Source: https://upload.wikimedia.org/wikipedia/commons/thumb/4/4c/OrissaCuttack.png/250px-OrissaCuttack.png (accessed 28th September, 2015).

18 In India states are divided into sub-districts or mandals as an administrative division comprising of several villages.

19 See the DDS website, at http://ddsindia.com/www/default.asp (accessed 18th July, 2014).

the importance of millet(s) for the community, evident also in various customs and food practices. Compared to CRRI, the organisation reflected arrangements that are informal in nature. Analysing DDS assists in reflecting the social and cultural context of seed conservation and management along with the collective resistance of the community through CBSs and the commonisation of seeds.

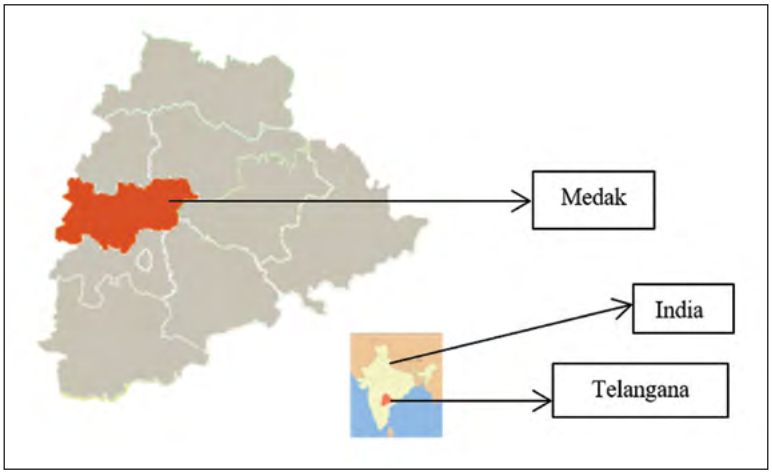


Figure 1.4 Geographical position of Medak district in Telangana state, India.[20]

1.7.3 Loka Samabaya Pratisthan (LSP)

Loka Samabaya Pratisthan (LSP) was selected as an initiative in the interior parts of Odisha representing resistance and repossession of seeds at a grassroots level. LSP is situated in the village of Nariso, Khurda district of Odisha (Figure 1.5). Situated in the same state as CRRI, LSP was deliberately selected to reflect on the social arrangements adopted by a grassroot Non-Governmental Organisation (NGO) in the interior of Odisha. LSP has its own seed bank and practices organic farming, registered under the Society Act of India (1860). Unlike DDS, LSP is a small organisation with limited infrastructure, but it caters to the needs of hundred farmers every year from nearby villages and from all over India.[21] According to the LSP founder, the limited financial support makes it difficult to develop a large infrastructure for conserving seeds. However, within these constraints LSP has successfully conserved around three hundred and fifty varieties of rice.[22] These varieties are conserved

20 Source:https://upload.wikimedia.org/wikipedia/commons/thumb/4/43/Medak_district_in_Telangana.png/250px-Medak_district_in_Telangana.png (accessed 20th July, 2015).

21 See the Global Green Grants website, at http://www.greengrants.org/2011/11/02/a-retired-teacher-seeds-organic-farming-in-india/ (accessed 20th August, 2015).

22 See the Global Green Grants website, at http://www.greengrants.org/2011/11/02/a-retired-teacher-seeds-organic-farming-in-india/ (accessed 20th August, 2015).

in the LSP seed banks that are situated at different places in Nariso, held in small rooms (including some in the founder's house), with seeds stored in earthen pots and jute bags.

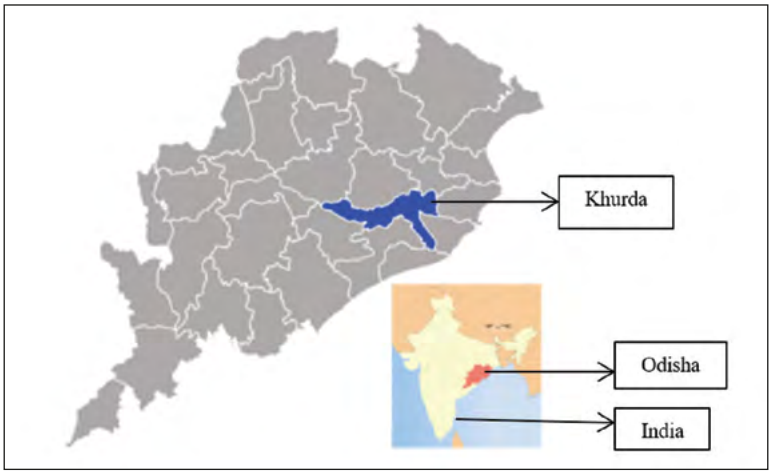


Figure 1.5 Geographical position of Khurda district in Odisha, India.[23]

LSP maintains and conserves landrace varieties using its organisational seed bank, which is managed by the organisation. LSP is also recognised by the Organic Farming Association of India (OFAI). Established in 2002 and officially registered in 2006, OFAI organises organic farmers and farming across India.[24] It promotes a variety of activities, including lobbying for organic farmers and assisting them through training programmes. This ideology is shared by LSP, reflecting its practices of doing agriculture and assisting in the analysis of the biosocial relations leading to access of landrace varieties by farmers. This case enables reflection on the various practices of repossession of seeds, providing opportunities to study the interaction between the resources, an organisation and its stakeholders to further contribute to investigation of the commonisation of seeds as biosocial commons.

1.7.4 Sambhav

Situated in Rohibank, in the Nayagarh district (Figure 1.6), Sambhav represents another grassroot level initiative in interior Odisha engaged in repossession of seeds. Like LSP, Sambhav was also selected to reflect on the social arrangements adopted by grassroots' NGOs in interior parts of Odisha working to maintain agrobiodiversity by reclaiming seeds to realise farmers' autonomy. Sambhav is organisationally

23 Source: https://upload.wikimedia.org/wikipedia/commons/thumb/7/71/OrissaKhordha.png/250px-OrissaKhordha.png (accessed on 20th July, 2015).

24 See the OFAI website, at http://ofai.org/organisation/ (accessed 8th August, 2015).

small, but it is spread across ninety acres of land. It has its own seed bank and practices organic farming, again registered under the Society Act of India (1860). Like LSP, Sambhav participates in programmes organised by the state to motivate young people to take up organic farming and through it become self-sufficient.[25] These activities reflect the resistance and repossession activities of Sambhav.

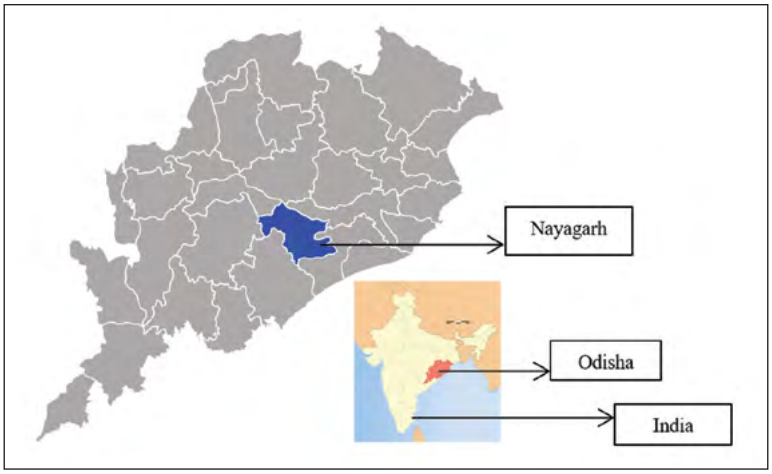


Figure 1.6 Geographical position of Nayagarh district in Odisha, India.[26]

The conservation of seeds at Sambhav takes place at two levels. First, at the level of the organisation, the seeds are collected from different places and conserved; second, at the level of farmers, people from different villages form groups and conserve varieties. Varieties are held at the organisation, using earthen pots and jute bags; seeds are also stored, in plastic containers due to the lack of proper space and funding. Sambhav focuses more on the issue of women farmers, imparting training in skills like stitching and weaving to maintain their livelihoods in the agricultural off-season. Thus, further to conserving resources, this organisation aims at bringing livelihood options to the farmers. Sambhav has also been recognised by OFAI, and adheres to the ideologies of organic farming and sharing. Overall, this case provides reflections on various practices of seed repossession and the interaction between the resources, organisation and stakeholders, all of which provides further information on the commonisation of seeds as biosocial commons.

25 See The New Indian Express, at http://www.newindianexpress.com/education/edex/article554116.ece (accessed 20th September, 2015).

26 Source: https://upload.wikimedia.org/wikipedia/commons/thumb/9/99/OrissaNayagarh.png/250px-OrissaNayagarh.png (accessed 20th July, 2015).

1.8 Ethical Issues

All the organisations studied as cases were contacted and prior consent was taken before the fieldwork was carried out. Interviews and FGDs were conducted with the consent of the respondents. In case of CRRI, prior written consent was taken from Indian Council of Agricultural Research (ICAR), whereas for the three NGOs (DDS, LSP and Sambhav) contact was made with the gatekeepers prior to visiting. A translator was used for the DDS study.

1.9 Organisation of the thesis

The thesis is organised into six chapters, including this introduction. An overview of the content of the following five chapters is provided below.

1.9.1 Chapter 2

This chapter employs the case of CRRI to describe how conservation of PGRs at an ex situ genebank in India acts upon seeds as a composition of biological, informational and biosocial components. It describes how in the process of conserving seeds at the genebanks these resources are transformed into intellectual commons. This highlights how seed becomes disconnected from its natural and human environments (farming communities) and the informational aspect connected to scientists and hence becomes an intellectual commons. The research thus shows how the development of informational commons is based on the transformation of seeds from their biosocial environment through processes of disconnection and appropriation, and it concludes with suggestions for reconnecting the seeds conserved with their biosocial environment.

1.9.2 Chapter 3

The main objective of this chapter is to analyse the local processes of managing resources (seeds) and the community struggle to maintain autonomy over these resources through its seed banks. The issue of autonomy is magnified since the community in question is a marginalised one in Indian society (in fact, being a women's group as well as Dalit, the lowest caste, it is doubly marginalised). This chapter also describes at a micro-level how the governance and functioning of the CSBs has over the years come to translate into a social space of commons developing an empowering normative subjectivity among the marginalised community. At the macro-level, it investigates ideas around conserving seeds through strategies

of culinary resilience and lobbying for inclusion in India's Public Distribution System creating inroads into the market. These reflections help in analysing CSBs managed by a marginalised community as possibilities for creating alternatives to the dominant form of conservation fostering the commonisation of PGRs.

1.9.3 Chapter 4

This chapter elaborates on the various practices of repossession of seed by four different initiatives; two NGOs (LSP and Sambhav, in Odisha) and two practices of repossession through open source mechanisms (Open Source Seed System in India and Open Source Seed Initiative in the USA). These initiatives, both farmer-oriented and open source, create alternatives by emphasising local farmer access and the conservation of agrobiodiversity by developing alternate legal procedures for repossession. In this chapter, I examine these practices of resistance and repossession focussing on examples representing these two approaches as different strategies that may both serve as a process of commonisation of seeds. The main objective of this chapter is to gain an understanding of the various singular practices of repossession that lead to the commonisation of seeds. This comparison is intended to provide insights into ways that the commonisation of seeds can be realised, both generally and more particularly in India.

1.9.4 Chapter 5

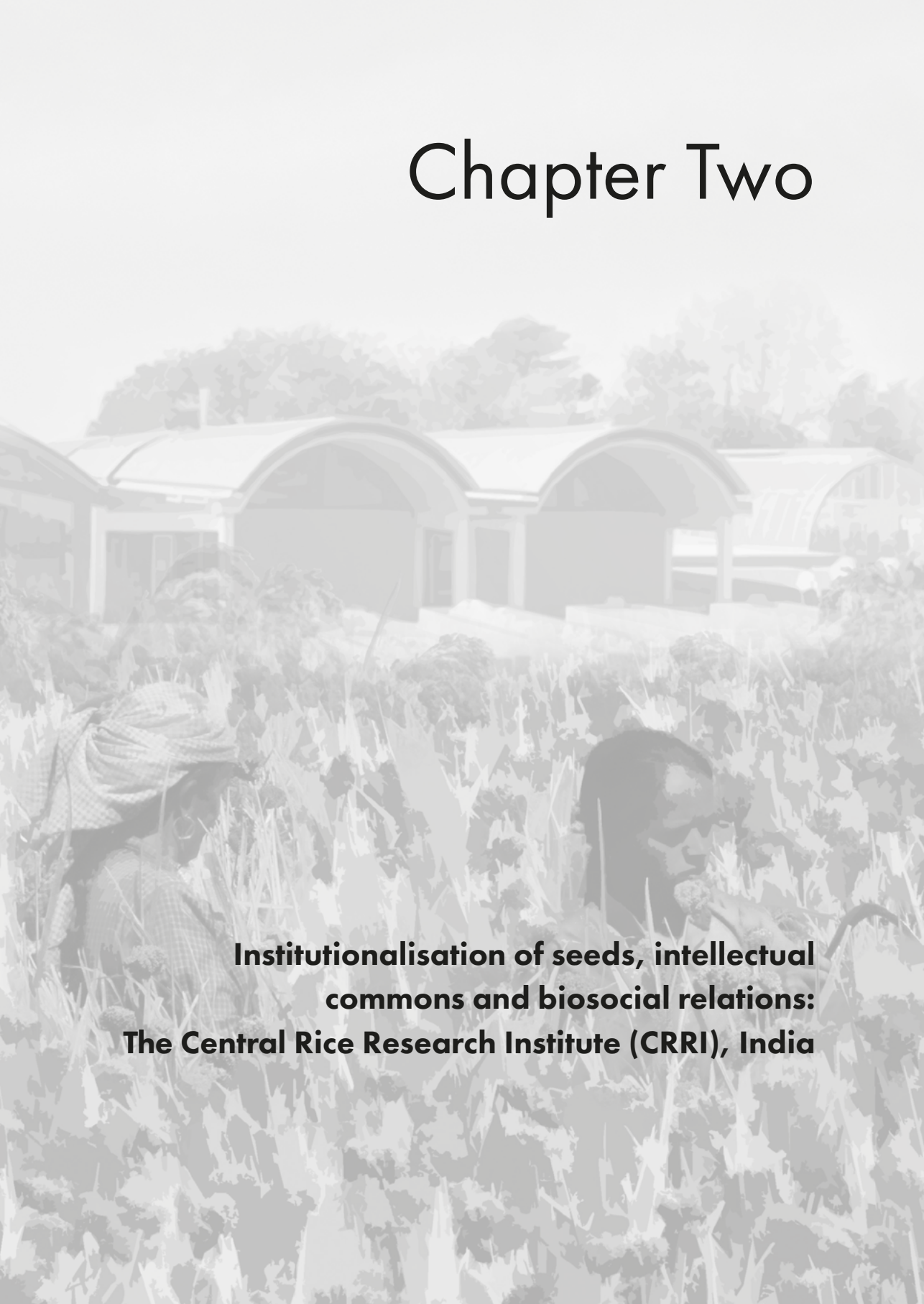
The fifth chapter deals with the access to PGRs using the ability perspective rather than the rights perspective within the access theories for investigating how farmers in India access the conserved landraces within the context of the two types of conservation practices (ex situ and in situ). Within this ability-oriented comparative framework, the social mechanisms that the small and marginal farmers use to gain access to PGRs, particularly the conserved landraces is analysed. Alongside this consideration of farmers' competencies, this chapter focuses on the various socio-political and cultural relations that facilitate or inhibit farmers' realisation of accessibility to the PGRs. This chapter thus aims to develop insights in the ways PGRs are accessed by small and marginal farmers and also how access to PGRs can be made more accessible leading the resources to function as biosocial commons.

1.9.5 Chapter 6

The thesis concludes by reflecting on specific problems from each case through the perspectives of disconnection, collective action, repossession and access. This chapter describes how the tangible and intangible components of the PGRs become

manifested under different management and governance systems. It also suggests how this distinction might be bridged to create spaces of social relations based on commons leading to the development of PGRs as biosocial commons. This chapter further provides a consideration of the various processes and practices that become the core aspects for a commonisation of PGRs, which can provide analytical grounds for other scholars interested in studying commonisation of PGRs, especially seeds as biosocial commons.

Chapter Two



Institutionalisation of seeds, intellectual commons and biosocial relations: The Central Rice Research Institute (CRRI), India

2.1 Introduction

Plant genetic resources (PGRs) consist of '*the entire gamut of plant material, of current as well as potential use in breeding of a crop*' (Bains et al., 2012: 53). Concerning their usefulness in the breeding process and for maintaining diversity in the fields, PGRs were conserved through ex situ and in situ conservation methods. However, these methods of conservation have been debated by different scholars based on their impact on agrobiodiversity and commons. In this chapter I focus on the case of ex situ conservation method.

During the 1920s and 30s, the institutionalisation of PGRs was initiated on a global level through ex situ conservation (outside the natural environment) in response to a genetic erosion reported in major crops across the world (Brush, 2000). The institutionalisation of PGRs through conservation of different varieties in ex situ genebanks was intended to maintain genetic diversity; however, the genebanks exhibited contradiction in their functioning. Over time, the diversity conserved at ex situ became employed by plant breeders to develop high yielding varieties (HYVs), which were genetically uniform varieties. The success of this institutionalisation, thus led to the replacement of diversity with uniformity, changing the agricultural landscape in the direction of mono-cropping industrial production and away from the original rationale of the genebank project (Hawkes et al., 2000; McCouch et al., 2012). Thus, the institutionalisation of PGRs in from of seeds at genebanks has led to their transformation into genetic information capsules bypassing, as it were, the range of farmers' needs; or, this institutionalisation effectively neglects the different relations that seeds have with different stakeholders (van Dooren, 2009).

At the same time, the appropriation of seeds through the institutionalisation and the use of plant breeding techniques transform seeds into intellectual resources (Dedeurwaerdere, 2012; van Dooren, 2009). Thus, the genebank enabled transformation not only affects seeds and related socio-cultural relations but also introduces issues of institutional dynamics, access and commonisation of PGRs. This chapter analyses one example of how this transformation takes place and considers the scientific culture of conserving seeds in genebanks in terms of cultural differences among different stakeholders and who can and cannot access the conserved resources and how commonisation of PGRs takes place. Following van Dooren (2009), it reflects on a genebank functioning in a developing country (India) and investigates the dynamics of the institutionalisation of seeds and effects of this on biosocial relations, issues of access and process of commonisation of PGRs.

To this end, the chapter looks at how the conservation of seeds at an ex situ genebank

transforms them and their relations with the (natural and human) environment, focusing on the socio-cultural transition of seeds from farmers' fields to the Central Rice Research Institute (CRRI), an ex situ public rice genebank in Odisha, eastern India. In order to analyse this transition, I use a typology of intellectual commons. This analysis is intended to add to the existing literature on the institutional conservation of PGRs (here, seeds) and on PGRs as intellectual commons. After a brief overview of the context of PGRs, ex situ genebanks in India and the theoretical framework employed, the methodology is presented, followed by the main findings of the research. Then, possible solutions are suggested in response to the central problems of the disconnection of seeds and PGRs from their natural and human environment and the failure to maintain a living diversity.

Through this analysis, the institutional structure and practices of the genebank are shown to create an intellectual commons producing scientific data useful for the plant breeders, scientists and researchers. However, the chapter concludes that once resources are banked in the genebanks, they become proxy for seeds and mostly serve as intellectual commons. This produces an intellectual commons but fails to reproduce diversity in the fields, which also affects the social relations seeds have with the various stakeholders (primarily farmers, farming families and agricultural communities), ultimately affecting their access and use. It is important to note that factors such as the appropriation of PGRs and their institutionalisation do create possibilities for developing the intellectual commons. Thus, I argue here that the institutionalisation of PGRs produces a positive but exclusive intellectual commons, and in the process creates cultural difference among different stakeholders leading to under-utilisation of the resources. In order to overcome these problems with ex situ genebanks, seed village programme and Seed Automated Telly Machines (ATMs) are proposed as possible solutions.

2.2 Conservation of PGRs and ex situ genebanks in India

Most of the important PGRs in the world are conserved in the form of seeds at national and international genebanks. The number of these facilities has exploded over the past half century. In 1970, there were less than ten functioning genebanks worldwide, while now, there are about 1,750 (FAO, 2014; Gepts, 2006), indicating the importance that PGRs and their institutional conservation have gained. These ex situ national and international genebanks currently house over seven million seeds and other plant propagating samples of food crops and their wild relatives (FAO, 2014).[27] Thus, genebanks act as the global reservoir of collected plant germplasm.

27 FAO (2014) *Genebank Standards for Plant Genetic Resources for Food and Agriculture*. Rev. ed., Rome.

Further the global pool of PGRs is maintained at Consultative Group on International Agricultural Research (CGIAR) genebanks, there are also national and regional genebanks adding to the collection of germplasm of different plant varieties. These include the U.S. National Plant Germplasm System, the Chinese Institute of Crop Germplasm, the NI Vavilov Institute of the Russian Federation and the National Bureau of Plant Genetic Resources of India (Gepts, 2006). In India, PGRs related activities were recorded from as early as 1910, but it was only in 1946 that a need was felt to establish a unit for the collection of global germplasm. Thus, the Plant Introduction Scheme in the Botany Division of the Indian Agricultural Research Institute (IARI) was established.[28] The systematic effort to manage PGRs in India is now headed by the National Bureau of Plant Genetic Resources (NBPGR).

The NBPGR was established as an independent institute in 1976, initially as the National Bureau of Plant Introduction. It was set up by the Indian government both to manage PGRs available throughout the country and to acquire PGRs from other nations. The NBPGR currently has ten regional centres, each located in a different phyto-geographical zone (based on uniform climate and vegetation).[29] The germplasm collected through the regional centres is ultimately sent to the NBPGR centre in New Delhi, where it is stored for long-term conservation and use. The CRRI, in Odisha, a regional centre at Cuttack, serves as a base for the NBPGR exploration and collection of rice germplasm in the humid/moist tropical east coastal region of India.[30] Since its establishment in 1946, CRRI has developed an extensive complex of engineering (laboratory), storage (genebank), library and administrative facilities. It has two research stations and five divisions contributing to the formation of man's repository of rice germplasm and the stored conservation of biodiversity. I will discuss about the functioning of the CRRI genebank later.

2.3 The intellectual commons approach

In his study of ex situ genebanks, van Dooren (2010) emphasised the need to rethink how seeds are stored at the genebanks, picking out (i) the inequalities these genebank create concerning access to the stored materials in the context of the international regulatory frameworks, and (ii) the functioning of genebanks as facilities for the transformation of seeds into genetic information resources disconnected from their biosocial environments. Understanding 'biosocial' here as '*the way in which humans*

28 See the official website of NBPGR (India) www.nbpgr.ernet.in/ (accessed on 20th April, 2015). Much of the information on the history of PGRs and their conservation in India reported here is derived from this source.

29 The regional centres are at Shimla, Akola, Cuttack, Hyderabad, Ranchi, Srinagar, Bhowali, Jodhpur, Shillong and Thrissur; each centre is responsible for collecting local varieties according to its mandate.

30 See the official website of CRRI, at http://www.crri.nic.in/ (accessed on 22nd April, 2015).

are inextricably entangled with various non-humans in both the cultivation of crops and the making of agricultural socialities, knowledges and practices' (van Dooren, 2010: 375). van Dooren's (2010) particular focus was on the dynamics surrounding the conserved seeds, or the tangible nature of PGRs, stored within the genebanks. However, seeds conserved at genebanks also have an intangible character, on which other scholars have focused.

Hayden (2003, 2005) highlighted the politico-economic dimension of the transformation of genetic resources conserved at ex situ genebanks into informational products. He noted that the transformation adds economic value to the genetic resources creating capital and thereby fostering their commodification. Similarly, Dedeurwaerdere (2012) emphasised the informational (intangible) nature of PGRs conserved at ex situ genebanks. He reflected on how informational or biological entities become part of the global intellectual commons, especially with the creation of research network communities. Thus, scholars have emphasised in different ways that seeds as natural products are reconstructed when they enter ex situ genebanks and become an informational resource for plant breeding. This social transformation is made possible by disconnecting seeds from their natural environment and storing them in genebanks. The studies cited above began from the issue of disconnection before focusing on either the tangible or intangible character of PGRs. Despite this common starting point, these studies failed to provide a concrete analysis of the process through which the disconnection and transition of seeds into informational resources and to intellectual commons takes places within the ex situ genebanks. I address this issue here by describing the process through which the transition of seeds from natural resources into intellectual commons occurs. This will help in understanding the dynamic interrelations of the scientific practices, social relations and genebank resources, which in turn can create possibilities for a relinking of the scientific and the social worlds reflecting on the broader issue of commonisation of PGRs.

To meet this end, I need to understand the scientific practices of ex situ seed conservation. Thus, it is necessary to investigate on the relationship between the scientific practices and biosocial context in which scientists conduct their seed-storing activities, a relationship emphasised by science and technology (S&T) studies carried out by various scholars related to other biosocial fields of application (Haraway, 1989; Knorr-Cetina, 1999; Latour, 1996; Latour and Woolgar, 1979; Law, 2004). It is also important to understand the resource in question, particularly the politics involved in the management of these resources, as we know from the natural resource management studies of political ecologists (Agrawal and Ribot, 1999; Escobar, 1998).

It is in view of these various frames of reference, therefore, that this chapter assumes the biosocial context, resources in question (seeds, genetic material) and scientific practices of conserving and storing seeds in ex situ genebanks as essential and not mutually exclusive categories. These categories interact and influence each other. For example, some scholars have investigated capitalisation and the conversion of resources into commodities that are held in common through technical and political interventions (Bakker, 2007; Harvey, 2003; Kloppenburg, 2005; Prudham, 2007, 2009). These studies emphasise a holistic picture of resource management, which requires consideration of the various social, political and scientific factors affecting the resource under study. This chapter, therefore, considers interactions between the scientific mechanisms of storing and conserving seeds as a resource contextualised within a biosocial environment.

Looking at the mechanisms through which management of resource systems are identified, a distinction may be made between common resource studies. Some scholars have emphasised the capitalisation of common resources (Bakker, 2007; Harvey, 2003; Kloppenburg, 2005; Prudham, 2007, 2009), whereas others focused on their management as commons (Agrawal et al., 2008; Baland and Platteau, 1996; Bardhan, 1993; Cahir, 2004; Cochran and Ray, 2009; Engel and Saleska, 2005; Holman and McGregor, 2005; McKean, 2000; Ostrom, 1990; Ostrom et al., 1994; Tang, 1991; Wade, 1988). While other common resource studies have distinguished common resources on the basis of their characteristics, classifying them into categories such as traditional, new and intellectual commons (e.g. Benkler, 2004; Boyle, 1992; Halewood et al., 2013; Hess, 1995, 2008; Hess and Ostrom, 2005; Litman 1990). Here, in this chapter, I am interested in understanding the transformation of PGRs into intellectual commons, which are associated with knowledge or intangible resources and, according to Dawson (1998), are not necessarily global and might be specific to circumscribed groups. For example, the data from PGRs stored in the genebanks can be accessed and utilised by any but only individuals with the capacity and ability to use these resources. Hence, intellectual commons may be open at a macro level but relevant to commoners with specific hereditary or acquired knowledge (Dawson, 1998). Various scholars from different fields have considered shared intangible natural resources, such as knowledge, as an intellectual commons (Benkler, 2004; Chan and Costa, 2005; David, 2001; Dawson, 1998; Harvey, 2004; Hess, 1995; Hess and Ostrom, 2005; Reese, 1995; Reichman and Uhlir, 2003; Seal, 2005; Suber, 2006). Hence, I analyse the process of the transformation of seeds at CRRI as they move from tangible natural resources to shared intangible resources as intellectual commons.

In order to investigate this transformation, I refer to the conceptual scheme of Drahos (2006) comprising the categories positive inclusive, positive exclusive, negative inclusive and negative exclusive. In his categorisation, inclusion refers to situations where rights to use information are enjoyed by all individuals (the Internet, wikis, etc.) with exclusion referring to rights that are confined to the members of a community (such as local libraries). The positive and negative categories are based on ownership and freedom to use the common resource. Thus, negative intellectual common resources are those that are not owned by anyone but accessible to all (and therefore vulnerable to emergence of monopolistic rights), while positive commons are jointly owned (so their usage depends upon the consent of the community). For negative intellectual commons, Drahos (2006) gives an example of information related to plants in the public domain which can thus be appropriated through IPRs or monopolistic rights that restricts users and their usage. In the case of positive intellectual commons, the collective responsibility reducing the likelihood of monopolistic claims is exemplified by the free software movement. Drahos thus regards intellectual commons as a political expression of the community regarding the use of information as a resource. Following Drahos' (2006) conceptual scheme, therefore, this chapter analyses how information related to seeds (intangible resources) stored at the CRRI ex situ genebank is managed in terms of positive/negative ex/inclusivity.

2.4 Research method

The CRRI in India is employed here as a case study to provide a contextualised, in depth, inquiry into a specific and complex phenomenon (Yin, 2013b). Through this case I investigate the institutionalisation of seeds through ex situ genebanks. Describing the specific process through which seeds become informational resources at CRRI provides information not only about the transformation of seeds as such but also about the biosocial context in which the transformation takes place. CRRI was selected as case study since it stores (rice) germplasm of national and international importance, it has been involved in various national and international programmes (related to rice) and it plays an important role in the institutionalisation of PGRs from all over India (especially for rice). Indeed, maintaining some thirty thousand varieties of rice germplasm, the CRRI genebank has been identified by the Food and Agriculture Organisation (FAO) as one of five world centres for the maintenance of rice germplasm.[31]

31 For details refer to CRRI website, at http://crri.nic.in/Research/Divisions/GeneticR.htm (accessed on 15th September, 2015).

Interviews and participant observation are used as primary sources of data for this study, with a range of published and unpublished documents, reports and official websites serving as secondary sources. The fieldwork at CRRI was carried out during October-December, 2011 and in February, 2012. The history of the institute was researched and analysed, semi-structured in-depth interviews were conducted with scientists from the CRRI Crop Improvement Division, field visits were made and several CRRI-organised farmers' meetings were attended, where unstructured interviews were conducted with farmers.

The investigation of the scientific practices at CRRI is presented in this chapter through the following structure. First, the public research body is examined in terms of its institutional structure, power dynamics and functioning in India. Then, the transformation of seeds into informational resources is analysed, with the different stages described. Finally, the focus is placed on the disconnection of seeds from their natural biosocial environments and their reconnection to scientific networks leading to the emergence of an intellectual commons.

2.5 Institutional background and history of PGR conservation at CRRI

The CRRI was initially developed as a solution to the regional food problem after the Great Bengal Famine (1943). This famine resulted in the deaths of some three million people (Uppal, 1984). Although the deaths were not necessarily due to lack of production, the need to increase food production was found to be essential. Thus, in 1945, the Government of India, at that time still under British control, determined on the utility of establishing a central institute for rice research. CRRI was established as an independent institute on 22nd April, 1946, at Cuttack, Odisha (then Orissa). Dr. K. Ramiah, an eminent rice breeder, was appointed as its founding director and played an important role in the initial agenda-setting of the institute. Hence, in the context of famine with several likely and certainly disputed causes (related, among others, to specific wartime conditions and colonial rule), a primary response of the then administration was simply to increase production, without consideration of the socioeconomic and political context.[32]

From 1950 to 1957, CRRI served as an experimental field and became the project headquarters for an FAO initiated indica-japonica hybridisation programme (Swaminathan, 2013). This programme aimed at the development of HYVs, with an emphasis placed on increasing production by mixing varieties (Barker et al., 1985).

32 For an overview of the famine and its causes see Uppal J. (1984) Bengal famine of 1943: A Man-Made Tragedy.

Aiming to increase yield through research programmes as its contribution to this national effort, CRRI collected, stored and sometimes exchanged seeds with other national and international research institutes. Thus, seeds became research objects for experimentation aligned with the initial goal of increasing production.

In 1966, an important institutional change took place when the administration of CRRI came under the administrative control of the Indian Council of Agricultural Research (ICAR), due to the latter's reorganisation. Thus, CRRI became a part of ICAR. ICAR functioned as an autonomous organisation under the Ministry of Agriculture, involved in the management and coordination of research in agriculture throughout India. Hence, CRRI being part of ICAR was placed in the national context in the 1960s, during the period of the Green Revolution. Engaged in collecting rice germplasm since its inception, CRRI has also been involved in many national and international rice research programmes.

In 1978, the Indian Government initiated a national project for rice germplasm collection. The NBPGR was given implementation responsibility for the three-year (1978-81) programme that transpired. This institution organised various training courses on collection methods, while CRRI acted as the coordinating agency for collection and conservation (Roy et al., 1983). However, CRRI was only assigned administrative tasks. At the formative level, it was the International Rice Research Institute (IRRI) that decided on the agenda of germplasm collection. The main aim of the national project was to collect and conserve varieties of rice that might be useful for research, focusing on threatened varieties and preventing biodiversity loss. It should be noted, however, that the concern with threatened varieties was by no means exclusive. For example, non-threatened varieties that could serve as donors for improved varieties were also collected from low-lying areas of Odisha (Roy et al., 1983). In total, the project resulted in a collection of some 5,224 samples of rice germplasm, housed at CRRI that, over a period of time, effected the centralising of seeds as PGRs at national level. Thus, it was CRRI project participation that determined the establishment and implementation of the criteria of varieties to be collected, conserved and used for research.

In 2013-14, CRRI released, acquired or collected some six hundred varieties of rice, as per distinct, uniform and stable (DUS) criteria (CRRI, 2014: 7). Further, with the increase in demands regarding the informational content of PGRs, genebanks worldwide have developed their own informational exchange system (Agrawal et al., 2007). For example, during the initial stages of development of the germplasm collection, the data related to the seeds conserved used to be merely maintained in documents (reports, catalogues, etc.), but now genetic information for seeds conserved at CRRI is managed by the NBPGR (see below).

Summarising, CRRI began as an institute established to meet a specific, perceived regional need (originating in a wartime food deficit and British colonial rule context). However, the objective and mandates have been tailored over the years to the contemporary situation (of national food-supply requirements) and international policy (related to PGRs). Manifestly, social, political and ecological factors have shaped and reshaped the CRRI focus, and this has affected the usage and treatment of seeds collected and conserved. Thus, the use of stored seeds at CRRI cannot be isolated from external factors. Drawing from this, I assume that the status and use of PGRs stored at CRRI will not remain as it is now into the future. In particular, when there is change in legislative rules at international or national level, then this will also affect the approach of CRRI. Future adjustment might, among other things, include moves toward restrictions based on IPRs (enclosures) or more open systems (commons).

2.6 Process of transformation of seeds into informational resources

The process of the transformation of seeds from natural resources into informational resources occurs in different, distinct, but continuous stages. These stages are seed selection, collection, evaluation, storage and use. Each of these stages is carried out by scientists following specific scientific and methodological procedures. These stages can also be regarded as distinct moves in disconnecting the conserved seeds from their biosocial environment. They are described in detail below.

2.6.1 Selection of places for exploration

The first stage in the acquisition of seeds for the genebank is built upon the recognition of a strong interrelation between seeds and their biosocial context. CRRI reports and interviews with scientists show that exploration and collection of seed is carried out following a defined protocol. First, scientists identify places in different regions of India with distinctive agro-ecological systems, and then seed varieties that are resilient in those systems are identified. At this stage, scientists emphasise the relation between seeds and their environment. In 2010, for example, fifty-six rice germplasm samples were collected for cold tolerant rice in five districts of Arunachal Pradesh and two districts of Assam (CRRI, 2011). Here, cold-tolerant biological traits present in seeds determined the place for exploration. Similarly, in 2011-12, scientists conducted explorations for drought-tolerant rice varieties in drought-prone areas (e.g. Kalahandi, Phulbani, Bolangir),

for saline-tolerant varieties in saline areas (e.g. Sunderban and its surroundings) and for varieties with submergence and saline tolerance traits in the Bhitarkanika mangrove, Odisha (CRRI, 2012). In these cases, not only were agro-ecological factors considered but also the biological traits of seeds informed the selection of places to be explored. Thus, the study observes a high level of recognition and valorisation of the relationships between the ecological, environmental and biological characteristics of seed by scientists at this stage. Thus, the exploration stage is tied to the biosocial context of seeds.

2.6.2 Seed collection: social relations between scientists and the social world

The second stage through which seeds make their way to the genebanks is through the specific biological characteristics they exhibit. At this stage, CRRI scientists seeking germplasm visit farmer's fields to collect seeds. They mainly collect seeds during the peak stage of crop maturity and from fields or at the threshing floor, although some go to the market place where farmers take their seeds to sell.[33] Thus, scientists come out of the closed spaces (laboratories) and interact with the social world of seeds (farmers and agro-ecology).

During this stage, scientists look for specific traits in a variety, such as different types of tolerance to be stored in the genebank for research. Interviews made with scientists established that at this stage, farmers (their farms and markets) are the source not only for seed collection but also of information about seeds. Scientists here recognise farmer's indigenous knowledge about seeds and their properties. For example, during the collection of extra-early duration and weedy rice varieties in Odisha in 2012-13, farmers informed scientists about the month suitable for cultivating these varieties as well as their specific characteristics (CRRI, 2013).

At this stage, the main focus of scientists is on gathering information on the biological character of the varieties from farmers, and the process of seed collection gives importance to the farmers' knowledge and understanding of each variety. Thus, the connection between seeds and their biosocial environment remains intact in this stage. Since the concern is to identify certain variety types as motivated by scientists following fixed programmes and informed by farmers as local experts, the narratives of farmers tend to be aligned with the institutional focus of CRRI. Thus, there is no evidence of any divergence between the two at this stage or dissociation of the resource from its biosocial context.

33 Interview with CRRI scientist (October, 2011).

2.6.3 Evaluation of seeds for conservation: separation of biological and social context

It is at the stage of evaluation that the biological character of seeds becomes the central concern for the scientists. Generally, scientists conduct many experiments before seeds are stored at the genebank, and these experiments with seeds re-shape the relations the seeds have had with their biosocial environment. Scientist first carry out tests to examine duplicates within the collected variety, this selection is made on the basis of the distinct character of a particular variety from the other varieties stored in the genebank. Then the selected seeds are given an accession number to identify them from other varieties. Thus, the collected variety loses its traditional name and becomes anonymised. For example, during exploration for relevant submergence and saline characteristics, CRRI scientists collected a wild rice called 'Dhanidhan' from the mangrove region of Odisha. This was assigned a temporary Collector Number and prefixed with 'BMW' before being stored at CRRI (CRRI, 2012). Thus, once the collected variety enters the genebank, it is identified by numbers, letters and morphological characteristics and becomes just another germplasm in the collection. Here, seeds are translated into germplasm and regarded as a sample for further research. The varieties collected are thus transformed into a representational embodiment of certain, specific characteristics of the plant variety.

Seeds at this stage become 'proxy' (Parry, 2004: 156), a '*good enough embodiment or representation of something for some given purpose*' (van Dooren, 2010: 377). Dedeurwaerdere (2005, 2012) has also reflected on the importance of the informational content of seeds, for which they are primarily accessed by breeders or scientists and which ultimately disconnects these resources from their biosocial environment. The genetic information becomes important at this stage for the new primary stakeholders, the plant breeders and scientists in general. This reduction of seeds into informational resources based on morphological characters represents a separation of seeds from their biosocial context. It is here that the varieties begin to serve a specific group (move towards exclusivity). Conserving seeds with accession numbers is symbolic of this, since it facilitates the disconnection of seeds from farmers and their biosocial relations. Now, only scientists, plant breeders and researchers have the ability to identify the variety (from the assigned Collector Number).

2.6.4 Seed storage: dividing the social and the scientific worlds

After the seeds have been transformed into an embodiment of specific biological characteristics as described above, they are stored as germplasm. Two types of germplasm conservation systems are employed in India, long term and medium

term. In the long-term storage system situated at NBPGR, New Delhi, germplasm is maintained for more than hundred years at minus twenty degrees centigrade, while the medium-term storage facility at CRRI conserves the germplasm for a minimum of seven-to-ten years as an orthodox seed (seeds that can be dried and conserved by freezing). According to the scientists at CRRI, rice can be conserved for at least ten years with the same viability. Since it is frozen, conserved in closed rooms, the germplasm is completely disconnected from the natural and social worlds. These seeds are kept away from any interaction with the environment; they are just banked. No longer utilised in the field for agricultural production, they are metaphorically as well as literally frozen, isolated and fixed in a suspension of reality. Here, the germplasm is only a source of information. Thus, the informational content of seeds stored in the genebanks now provides a new type of instrumental value through the disconnection and appropriation of seeds from their biosocial environment.

However, the conserved seeds are monitored every four to five years for maintenance of their viability. If scientists find any biological change in the variety or that the viability has declined below a ninety percentage calculation, then the germplasm is again rejuvenated in the field. At this point, the problem of maintaining the viability of the stored seeds opens a perspective for re-establishment of the connection between conserved varieties and the natural and social environment. However, during the process of rejuvenation, seeds remain perceived by scientists only as the embodiment of biological characteristics. The current practice after carrying out the rejuvenation is to have the freshly harvested seeds returned, to replenish the genebank. Nevertheless, the demand for rejuvenation of the stored seeds does seem to carry potential as an entry point to reconnect the varieties with the environment.

At the storage stage, therefore, one may discern the development of a '*technonature regime*' (Escobar, 1999:11). Escobar (1999) explains how the development of scientific knowledge reduces nature to different regimes, such as organic, capitalistic and technonature regimes, which are interpreted differently by different actors based on context. According to Escobar, contemporary technologies continuously intervene and create possibilities for the development of different understandings of the relationship between the social and the natural. He gives the examples of cloning, human genome projects and transgenic food as possibilities available in the technonature regime. It is a technonature regime that we find produced at CRRI in the seed-storage stage. This occurs when seeds lose their biosocial identity and are constantly acted on through different technologies, such as molecular breeding and genetic modification, to produce possibilities for developing modified varieties, like hybrid seeds.

Seeds developed by scientists using genetic information, such as HYVs and genetically modified (GM) seeds, have a natural origin or base but are adjusted, developed and

improved through disconnection and technological processes. Significantly, but by no means entirely man-made, therefore, once they are released they become part of nature (again), insofar as they interact with the natural world, and thus blur the natural-artificial distinction. These modified seeds bring with them different biosocial relations. For example, the HYVs developed by CRRI are identified by their characteristics and given (new) names. In this case, scientists decide on the time for cultivation and determine the special value of a crop (new variety), and farmers have to adapt to its needs. This introduces a different social relation, wherein farmers now become knowledge receivers rather than knowledge givers, an inversion of their role that was reflected in the seed collection stage. Thus, harnessing the informational content of seeds by scientists brings in a possibility for reordering of social relations whereby farmers are disempowered (since they become dependent on the transmission of the new knowledge regarding the new variety).

2.6.5 Transformation of PGRs conserved at CRRI and NBPGR into informational resources

After the seed storage, some seed samples conserved at CRRI are sent to NBPGR for long-term storage. NBPGR maintains and manages the data related to PGRs. Different genebanks in the world use different database management systems to develop their information on the germplasm stored (Agrawal et al., 2007). In India, the Genebank Information Management System (GBIMS) is used to document data on the germplasm collected and stored at NBPGR using Information and Communication Technology (ICT). The use of ICT helps NBPGR to provide information on the genebank management, taxonomic, passport and address data of the germplasm stored. It is at this stage, therefore, that the informational content of seeds stored at the genebanks becomes dominant and visible. Currently, GBIMS contains the data of more than 320,000 accessions of 1,187 species (Agrawal et al., 2007). Here, therefore, the development of informational resources in the form of data stored through virtual means is reflected. Indeed, the use of ICT makes it easier for users to access data on germplasm collection stored in genebanks in India.

The data generated through GBIMS is relational, meaning that details about seed stored in the genebank are organised in form of a relational tree. The place to which the seed belongs (nation, institute, district, state, etc.), the category to which it belongs (taxonomic details), how much seed was collected (total number and date received), distribution details (to whom and how much is given), how the stock is maintained (generation or distribution) and other items appear in a relational form, intended to be user friendly. In addition to this, NBPGR maintains a database, named the National Genomic Resources Repository (NGRR), through

which '*centralized efforts to collect, generate, conserve and distribute genomic resources for agricultural research*' are carried out.[34] This systematic management of the genetic information, along with the sharing and conservation of data, helps NBPGR in maintaining the stock and flow of PGRs conserved and the benefits to be shared among different parties. The relational tree thus provides users with information about the collection, distribution, maintenance, agro-ecological and biological characteristics of seeds stored in the genebank, but it fails to provide information about the biosocial relations and indigenous knowledge related with these seeds. This represents a deficit and another potential for reconnection.

Farmers cultivating particular landrace varieties have their notions of the best times of the year to cultivate, how to cultivate and any religious ceremonies attached to cultivating in different regions (Aistara, 2011; Salomeyesudas and Sateesh, 2009; Shiva and Dankelman, 1992). Targeting the agricultural research community, particularly plant breeders; the dissemination of information regarding PGRs through NBPGR omits this as relevant information. Conversely, taxonomic details and information about place of origin, generation and distribution are of little concern to the farming community. The information provided by NBPGR indicates its exclusive nature and indeed it is as this stage that the exclusivity of the resource is fully established. Therefore, there might be scope for information extension and alternative organisational approaches for creating more inclusivity here.

The data acquired through GBIMS is stored in a client-server technology that helps multiple users from NBPGR and different institutes managed under NBPGR to simultaneously access the same data about a variety. The access to this information about the germplasm collection is restricted to users of the NBPGR intranet. It is this feature that finally determines the exclusive nature of information disseminated. Users from NBPGR can freely access the information, which makes it a common resource for them, but only them. Thus, the community determined by the NBPGR system has access to information as an exclusive intellectual common resource.

While the informational content of seeds stored at genebanks is accessible to the NBPGR community, the seeds stored at genebanks can be accessed by researchers outside the NBPGR system making requests for a variety stored there. However, they need to meet certain criteria before these can be given. For example, requestors have to be a Principal Investigator of a Project and in the case of researchers they need to acquire the consent of their supervisor or guide.[35] These criteria seem useful in maintaining the stock and flow of the conserved varieties. Also, all requests

34 See source http://www.nbpgr.ernet.in:8080/repository/home.htm (accessed 28th March, 2015).

35 For the guidelines on what, how and to whom PGRs conserved at NBPGR are available, see http://www.nbpgr.ernet.in:8080/repository/request.htm (accessed on 20th February, 2015).

for materials must be made to NBPGR which has the authority to accept or deny the request. This reduces opportunities for appropriation of information and its transformation into intellectual property through the use of property rights since NBPGR is a public bureau. Indeed, the NBPGR repository also acknowledges the seed depositor's contribution and consent to the resource being used as described. These features make this a positive resource system as categorised by Drahos (2006). Thus, the genetic information of stored seeds reflects a positive exclusive intellectual commons characteristics referring to Drahos (2006) categories of intellectual commons.

2.7 Genebank, germplasm and intellectual commons

Defining germplasm as '*the physical genetic material (the DNA) that contains the information (or 'code') of the inherited traits of an organism*', Rodriguez and Dooren (2008: 179) go on to state that germplasm are physically delimited and serve primarily as an informational resource. Similarly, the data for the germplasm collection stored at CRRI primarily serves as an informational resource for the scientific community. There is a contradiction in the working of the genebank, however, which derives from the manner in which the intellectual commons is produced. The farmers' indigenous knowledge is employed to appropriate seeds (resources) from their biosocial context and then convert these into an intellectual commons. As observed above, seed could be reintroduced to the 'donor' communities, but this does not happen. While the intellectual commons produced is analytically positive, therefore, the basic orientation of this facility is to treat the genetic information as a resource for all and without regard to the biosocial context of seeds from which the information is derived.

Seeds here can be identified as the material object and the genetic information as ideational. Cahir (2004), while describing information as common resources, distinguished between the material and ideational resources, where the former have physical form and the latter a more abstract form. Similarly, the information about the biological characteristics of varieties and information categorised around the relational trees by and through GBIMS is more abstract in nature than the qualities and histories it represents. The abstract form in this case, the basic genetic information about seeds, is an ideational resource, which may not be easy to appropriate under the property regime. In a similar manner, while describing PGRs as global commons, Roa-Rodríguez and van Dooren (2008) explained how the intangible or informational aspect of PGRs make them non-rival and non-excludable in nature, and thus commons. However, in this case when something concrete from this basic information emerges and is realised in material form (a new variety), it might come under the provisions of property rights.

Natural resources such as pastures, forests and water that are managed as commons can be studied in general and distinguished from immaterial, manmade and other forms of communication and knowledge that are not subject to ownership through copyright. For the better management of seeds as a resource, however, one may argue, that efforts should be made to specify both their material and ideational aspects. It is this failure to recognise both its characteristics, in fact, that constitutes the effective dematerialisation of seeds through the narrow concentration on the information that they contain or carry. Thus, I would assert, seeds stored at genebanks should cease to only or even primarily act as a means for developing and retaining intellectual commons; rather, efforts should be made to revalue and relink them for local development. The next section offers two specific solutions that can work to relink the biosocial with the informational content of seeds conserved at CRRI.

2.8 Seed Village Programme and seed vending machines (seed ATMs)

NBPGR recognises the importance of conserving genetic resources from genetic erosion.[36] However, conservation practices to maintain agrobiodiversity that adopt the NBPGR and CRRI mechanisms have a disadvantage as they break the link between seeds and their biosocial environment. Hence, the proposal is to overcome this disadvantage of ex situ genebanks by complementing them with practices for local development and agrobiodiversity. Aimed at relinking the fields and the genebanks, this focuses on activating the frozen seeds in the food system, through seed village programme and through seed vending machines (SVMs) or seed automated teller machine (seed ATMs).

2.8.1 Seed Village Programme

In 2007, the Indian Ministry of Agriculture recognised the importance of in situ as well as ex situ practices for the conservation and development of bio-resources in its National Policy for Farmers.[37] This policy aimed to conserve and develop endangered PGRs by setting up farmer-level seed/gene banks. Valuable as the initiative was, however, it did not ensure the (re)linkage of the stored seeds at CRRI with the local environment. Direct public support for establishing seed banks at different villages according to the local needs and releasing seeds stored in the public genebanks can realise this (re)linkage.

36 See NBPGR official website http://www.nbpgr.ernet.in/Why_Conserve_PGR.aspx (accessed 20th January, 2015).

37 For details on the National Policy for Farmers, see http://agricoop.nic.in/npf/npff2007.pdf (accessed 10th September, 2015).

In fact, an effort to this end was made by the Indian Government in the mid-1960s, when it implemented the Seed Village Programme (SVP). However, the focus of the SVP was on the provision of quality and certified seeds through various state government and implementing agencies. Indeed, there are many instances of SVPs being implemented in different states of India (Dixit et al. 2005; Mandloi et al. 2013).[38] These programmes train farmers in establishing, managing and maintaining certified seeds, but focused purely on HYVs and not on seeds conserved at CRRI (landraces) and their biosocial contexts, which is essential for maintaining diversity. Hence, the first specific proposal made in this chapter is that these SVPs can also be used as means of reaching and transmitting the landraces stored in the genebanks at different regions for local people's needs. Since the village seedbanks are already functioning in different states, the Indian government needs only to allocate additional organisational resources and funding to develop these seed banks as containers of landraces. This will not only encourage farmers to cultivate landraces but will also enhance diversity and relink the seeds with their biosocial environment.

2.8.2 Seed Vending Machines/Seed ATMs

Another solution to the need identified (for the stored varieties to be made accessible to farmers and farming communities) can be realised through SVMs/seed ATMs. Recently in India, agricultural universities have come up with the idea of seed ATMs to dispense vegetable and flower seeds for kitchen garden or roof-top cultivation. These seed ATMs function as any other vending machine, with packets of seeds stored, priced and administered when coins are inserted (currently to the value of ten Indian rupees) (Madhavan, 2015). Thus, seed ATMs increase access to seeds by anyone with a ten Indian rupee. The first Agricultural University to install a seed ATM was Kerala Agricultural University (KAU) following this example; Tamil Nadu Agricultural University (TNAU) also installed a seed ATM on its campus. The TNAU seed ATM, meanwhile, dispenses a total of thirty-six varieties of vegetables and also flowers.[39] These seed ATMs serve as examples of how people who want access to seeds of different varieties for cultivation can be reached.

The second specific proposal made in this chapter is thus to take up this idea to use seed ATMs to dispense stored seeds at genebanks and in a way that is informed by the local needs of the farmers. Conserving varieties for the next harvest has been part of the culture of farming communities and remains a practice in which farmers

38 See http://agritech.tnau.ac.in/seed_certification/seedtech_index.html (accessed 12th November, 2014).

39 For details see Madhavan (2015) *TNAU to establish 10 seed vending machines in Coimbatore*, The Hindu, Jan. 5, available at http://www.thehindu.com/news/cities/Coimbatore/tnau-to-establish-10-seed-vending-machines-in-coimbatore/article6755763.ece (accessed on 25th May, 2015).

still engage in India (Pandey et al., 2011; Satheesh, 2000). By dispensing small amounts of landrace seeds and with financial support, farmers' fields can serve as regeneration sites for the landraces and other varieties conserved in the genebanks.

Implementing these programmes might also need international support and funding, while some incentives for farmers and certainly awareness-raising (publicity, marketing) will be essential for such an initiative to be successfully implemented. One issue with seed ATMs that ought to be mentioned is that they need a regular supply of electricity for their functioning, and there are many villages in India where this is not present. Thus, these machines cannot be installed everywhere unless an alternative technology is employed for delivery. For example, if the machines are developed in tandem with 'green' energy sources, such as individual solar powered batteries (photo-voltaics), which are increasingly being introduced in urban contexts to power things like road signs. Also, the functioning and maintenance of seeds within these ATMs is and can be regulated by public bodies (the universities or state/national government), which further introduces possibilities of farmer involvement. Indeed, a holistic approach can be taken to the employment of seed ATMs as a starting point for reconnecting the public genebanks with farmers' fields.

2.9 Conclusion

This chapter has described the transformation of seeds from field into the CRRI ex situ genebank. The transformation of tangible resource (seeds) into intangible resources (scientific knowledge) is realised through various institutional practices and rearrangements during the selection, evaluation, conservation, storage and use of seeds in the ex situ genebanks. A historical and organisational description of institutionalisation of PGRs at CRRI has indicated various political, social and ecological factors that have shaped the institute and thereby influenced its policies and practices. With a model of distant, top-down administration, the PGRs conserved within the institute ultimately tend to become metaphorically as well as literally frozen (underused, far away from the localities from which they originate).

The biosocial relations that seeds have prior to their storage in the genebank do not break in a single instant. The connections between seeds and their biosocial environment remain intact during the initial stages, then they blur and eventually seeds become only informational resources. By then, the ex situ genebank has come to comprise a biosocial context of its own, where scientists, germplasm and laboratory conditions interact with one another through different scientific practices described. Thus, different scientific stages reduce seeds to informational resources, drawing a divide between the social and the scientific worlds, or, transforming

the various natural biosocial contexts of these seeds for a single one defined by processes of scientification. This is further enhanced through the transformation of genetic information into intellectual commons.

Seeds treated as common heritage of mankind once they enter the bunkers of a genebank are appropriated only by a certain group, itself marked by exclusivity. This appropriation does not lead to the creation of private property, though; on the contrary, it creates a pool of intellectual commons. In addition to this, the transformation of seeds into informational resources creates possibilities for the development of new varieties of seed, which, in turn, introduce new social relations among different stakeholders. Nevertheless, the exclusive character does provide a potential gateway to an appropriation of the intangible or ideational aspects of this information commons. Hence, the transformation of seeds from fields into genebanks not only creates (is based on) a disconnection between the resources and their biosocial context but actually provides opportunities for them to become products (public goods) liable to be appropriated and monopolised (as private goods). As a result, the divide between the resources conserved at genebanks and their biosocial environment becomes problematic even at the level of their expression in intellectual commons.

The intellectual commons produced in this case is facilitated by the use of ICT and replicates the qualities of a positive intellectual commons as proposed by Drahos (2006). However, this intellectual commons reduces seeds to proxy or embodiment of the informational content when conserved and managed within the genebanks. This finding adds to the study by van Dooren (2010), who also emphasised that genebanks reduce seeds into proxy for agricultural plant varieties.

The information related to germplasm collection forming the intellectual common is, nevertheless, a rather limited common, like the common space in a sealed-off, private housing estate (gated community). Here, we do need to be explicit that commons are rarely universally accessible and that they are in an important sense almost always socially constructed and thus relative. As Harvey (2012: 73) explains, '*the common is not to be constructed, therefore, as a particular kind of thing, asset or even social process, but as an unstable and malleable social relation… There is, in effect, a social practice of commoning*'. Here, he brings in an important aspect of commoning that involves particular social groups in collective practice but without market logic to enhance common resource management, as in the case of the intellectual commons of CRRI. This commoning is specific to a particular social group that enhances as well as derives benefit from the common resource. In this case, the intellectual common remains accessible to and useful for the research community, but it neglects its potential utility for other social groups, notably farmers. Hence,

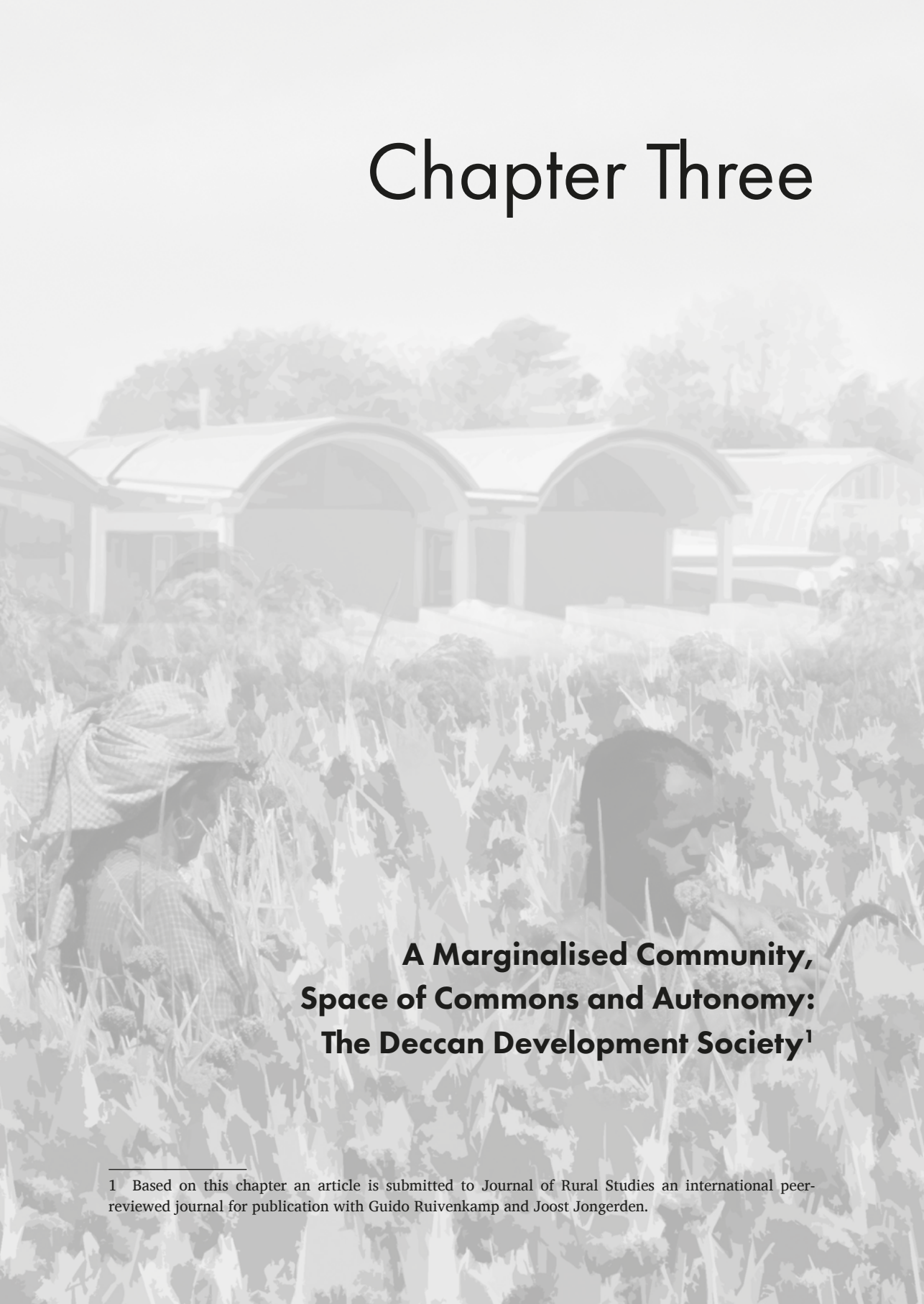
efforts should be made for a fundamental reorientation toward re-linking seeds with their biosocial environment in order to nurture agrobiodiversity and maintain the seeds as (relatively) inclusive commons. For this, the dissemination of seeds conserved at CRRI through village seed banks and seed automated teller machine (ATMs) is proposed. These mechanisms are assumed to become means for (re) linking seeds conserved at genebanks to their biosocial environment promoting commonisation of the PGRs.

Appendix-1

Experimental field of Central Rice Research Institute, Cuttack (October, 2011).
[Picture from the field by the researcher]

The experimental field sets out the institutional context (controlled environment) within which seeds function at CRRI.

Chapter Three



A Marginalised Community, Space of Commons and Autonomy: The Deccan Development Society[1]

1 Based on this chapter an article is submitted to Journal of Rural Studies an international peer-reviewed journal for publication with Guido Ruivenkamp and Joost Jongerden.

3.1 Introduction

Community seed banks (CSBs) can be described as '*locally governed and managed, mostly informal, institutions whose core function is to maintain seeds for local use*' (Vernooy et al., 2015: 2). CSBs function through the collective activity of a group (Lewis and Mulvany, 1997; Sthapit, 2012; Vernooy et al., 2015) with functions determined according to objectives set by the community, including conservation of agrobiodiversity, seed security, access to seeds and food sovereignty (Demissie and Tanto, 2000; Jarvis et al., 2011; Lewis and Mulvany, 1997; Shrestha et al., 2013; Vernooy et al., 2015).

Various studies on CSBs have analysed the community based management of seeds and its effects on agrobiodiversity conservation (Bezabih, 2008; Shrestha et al., 2005; Shrestha et al., 2006; Shrestha et al., 2013; Vernooy et al., 2015), with most of the empirical research on CSBs reported in the grey literature of reports and NGOs briefings (Vernooy, 2012). A recent study looked at functions of CSBs in different contexts and factors that influence their viability using 35 cases and theories from on-farm conservation literature (Vernooy et al., 2015). In this study I analyse the functioning and governance[40] of CSBs by women of the Dalit caste (lowest caste), which has historically been oppressed and remains economically poor, socially and educationally backward (Chatterjee, 2012). This chapter employs a socio-political approach in examining the collective resistance of the community through community seed banks (CSBs) strengthening commons in south India. It will help in establishing the relations between resource governance and marginalised communities, while also contributing to the literature on commons and CSBs.

Specifically, the research reported here focuses on the ways in which women from a marginalised community have organised CSBs as a common-pool resource (CPR) in defence of their local food system based on millets. While millets are generally considered to be neglected (research) and under-utilised (commercial potential) in the mainstream food supply chain, they are vital for those who depend on them for their food and livelihood (Mal et al., 2010). To critically analyse the Dalit women's CSBs practice, this chapter describes CSBs organisational structure, characteristics, functioning and governance. It reflects on the multiple socio-political and cultural dimensions operative in the struggle of the Dalit women, borrowing from studies on seed networks as sites of contestation (see Aistara, 2011; Bezner Kerr, 2013; Da Via, 2012), and it refers to debates on new commons dimensions of governing seeds as commons.

40 Governance here means refers to the process whereby people work collectively in groups for maintaining moral, legal, political and financial aspects of the community at the same time being accountable for their actions (Sthapit et al., 2015).

The chapter structure is as follows. First, ideas about commons and CSBs practices are outlined and the research methodology is detailed. Then, an overview of the context of resistance to establish CSBs is presented, together with a trajectory towards culinary resilience. Next, the main part of the text describes the development and functioning of the CSBs studied, with a focus on how this creates a social space of commons through lived experiences of the community. The chapter concludes with broad issues of commonisation of seeds by reflecting on development of the spaces of commons and culinary resilience by the community.

3.2 Theories of commons, CSBs and their practices

Community based efforts to maintain common resources have drawn the attention of many scholars over the past few decades (Agrawal and Chhatre, 2006; Baland and Platteau, 1996; Benkler, 2004; Cahir, 2004; Ostrom, 1990; Ostrom et al., 1994; Wade, 1988). Scholars of Common-pool resources (CPRs) have particularly highlighted the relevance of managing commons through effective governance to avoid any tragedy of the commons (Agarwal, 2001; Berkes, 2006; Gibson et al., 2000; McCay and Acheson, 1987; Ostrom, 1990). They have particularly analysed institutional arrangements for managing CPRs as an alternative to state controlled or privately operated systems. In this study, I analyse CSBs as forms of resistance by constructing a CPR providing insights into the processes of commonisation of seeds.

In order to study collective action, Oakerson (1986, 1992) developed a taxonomic framework further developed by Ostrom et al. (1994) in their Institutional Analysis and Development (IAD) framework.[41] This framework became the dominant paradigm in studies of commons, emphasising institutional factors that lead to successful governance of resources. Although IAD is a systematic framework, it neglects historical and political factors affecting community governance over a resource (Agrawal, 2003; Whaley and Weatherhead, 2014).

The use of IAD framework for studying CSBs is however limiting for two reasons. First, CPRs are embedded within larger cultural systems and social relations (Beitl, 2012; Wagner and Davis, 2004), functioning within the broad socio-political and cultural context in which they are situated (Aistara, 2011; Bezner Kerr, 2013; Da Via, 2012; Vernooy et al., 2015). These political and cultural aspects will be neglected by using the IAD framework as the IAD framework focuses on institutional mechanisms which will further prevent a holistic understanding. Second, seeds managed as commons in the case of CSBs exhibit both tangible and intangible characters, such

41 The IAD framework provides guiding principles to analyse common property institutions for their sustainability and robustness.

that they may be referred to as new commons (below). As Hess (2008) emphasised, the characteristics of a resource needs to be given special attention while analysing new commons governance. Hence, this chapter adopts a socio-cultural and political analysis of the functioning of the CSBs rather than focusing on institutional mechanisms through the IAD framework, which will limit the understanding of the political factors affecting a community governance of this new commons.

Indeed, debates on commons have placed importance on the characteristics of the shared resource. Some scholars have looked at commons as shared tangible natural resources (agricultural land, forests and water) (Agrawal and Chhatre 2006; Andersson et al. 2014; Baland and Platteau 1996; Gibson et al. 2000; Ostrom 1990; Wade 1988), while others have considered commons as shared intangible natural resources (knowledge, climate and internet) (Benkler 2004; Boyle 2003; Cahir 2004; Holman and McGregor 2005; Litman 1990). These scholars mostly focussed on issues of governance and the management of shared resources based on their characteristics as either tangible or intangible (the former as territory-based with a defined community and the latter with fluid boundaries). The conventional division of commons as either tangible or intangible was challenged by Hess (2008: 38), who emphasised new commons as evoking '*a sense of awakening, of reclaiming lost or threatened crucial resource*'. In addition to this, Halewood et al. (2013) emphasised that most of the new commons are manmade, geographically unlimited and with non-confining membership. The case of CSBs is similar, with commons comprising seeds and networks, the later manmade, geographically unlimited and with fluid membership, so intangible, and the former exhibiting a complex mix of both tangible and intangible properties.

Unlike traditional (natural) common resources, seeds are not static and are not geographically fixed. First, the physical (tangible) character of seed, such as the ability to reproduce, combines with biological varietal traits (intangible). Seeds also have history of travelling long distances through informal networks (Almekinders et al., 1994; Chambers and Brush, 2010; Coomes, 2010; Pautasso et al., 2013) and associated stories (intangible). For example, indigenous knowledge of cultivation, conservation and use of seeds that is passed on through generations as regional farming lore is nevertheless a dynamic system comprising of knowledge commons. This mix of culture, value and biological character makes seeds conserved in CSBs different from other traditional resources. Therefore, the study of CSBs requires engagement at two levels of governance and functioning, at both individual and community level.

At the community level, many scholars have analysed seed networks as a form of resistance. Aistara (2011), for example, analysed seed saving and exchange practices among Costa Rican farmers as creating a space for resistance, and Da Via explained

seed networks in Europe as 'a concrete expression of the *practice* and *politics* of re-peasantization' (Da Via, 2012: 230), while Bezner Kerr (2013) described on-farm seed saving activities by Malawian small holder famers as a form of achieving food sovereignty. In addition to maintaining resources as commons, seed networks also imply an active source of resistance to off-farm produced seeds. It is from this perspective of seed networks as resistance that this chapter focuses on the collective activities of a marginalised community in relation to a community seed bank project with its own, specific members' socio-cultural identity (Srinivasulu, 2002). Dalit women, who make up the community studied here, moreover, are doubly disadvantaged. As Dalit they are marginalised and as women they are marginalised, so as both they are marginalised among the marginalised (Manorama, 2008; Rege, 1998). With their collective activities of resistance expressive of the embedded social relations and cultural systems of both caste and gender they represent a unique case. Summarising, this study is informed by theories of commons and practices of seed networks that emphasis resistance as well as governance for a better understanding of the collective activities of a doubly marginalised community.

3.3 Research methods

The case study method is applied here for a holistic analysis of the constructive resistance of Dalit women which makes it '*a specific and complex phenomenon (the 'case') set within its real-world context*' (Yin, 2013b: 321). It has limitations in relation to generalisation, since the case is specific (to the particular place, community, food). However, the contextualised in-depth study of this marginalised community as unit of analysis provides information not only about this specific initiative of the Deccan Development Society (DDS), but also about the context in which their struggle is situated. Thus, this case may resonate with other sufficiently similar cases.

Data was collected both from primary and secondary sources. Interviews, focus group discussions (FGDs) and participant observation comprised the primary sources, while published and unpublished documents, reports and official websites comprised the secondary sources. Thirty interviews were made, all in the local language (Telegu) with a translator. Key informants from the DDS were interviewed in September 2013 for information on the management and functioning of the CSBs. Identified through their involvement in the project, the key informants had all been associated with the DDS for ten to fifteen years. Most of the respondents were marginal farmers with less than one hectare of land, on which they practiced mixed cropping.

Each DDS community seed bank is managed by a women's group known as *sangham* (voluntary group), with one woman appointed as its head. To gain in-depth information about CSBs and their functioning, five FGDs were conducted with *sangham* heads[42] covering 33 different villages. Although themselves also smallholder farmers, these heads nevertheless formed a heterogeneous group as they were living and working in different communities, in different household circumstances and with different size plots of land. While enabling the acquisition of information and opinions from a large number of respondents at reduced time and financial cost, therefore, these FGDs also provided opportunities for participants to interact with one another, thus enriching the material they provided (Morgan, 1997).

Further, unstructured interviews were conducted with ten *sangham* members from different villages, and the researcher also visited the homes of three women in one village (Pastapur, where the DDS project office is located). These women were *sangham* members had also improved their economic conditions by saving millets at home. In addition, a semi-structured interview of over an hour was held with one of the founding members of the DDS using a predetermined interview structure in order to gain the historical context of the CSBs. The secondary source investigation comprised a historical analysis of DDS and its CSBs. This was made using government reports, reports published by DDS and articles and websites featuring DDS and the CSBs, aimed at expanding the primary sources and setting the context in which the struggle was initiated.

3.4 Contexts

The following sections look at the setting and background to the DDS project. First, the geographical location is specified, then the agricultural context (focussing on millet and local food production) and then recent political factors and the cultural setting.

3.4.1 Geographical location of DDS and the CBSs

The DDS has its project office in the Medak district of the state of Telengana in south India, on the South Deccan Plateau, which has a semi-arid climate. This climate is conducive to grow millet crops which are '*well suited to drought-prone regions*' (Nagaraj et al., 2013: 75). Millet crops require less water and rainfall as a result can be cultivated in the semi-arid regions (Nagarajan et al*.,* 2007). The CSBs are situated in the district's agricultural division of Zaheerabad and spread across

42 Every community seed bank has one women appointed as its head.

Jharasangam, Raikode and Nyalkal, which have similar agro-ecologies supporting millet cultivation. In interviews, the women highlighted how they had previously travelled long distances to acquire seed, sometimes without success in finding the varieties they wanted. Thus, they decided to place CSBs in the centres of their villages rather than peripherally, near the fields. The CSBs are located in the centre of each village in which DDS functions. This central positioning makes the CSBs easily accessible to women from all over the village. Nagarajan et al. (2007) have even emphasised distance from the source of the seeds as an important variable for better functioning of seed networks. Adding to this the community found the seed at the market was costly, adding to the burden on farmers of crop failure (Pionetti, 2005). For these reasons, the CSBs were found to be accessible and affordable by the women participating in the DDS projects.

3.4.2 Context: Millet farming, DDS and CSBs

Millet forms an important part of the traditional food system of the Dalits in Zaheerabad (Salomeyesudas and Satheesh, 2009), but the beginning of the 21st century in particular saw a sharp decline in millet farming. The land area in Medak district given over to millet production decreased, with sorghum (*jowar*) falling from 101,400 hectares to 28,769 hectares between 1998-99 and 2011-12, pearl millet (*bajra*) from 1700 to 323 hectares and finger millet (*ragi*) from 200 to just six hectares, while small millet cultivation dropped from 16 hectares in 2000-01 to four in 2006-07.[43] This rapid and major decline threatens to wipe out local food practices. In the declining millet production context the DDS through *sanghams* focused on the development of initiatives to revive millet production, cultivation and consumption (Kumbamu, 2012).

The founders of the DDS blamed the Indian government Public Distribution System (PDS) for inhibiting the production and consumption of local food crops.[44] The PDS was viewed as a market-driven political intervention that contributed to the destruction of the local food system in Medak (Kumbamu, 2012). Indeed, millets do not have a good market value and are mostly used for consumption purposes by the smallholder farming families who produce it (Nagarajan et al., 2007). The effects of the PDS were compounded by an increasing preference for a food system based on rice, wheat and maize, which further decreased demand for millet crops (Nagarajan and Smale, 2005).

43 Figures from the official website of the Directorate of Economics and Statistics, Ministry of Agriculture, Government of India http://apy.dacnet.nic.in/crop_fryr_toyr.aspx (accessed 15th June, 2015).

44 Interview with DDS founder, 11th September, 2013.

Thus, against this background of local food system devastation, the DDS initiated CSBs through *sanghams*, aiming to re-establish local food self-sufficiency and secure community access to and control over food production. Established in 1983, the DDS was the idea of six urban professionals committed to social development.[45] They used participatory rural appraisal methods to motivate women from different villages in the Medak district (then in the state of Andhra Pradesh). It is because of this location-specific focus in working towards the creation of an alternative to the dominant food system based on rice and wheat, therefore, that DDS efforts with *sanghams* directed at creating CSBs for the storage of local seed varieties are contextualised as a resistance. In respect of this core activity, the result was over five hundred varieties of millet stored in the CSBs (Kumbamu, 2012).

The initiative was launched by providing loans to small-scale, resource-poor female farmers in Zaheerabad to compensate for initial costs borne for fertilisers and tillage to generate the seeds. The DDS was able to provide loans through funding received from various international NGOs.[46] It is important to recognise that the localised, bottom-up approach emerged from the instigation and stimulation of outsiders applied to the local context although it is equally important to stress that these professionals have withdrawn from the daily activities of the CSBs over the years. Now, *sanghams* govern financial strategy and day-to-day management, while the DDS focuses on placing the community efforts in a broader context. For example, the DDS forged links with a peasant seed association in Senegal to establish an international millet alliance (MINI, 2013). This indicates that collective practice of reviving local food practices has created a space of commons transcending local boundaries (will be discussed later).

3.4.3 State policies, food culture and religion as stimulant for collective actions

In 1983, the then Chief Minister of Andhra Pradesh, N.T. Rama Rao, introduced a rice pricing scheme (two rupees per kilogram) for the poor, in line with an election promise of the victorious Telugu Desam Party (Rao, 1993). This scheme made rice a particularly cheap and affordable food. During FGDs, *sangham* heads identified cheap food, particularly rice, as the major reason for abandoning millet cultivation. Women testified to the attractiveness of the scheme, especially since it was easier to cook rice than millets. For example, preparing millets requires time and energy to pound and process. However, over the years, their dependence on external sources

45 See http://ddsindia.com/www/default.asp for details (accessed 12th June, 2015).

46 Most importantly, Christian Aid and Find Your Feet (UK), EED (Germany), HELVETAS Swiss Intercooperation (Switzerland) and Inter Pares (Canada) (Interview with DDS founder, September 2013).

for food increased, to the point that the idea of reviving the local food system appealed to them.

Food plays an important role in building local, regional and national identities (Lind and Barham, 2004; Rosenblum, 2010). Similarly, the cultural practices associated with making food informed everyday experiences of these Dalit women. As *sangham* members stated that preparing dishes from millets required a skill-set passed on through generations. These skills were also being lost and they felt disconnected while preparing rice purchased from vendors rather than millets grown on their land. Thus, in addition to the motivation of the lengthy and sometimes wasted market journeys (above), the cultural perspective of the idea of switching back to millet cultivation and producing their own food again made them keen to participate in the CSBs. Here the study finds participating in the CSBs were also bringing in a sense of local identity by preparing millets and reclaiming of autonomy in terms of producing their own food.

During FGDs, *sangham* heads also described how the collective practice of seed selection, conservation and sharing had been a part of their culture through religious practices. Indeed, various studies have identified how religion and culture encourage communities worldwide to conserve and share seeds (Barrera-Bassols and Toledo, 2005; Ford, 1994; Maffi, 2001; Pionetti, 2005). One *sangham* head described conservation and sharing in part of a local religious festival called *Dusherra*. During *Dusherra*, she said, they celebrate the extended ritual of *gatlu*, in which women collect seeds from different households of the village. Seeds are then mixed with soil and sown in front of a representation of the deity in their homes. Thereafter, they observe the germination and then select seeds to be stored and saved for the next harvest. Women also mentioned stories related to the popular Indian epic Mahabharata in which the qualities of foxtail millet played an important role in feeding the hungry Pandavas (characters in the epic; see also Satheesh, 2000). CSBs relinked these cultural ties, enabling co-operation to be more easily developed, drawn upon and transformed into the ongoing community management of seeds.

3.5 CBS functioning

The following sections look at the functioning of the DDS CSBs system in Medak and its organisation and operation by Dalit women in Zaheerabad.

3.5.1 Establishment and organisational dynamics of CSBs

For centuries seeds have been collected and shared through informal social ties (Almekinders et al., 1994; Chambers and Brush, 2010; Coomes, 2010; Pautasso et al., 2013). Farmers in developing countries continue to develop and engage in seed networks as a social process (Delêtre et al., 2011; Pautasso et al., 2013). During the development of the DDS CSBs in Medak, women went to their mothers', friends' and relatives' homes and farms, neighbourhoods and villages in search of endangered local millet seeds. In rural India, people have informal social ties with neighbouring villages (through marriage, friendship, work, etc.); *sanghams* used these informal social ties to collect seeds. This also gave women a sense of confidence regarding the germination possibilities of the collected varieties, since they trusted the sources of seeds. Again, many studies have shown how social relations and trust play a central role for farming communities in the acquisition of seeds (Almekinders et al., 1994; Badstue, 2004; Badstue et al., 2007) and the CSBs practices of DDS are no exception to this.

The practices of seed management, exchange and utilisation employed at the CSBs follow certain rules, like any other system of CPRs. The system of rules developed for resource use in Zaheerabad is based on individual circumstances. As one *sangham* head said,

Sangham members contribute according to their capacity and take according to their needs. This is how we understand each other's need and co-operate accordingly.

The distribution of benefits in this case is organised according to each person's (family's) requirements, which is different from the collective management of forest resources, where better-off members based on class and gender tend to enjoy greater benefits (Agarwal, 2001). From the selection of *sangham* heads to procuring seeds, maintaining stock and resource flow, these CSBs are all managed collectively, with monthly meetings conducted to monitor functioning and serve as a forum for discussion and decision making.

Sangham members spoke at length on matters of authority. Women referred to the word '*karyakarta*', meaning 'member' or 'membership', when describing the power structure involved in the management of CSBs. For them, *karyakarta* constitutes the ultimate *sangham* authority, the basis on which each member of *sangham* gains equal rights and duties. Thus, *sanghams* enact rules to ensure involvement that are informal but enforced by the moral authority of the collective. This was explained by a young *sangham* member:

> If a member doesn't perform her duties, like attending *sangham* meetings or helping the *sangham* in its day-to-day functioning, then she has to be penalised. She is excused, if she has health problems or family issues.

The amount penalised is not much, but the symbolic value of the penalty does have a coercive effect. According to a *sangham* head, this penalty encourages members to adhere to community expectations and minimises the problem of free riders.[47]

Although decisions regarding a member's shirking and punishment are taken collectively, the *sangham* head has the final word. The head is usually an elder selected by the members. Some women emphasised the importance of having an elder as head for social and cultural reasons. For them, such women have good experience of the field, seed practice and agriculture, which helps in managing the resources properly. Also, respect for elders is part of the local tradition, as respondents emphasised. This strategic placement of an elder as wise-woman enables *sanghams* to work effectively following rules-in-use established and changed as necessary by the members themselves. Thus, governance of the CSBs is based on certain rules-in-use that dictate resource management functioning, as is usual among CPRs, especially those operating in a traditional community context.

3.5.2 Seed management by sanghams

Prior to instigating CSBs, DDS used the knowledge of women members to identify seed keepers. DDS identified at least one 'good seed-keeper' in every village using local knowledge of community members whose understanding of who could save seeds efficiently was based on general observation and longstanding relationships. These good seed-keepers were approached to join *sangham*. They joined *sanghams* as a matter of pride and honour, as it gave them social capital to mobilise and conferred on them certain responsibilities.

Considering the local knowledge, seeds are selected by the members based on appearance and colour. For example, size matters for sorghum, while density is criterion for foxtail millet. Then, storing seeds at CSBs is guided by indigenous knowledge. For example, selected seeds are mixed with ashes and stored in traditional baskets made of bamboo sticks to protect them from moisture and pests. The baskets are later covered with cow dung and mud paste to make them airtight and cool (*sangham* members explained that controlling temperature in the baskets helps in maintaining the genetic/reproductive quality of the seeds). This indigenous knowledge is passed on from mother-in-law to daughter-in-law. As one *sangham* head said,

Daughters marry and go but daughter-in-law stays in the house and with her the knowledge stays.

47 The free rider problem and its potentially 'tragic' consequences emerge when resources managed as commons without restriction on usage lead to potential over-exploitation (e.g. Ostrom 1990; Ostrom et al. 1994).

In this community after marriage daughter-in-law lives with the groom's family but daughters leave their parents' house. Thus, women transfer indigenous knowledge through the generations in what might be considered an interesting way to manage seeds including the culture and tradition of the community.

3.5.3 Seed exchange, festival and sharing

Every village *sangham* maintains two registers for management of the seed collection, one listing the different varieties of millet available in each village CSBs and the other recording the resource use. The register used for listing varieties is maintained seasonally, as varieties are added by *sanghams* to the village stock each year. The second register is used for listing varieties and quantities borrowed by individuals. Each farmer can borrow the seeds of around fifty to eighty varieties from the CSBs. After each harvest season, the second register is referred to when collecting seeds from the borrowers for restocking, which is done on a 1:2 principle to increase as well as replenish the stock. For example, if a person borrows two kilograms of millet seeds from the village stock, then s/he has to refund four kilograms of the same millet seeds.

There is no technical guide followed by the community to check the genetic purity or viability of the regained seeds. The exchange here is made on trust. Communities from other states have requested DDS to send varieties of significant financial value. It was learnt that *sanghams* sent the varieties without any formal procedure (just asking for the transportation charge). For *sanghams*, trust and sharing the same ideology as those making the requests plays an important role in such exchanges. Thus, the resistance of the community is extended to wider and more generally local, collective and informal approach through these seed exchanges.

Since, 1998, the DDS has organised an annual Biodiversity Festival, in which the CSBs are involved. Intended as a means to encourage farmers to save and produce their own seeds, the festival is referred to by women members as the traditional crops festival (*paatha pantalu panduga*). The festival brings together farmers as participants and visitors from different villages, who showcase the varieties of seeds they possess. Initially, it was held in a specified village, but in 2001 it was made mobile and extended to a month-long celebration. Farmers bring their seeds in small earthen pots and carry them through the villages using decorated bullock carts. This festival extends and establishes new seed networks among different villages, as well as contributing to the local network of informal social relations generally.

Contrary to the conventional market ethos, DDS members strongly believe in sharing as a means to achieve and maintain biodiversity. In this context, profit maximisation is not significant for the community. Sharing on the basis of informal ties and

trust rather than for economic benefit is the determining aspect of all institutional arrangements. This is an aspect of collective action conventionally neglected in the approach of the rational choice theory of commons, in which it is assumed that individuals cooperate for profit maximisation. In contrast to that, this research, like that of Nightingale's (2011) study of a Scottish fishing community, observes the presence of alternative rationalities for cooperation in managing commons based on normative subjective actions and informal relations rather than economic relations.

3.6 Commons perspectives

The following sections look at issues related to commons in respect of this case study, focusing on ideas of subjectivities and of 'space of commons' and the linkage of these to culinary resistance.

3.6.1 Subjectivities and commons

During the FGDs, *sangham* heads highlighted the social discrimination they had faced before their involvement with DDS. Discrimination is based on caste as well as gender.[48] As women, they are expected to follow certain rules regarding the correct way of behaving in relation to men and society. For example, women have to cover their heads with a veil while walking in front of a higher caste male to show a subordinate position. These discriminatory treatments through social customs inculcate a normative subjectivity within women, referring to Nightingale's interpretation of subjectivity as '*the ways in which people are brought into relations of power, or subjected, which is part of how identities emerge*' (Nightingale, 2011: 123).

According to Nightingale (2011), stimulated by studies of Foucault, subjectivity evolves through a continuous and constant interaction between the subject and the social processes, in which power forms an important component. This does not imply that these women were not aware of the subjugated power exerted through caste and gender relations, but it was only after joining *sanghams* that they actively started to challenge it. This normative subjectivity brought them together in solidarity to resist the caste system and gender inequalities. Relations between subject and power have been well established by feminist scholars in their accounts of everyday interaction (e.g. Butler, 2002; Nightingale, 2006, 2011). Here, *sangham* members shared an empowering normative subjectivity that they developed through the collective activity of autonomous resistance which I will describe now.

48 One might also suspect dimensions related to rural poverty to have operated, since these women have no wealth to talk of beyond their homes and farms (which have a low capital value).

In India, the upper castes usually control land and resources (Gadgil, 1991; Thorat and Newman, 2007). Similarly, the control of resources by the higher caste was resisted by *sangham* members when they made efforts to (re)gain access to seeds through CSBs. Most of the women who participated in CSBs had been dependent on landlords from higher castes due to their control over the seeds and land. DDS *sangham* heads recalled how seed was previously stored at the landlord's house, with whatever the smallholders produced on their lands used for consumption, so they could not save seeds themselves. Good seeds or the best ones from the conserved varieties as the members pointed would be sown on the landlords' fields first, and only after that were the remaining given to the other farmers. This dependence on landlords sometimes led them to miss the harvest season. Here, the practice of saving seeds at CSBs has challenged and changed all this. One *sangham* member recalled how a landlord from her village came to ask for black horse gram seeds from their CSBs. She said:

> Black horse gram seed is important for the upper caste for performing religious rituals. The landlord could not get it from shops and came to us. Before, we used to go to landlords for seeds, but now they come to us.

Thus, seed-saving has not only made members and their families self-sufficient, but also enabled them to attain self-confidence and undermine (thus challenge) the caste hierarchy and monopoly over resources. In this way, CSBs have also led to the creation of a space of commons which I will describe in the next section.

3.6.2 A space of commons

Taking Bourdieu's (1985, 1989) notion of social space and Aistara's (2011: 494) notion of *'new cultures of relatedness'*, I introduce the idea here of a space of commons. This refers to a socio-economic or more broadly cultural space in which the marginalised but empowered community encounters and negotiates a common lived experience. According to Bourdieu,

> the social world can be represented as space (with several dimensions) constructed on the basis of principles of differentiation or distribution constituted by the set of properties active within the social universe in question, i.e., capable of conferring strength, power within that universe, on their holder (Bourdieu, 1985: 723-24).

For Bourdieu, space is multidimensional but at the same time demarcated structurally into social spaces where individuals are placed or agents act. Thus, space can be differentiated structurally, and an individual's position is determined by the part of the space she/he occupies within the whole. Similarly, possession

of multidimensional space by a marginalised community like Dalit caste women is differentiated from that of men and other higher castes. This multidimensional space transforms into a space of commons when women become the members of *sanghams* sharing a common social identity differentiated from 'others' (men and higher caste).

The *sangham* members share a common lived experience with other members of the community. It is a space of commons insofar as it is created through the common lived experience of the marginalised community. Following Bourdieu's logic, the commonality is to be understood as defined in relation to that which is external. In practice, this means that the space of commons becomes a platform for defending the common goals and negotiating subjectivity with others placed outside this space. For example, the community members challenged and thus diminished the monopoly over resources by conserving seeds through CSBs.

As the sharing of seeds (above) suggests, this space of commons is not restricted to *sangham* members, however, since it is a fundamentally open space that any individual or organisation with objectives or lived experiences sufficiently similar to those of these women can enter and share. It is based on social relations created through shared experiences of oppression and empowerment. Individuals/groups sharing this space are related through what Aistara calls a '*new culture of relatedness*', in which farmers are related to each other not on the basis of kinship or biology but '*through the common management of other biological species – the plants and their seeds*' (Aistara, 2011: 494).

The case of the Millet Network of India (MINI) represents an attempt to formalise this space. This is a network of communities and organisations from all over India[49] that produce millets. The network is related through common lived (politico-socioeconomic) experience and new culture of relatedness where members share a space of commons. It is through this space of commons that members gain an opportunity to translate their struggle and resistance at a broader level. This space of commons is not bounded or fixed and is subject to continual redefinition as recent MINI activities suggest, since MINI has recently been mobilising it to focus on finding a place for millets in the National Food Security Act (2013) of India. Similarly, MINI is agitating for inclusion of millets in the government (school feeding and other) mid-day meal programmes. These activities indicate how a space of commons may be translated further through networks into an anti-hegemonic movement against the dominant food culture (here, based on rice and wheat). Indeed, they suggest scaling-up possibilities for local commons toward the development of an alternative food regime.

49 From the states of Andhra Pradesh, Karnataka, Tamil Nadu, Gujarat, Madhya Pradesh, Odisha, Nagaland and Himachal Pradesh.

3.6.3 CSBs and culinary resilience

After few years of operation, DDS and *sanghams* felt the need to create a local market to encourage farmers to cultivate millets. In 2004, DDS came up with the idea of establishing a restaurant serving local food of the region, the *Café Ethnic*.[50] This is now a successful enterprise operating with the motto 'Taste, Health, Nutrition'. The name of the cafe reflects the value it attaches to the local food of the community, and the food qualities named in the menu have become symbolic for the community. The menu card includes dishes such as korra (prepared from foxtail millet) and jonna (prepared from sorghum), along with information on the ingredients. While eating food prepared by the café, I was informed by women members about the nutritional and health benefits of each food. These practices can be seen as a form of what Finnis (2012:127) calls '*culinary resilience*'. In her study of the Malayali tribal community in Kolli Hills of South India Finnis (2012) found the culinary uses of the two minor millets (samai and thenai) were preserved, enacted and sold to the non-tribal consumers in form of a cookbook. These cookbooks were seen as promoting culinary reliance. Similarly, in the case of DDS, the traditional culinary practices of the Dalit community are preserved through the *Café Ethnic*. In addition to this, the community has also produced cooking recipe films to attract urban consumers. These recipe films are regarded by the community as an attempt to highlight the health advantages of the local food, enabling it to transcend the immediate locality and become incorporated in urban areas. Younger *sangham* members in particular emphasised the nutritional value and other health benefits of their local food. Comprehending the attempts of the Dalit community, here I find emphasising on the health benefits and recipe films as a form of culinary resilience similar to what Finnis (2012) elaborated in her study. Thus, the ideology of preserving agrobiodiversity by the community is now extending from the conservation of resources at CSBs to an engagement in broader dialogues about benefit of foods prepared from millet over other foods.

3.7 Conclusion

The research presented in this chapter has investigated the struggle of a (doubly) marginalised community to revive local food through millet-seed conservation as a commons. The disconnection of the marginalised community from its local food system based on millets was the prime motivating factor for resistance (underlying the identity and autonomy issues). While conserving genetic resources (seeds), agrobiodiversity and culinary preference have increasingly stimulated the Dalit

50 Kumbamu (2012) considered *Café Ethnic* as an effort to revive the local (*dalitbahujan*) food culture.

women to reconstruct practices of crop cultivation (Zimmerer and Bassett, 2003) and widen the implications of this through extending both beyond the immediate territorial base. Here, we must recognise that the involvement of women in *sanghams* and the DDS generally may shape their understanding of the situation: their involvement may be seen as a social means of connecting and as a political expression. However, the collective management of CSBs not only comprises a strategy related to resources but has also developed an empowering normative subjectivity among its participants.

This is, therefore, an empowering normative subjectivity through women's groups that intrinsically challenges the social and cultural marginalisation of members. The resistance of women enabled through and thus identified with CSBs creates a social space one in which they encounter and negotiate their common lived experience from a position of relative strength. This is called here as a space of commons, where members are related through a new culture of relatedness. The seed exchanges through CSBs not only help in conserving the local food system, but also create possibilities for the creation of a space of commons. These are not limited as specific to the present case but were found to extend to a nationwide network (MINI), creating a formalised space of commons related to millets without any necessarily binding geographical restriction.

In this case, the social relevance of indigenous knowledge provides an input for bottom-up governance, with rules-in-use informed by local, traditional practice for the functioning of CSBs. The common resource management here should be understood as a cultural system of the marginalised community (that establishes and manages it) to re-establish its local food culture; a finding that confirms the research by Wagner and Davis (2004). The organisational dynamics reflects an egalitarian structure based on benefit sharing and authorising age for important positions in *sanghams*. Although a deeper analysis of power relations beyond this basic structural definition was outside the scope of the chapter, this might be usefully taken up, since, as Agrawal (2003) points out, even successful commons institutions can exhibit internally coercive power relations.

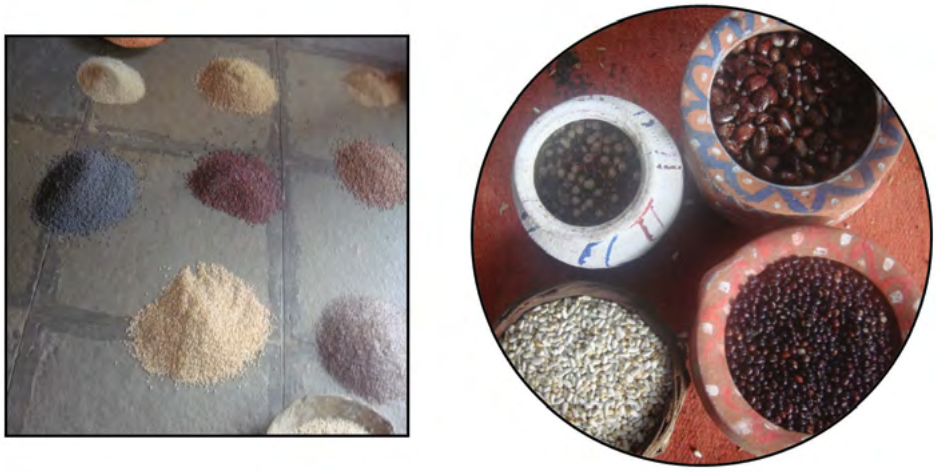
Presently, collective practices of the community studied are broadening in general, through restaurants producing a culinary resilience that transcends local boundaries and engages with wider debates about food. However, efforts such as those reported to integrate millets into the market may also lead in the long run to a demand for a reduced number of preferred varieties. This interface of commons with capital represents an interesting development that warrants further investigation and reflection through similar projects. Regardless of this development and any associated concerns, the efforts of this community in sustaining its space of

commons does provide an example for other marginalised communities similarly subjugated in relation to natural resources. This case departs from other cases of traditional commons like land, water and forests where collective activities evolved to prevent over-use of resources, since it arose from an under-use of local food crops (millets). In addition to this, it provides possibilities for the commonisation of the seeds through the community practices in the sense of reclaiming lost rights, regaining access to and control over resources and re-commoning that which had been enclosed. Further studies on CSBs may be enriched by drawing from this aspect for generalisation.

Appendix-2.1

The left picture shows a *sangham* member house storing seeds inside the bamboo baskets and copper pots, whereas the right picture shows another *sangham* member with traditional bamboo basket storing seeds, Medak (September, 2013). [Selected Pictures from the field by the researcher]

Appendix-2.2

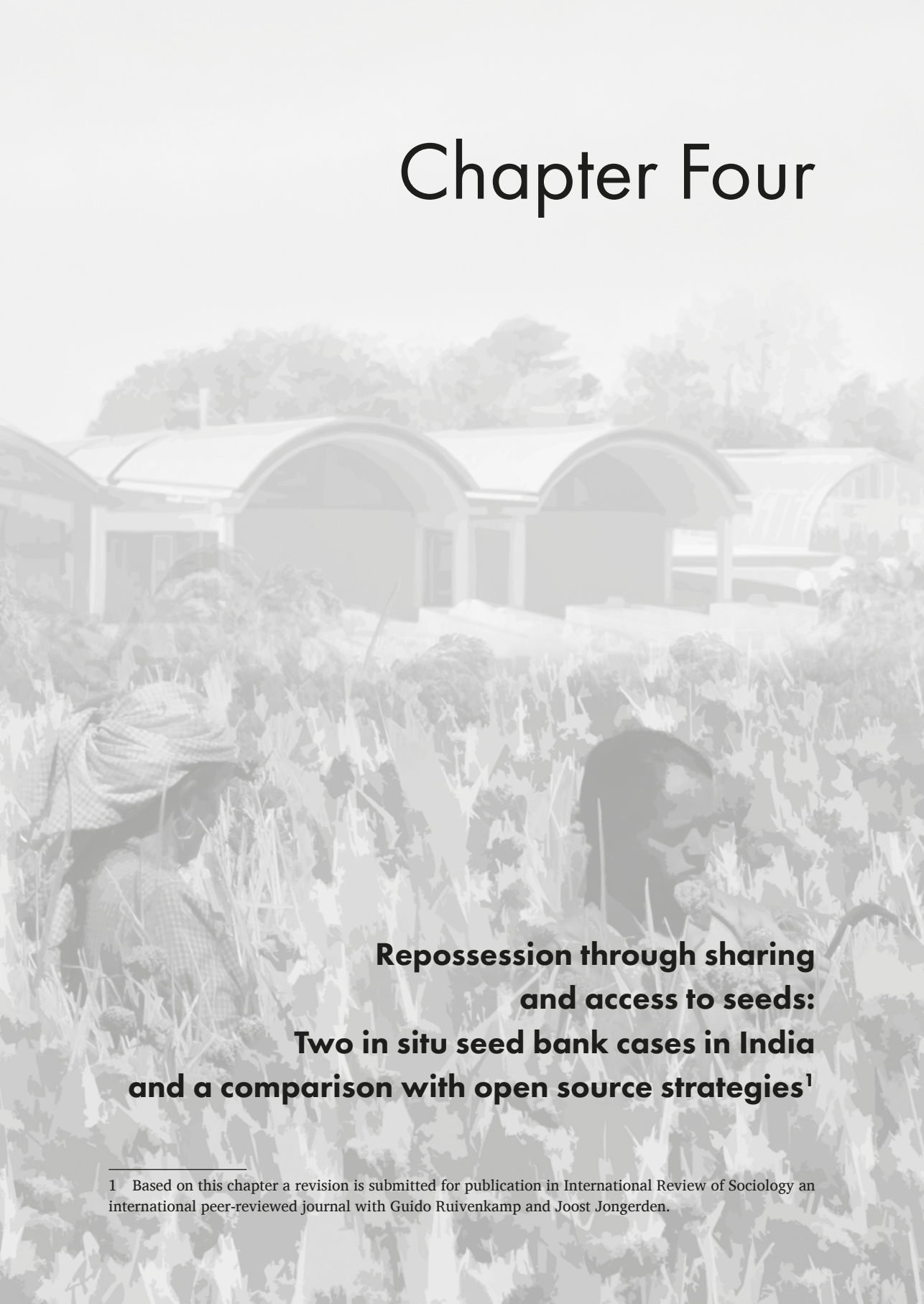


Varieties of seeds (millets) conserved by the DDS *Sanghams* (September 2013). [Selected Pictures from the field by the researcher]

Appendix-2.3

Left picture shows *sangham* members in discussion over *sangham* functioning, whereas the right picture shows different food that is prepared at Cafe Ethnic using millets (September 2013). [Selected Pictures from the field by the researcher]

Chapter Four



Repossession through sharing and access to seeds: Two in situ seed bank cases in India and a comparison with open source strategies[1]

1 Based on this chapter a revision is submitted for publication in International Review of Sociology an international peer-reviewed journal with Guido Ruivenkamp and Joost Jongerden.

> *But if 'food sovereignty' is to be achieved, control over plant genetic resources must be wrested from the corporations that seek to monopolize them and be restored to, and permanently vested in, social groups and/or institutions with the mandate to sustain them and to facilitate their equitable use. That is, realization of food sovereignty is predicated in no small part on the repossession of 'seed sovereignty'.*
>
> (Kloppenburg, 2010: 368-9).

4.1 Introduction

Seeds form an important aspect of agricultural production; they serve as both the means and the product of agriculture, the beginning and the end (Kloppenburg, 2010). According to Kloppenburg (2014: 1225), '*corporate appropriation of plant genetic resources, growing monopoly power in the seed industry, the development of transgenic crops and the global imposition of intellectual property rights – has become a pivotal issue for farmers the world over*'. Historically, the introduction of a (political) function of seeds within global food chains begins with the efforts of plant breeders to liberate crops from their natural constraints as determined by their adaption to the local conditions (Ruivenkamp, 1989, 2005). Indeed, the scientific and technological development of plant breeding has led to the redefinition of seeds according to a distinction between the traditional biological (whole seeds) and contemporary scientific (genetic material). This distinction is expressed in the literature on common property resources and then commons as the tangible-intangible binary (Kloppenburg, 2010; Roa-Rodríguez and van Dooren, 2008: van Dooren, 2009).

The use of science and technology in plant breeding changed seeds into commodities to be owned and appropriated (Kloppenburg 2010, 2014; Kloppenburg and Kleinman, 1987; Ruivenkamp 1989, 2005), particularly by inscribing specific content.[51] In addition to this, as Demeulenaere (2014) argued, high yield varieties (HYVs) and genetically modified (GM) varieties turned farmers from active producers of seeds into buyers making reproduction of the farm subject to corporate control. The capacities of seeds to change and impose specific social relations for the benefit of seed companies have been extensively discussed in relation to spectacular examples as HYVs (Kloppenburg and Kleinman, 1987; Shiva, 1991; Swaminathan, 1996), and GM crops (Herring, 2005; Raeburn, 1995; Shiv et al., 2000).

Further, seeds have also come under the regime of intellectual property. This has not only increased the possibilities for appropriation of seeds through monopolies

51 The scientifically improved seeds required new means to protect them against insects and pests by using insecticides and pesticides. Again, fertilisers were essential for the plant's growth, and the product from the seeds underwent additional food processing procedures. All these procedures created and modified the relations farmers had with nature and other stakeholders.

(Kloppenburg, 2010; Srinivas, 2006), but also enabled transnational corporations to extend their control over agricultural production (Ruivenkamp 1989, 2005). However, this appropriation of seeds has been contested, not only by overt protests and activist sabotage (see Gadgil and Guha, 1994; Herring, 2005; Shiva, 1991), but also by what van der Ploeg (2010: 16) names a '*third kind*' of resistance. According to Ploeg (2010: 16), this third kind of resistance is '*direct intervention in, and alteration of, labour and production processes – is widespread in today's agriculture*'.

In contrast to this hegemonic line of development, scholars have referred to new initiatives drawing on farmers' traditional practices of saving farm-seed. Scholars have regarded this practice as challenging and even transforming the politicising tendency of contemporary scientific practices and enhancing farmer autonomy (Da Via, 2012; Schneider and McMichael, 2010; van der Ploeg, 2010). Scholars from India, meanwhile, have highlighted the importance of community-saved seeds for challenging the caste hierarchy (Kumbamu, 2012). Alongside these debates on seeds as politicising products with either monopoly-strengthening or social transformative capabilities, another debate has emerged focussing on the strategy of an open source system in agriculture specifically challenging the monopoly of intellectual property rights (IPRs). For example, Kloppenburg (2014) reflected on the Open Source Seed Initiative (OSSI) in the USA and the ways it aims to transform seeds from being politicising products for monopolies into means of creating alternatives to the enclosure strategy.

These types of initiatives both farmer-oriented and open source create alternatives by emphasising farmer's autonomy and the conservation of agrobiodiversity or by developing alternate legal procedures for repossession. In this chapter, I unravel these practices of resistance and repossession focussing on examples representing these two approaches as different strategies that serve towards process of commonisation of seeds. The main objective of this chapter is thus to understand the various singular practices of repossession of seed that leads to the commonisation of this resource. A comparison of these various practices of repossessing seeds will provide scholars and practitioners with further insights into the ways commonisation of seeds can be realised, both generally and more particularly in India.

In order to understand repossession in the domain of agricultural production, it is essential to understand the context and mode of appropriation of seeds, which, in turn, determines strategies of repossession, such as repossession through change in the mode of production (Kumbamu, 2009; Salleh, 2010; Shiva, 2005a) and through open source (Deibel, 2013; Hope, 2008; Kloppenburg, 2010, 2014). It has already been emphasised that the USA, OSSI initiative cannot be just replicated in the Global South, because of its location-specific characters (Kloppenburg, 2014). In line with

this, it becomes important to highlight various practices of repossession that exist in India and reflect on their practices for the commonisation of seeds. Here, I analyse the strategies of two NGOs in India as examples of repossession through changes in the mode of production.

First, I describe two grassroot movements working to repossess seeds as commons in India – Loka Samabaya Pratisthan (LSP) and Sambhav, both in the state of Odisha. Then, I highlight the practices of two further organisations to reflect on repossession through open source mechanisms and their efforts toward the commonisation of seeds. I compare the LSP and Sambhav cases with two open source initiatives; OSSI in the USA and a similar initiative by the Organic Farming Association of India (OFAI) called the Open Source Seed System (OSSS). While analysing the specific practices involved in these approaches, I also seek to investigate relations between the strategies and the social-economic and agro-ecological contexts in which they operate. This requires an understanding of repossession through resistance to the appropriation of resources. Thus, I start by looking at the disconnection of resources and then outline the Indian context for and responses to this, before going to detail the comparative approach and case study methodology prior to presentation of the main studies.

4.2 Resource disconnection: Metabolic rift, repossession and meta-industrial labor

Derived from Marx's *The Poverty of Philosophy* (as cited in Foster, 1999), the concept of metabolic rift was used by Foster (1999), to look at how Marx had appraised the condition of capitalistic agriculture through the application of chemistry and degradation of soil fertility. Building from this example, Foster (1999) suggested that the thought be taken further, emphasising more broadly to the unsustainability of the capitalistic approach to agriculture. The concept of metabolic rift has been used by various scholars since then to study relations between socio-political and ecological factors. Scholars used the concept to refer to the relation or rather disconnect between capitalism and nature (Foster, 1999; Moore, 2000) or, more generally, to various ecological and political aspects of environmental problems (Campbell, 2009; Clark and York, 2005; Clausen and Clark, 2005).

For Wittman (2009), metabolic rift can be better explained by understanding how society appropriates nature by creating a labour market and commodifying agricultural process. In order to do this, she explained how the introduction of capitalist commodity production into agriculture has challenged and changed the relationship between society and nature. Thus, nature cannot be taken as an

independent category for the study. Other scholars support this claim as they emphasise nature as an assemblage of political, economic, cultural and agro-ecological aspects (Escobar, 1998; Graddy, 2013; Hayden, 2003). These factors influence the social relations between nature, labour and the mode of production. Thereby, implying that nature in the form of forest, trees, plant and seeds can no longer be regarded as just biological/natural entities distinct from the influence of society. Nature in these forms is susceptible to metabolic rift through changes in the mode of production and capitalisation, which in turn can change the social relations between different stakeholders. I comprehend metabolic rift as '*the effect of a specific mode of production, namely industrial capitalism, which destroys the human-nature metabolism in an endless pursuit of profits*' (Salleh, 2010: 206).

Ruivenkamp (2015) has explained how through capitalistic interventions the social transformation of seeds from commons into commodities creates new social relations in to the agricultural production system. He takes the example of global food chains which play a key role in strengthening the process of industrialisation in agricultural production which can be considered as a metabolic rift. Similarly, Kloppenburg (2010) described the need to change the capitalistic means of agricultural production to overcome effects of new technologies and property rights which can be considered as metabolic rift, changing the mode of production. The strategy required in response to overcome this metabolic rift is to emphasise on repossession.

Repossession is '*the actual recovery or reacquisition of what has been lost, and even the proactive creation of new, commons-like spaces in which more just and sustainable forms of social production might be established and elaborated*' (Kloppenburg, 2010: 368). Kloppenburg (2010) moved a step forward from earlier debates by elaborating the possibilities of bringing back seeds from private company monopoly and capitalist production which creates the rift. Thus, solutions to the metabolic rift in agriculture can be envisioned by bringing resources back into the domain of protected commons, for example through collective activities and the use of open licensing. Repossession thus not only operates as a strategy that returns what was possessed by an individual or group or institution into the domain of commons but also (re)introduces a metabolic fit.

Scholars like Salleh (2010) have described the importance of recognising forms of labor outside the capitalistic mode of production, such as that of peasants, parents and gatherers. According to her, it is through such '*meta-industrial*' labor that a metabolic fit, a synergy between human activity and nature, is maintained (Salleh, 2010:212). Salleh (2010:212) further maintains that the meta-industrial labor class produces '*metabolic value'* created by the ecosystem through organic reproduction

which sustains ecological integrity. For example, by using organic fertilisers, the farmer (labor) maintains soil fertility, and metabolic value is produced by nature through organic reproduction, which leads, in turn, to a metabolic fit. An interesting feature is that the meta-industrial labor class as described as Salleh (2010) is intrinsically more attuned to a green economy and maintaining commons.

Salleh (2010) finds that the meta-industrial labor works towards maintaining a metabolic fit by understanding of the complex nature of the local ecology, which leads to eco-sufficiency, especially in the Global South countries. Thus, I consider that a specific mode of production based on ecological principles, such as organic farming also undermines metabolic rift. Salleh (2010) then connects resistance to capital through collective activity with this distinct mode of production that creates metabolic value rather than commodities. Thus, reclaiming possession and creating autonomous spaces with regard to seeds can have multiple connotations with regards to metabolic rift, metabolic fit and meta-industrial labor. Here, in this chapter I further add to the different meanings of repossession and commonisation of seeds. I compare four cases looking at their concrete practices for repossession of seeds with reference to the concepts of metabolic rift, metabolic fit and meta-industrial labor developed by Salleh (2010).

4.3 Disconnection of resources and response: The Indian context

Applying the ideas of metabolic rift, repossession and metabolic fit to the Indian agricultural production system, I find instances of metabolic rift manifested particularly during the Green Revolution period. In India during the 1960s, when HYVs were introduced through Green Revolution, these varieties reinforced structural changes in agriculture. The HYVs mediated the disconnection between the agricultural mode of production from its natural environment by increasing the need for the use of industrially produced herbicides, pesticides and fertilisers (Shiva, 1991; Singh, 2000; Swaminathan, 1996). However, the metabolic rift between the means of agricultural production and nature led to the emergence of various environmental movements and collective activities in different parts of India.

Among the environmental movements, for example, were *Beej Bachao Andolan* (Save the Seeds Movement), launched in 1982 by local people in Garhwal, Uttarakhand to revive the use of indigenous crops and cropping systems destroyed by the introduction of HYVs (Jardhari et al., 1998; Singh, 1998). Similarly, the *Pluck and Plant Satyagraha* emerged in 1987 at Kusnur, Karnataka, as a reaction to state allotment of village pasture land on which the villagers depended for their livelihoods in order to establish a paper (polyfibre) industry (Gadgil and Guha,

1994). These environmental movements in the 1980s can be seen as local people challenging different forms of resource appropriation and struggling to repossess agricultural resources from capital and state monopoly.[52]

Similarly, collective activities have been expressed as farmers' movements in some parts of India resisting globalisation (Assadi, 2002). Examples include the Navadanya movement against mono cropping and control over resources by corporates (Kothari, 1994) and the Karnataka Farmers Movement against genetic modification and biotechnology, which led them to oppose Monsanto in 1998 through slogans like 'Cremate Monsanto!' (Featherstone, 2003: 407). Assadi (2002) further established how various regional agrarian movements in India later became involved in global collectives such as of Via Campensia and the People's Global Action. These activities can be seen as a reaction to the metabolic rift, resource capitalisation and local agro-ecology destruction, in which local communities fought for the repossession of the monopolised resources by capitalistic interventions.

These movements and activities have been explained in terms of resistance, but the aspect of repossession of resources by the local communities and their commonisation has not been much elaborated. In this chapter, I add to this rather sparse literature. I look at two informally structured collective initiatives that resist the metabolic rift in Odisha, India, focusing on their strategies of repossession and commons. The first initiative, the Loka Samabaya Pratisthan (LSP), is an NGO that reacted against the technological development inscribed in the HYVs and perceived as destroying the ecological system. The second initiative, Sambhav developed as an effort for maintaining agrobiodiversity by restoring local varieties. Both of these informally structured initiatives practiced repossession of local varieties through in situ seed banks and through collective activities they developed their notions of repossession.

The case of these two initiatives (LSP and Sambhav) can be categorised as a resistance to the change in mode of production. As such, they were recognised by the Organic Farming Association of India (OFAI). Established in 2002 and officially registered in 2006, the OFAI aims to organise organic farmers and farming across India. It organises a variety of activities including lobbing for organic farmers and assisting them through training programmes.[53] The OFAI objective is to resist the metabolic rift created through capitalisation of resources (GM seeds) and destruction of local agro-ecology (through the introduction of Green Revolution technology). These ideologies are also shared by LSP and Sambhav, which brought them into the OFAI network and thus resisting the industrial mode of production through their efforts.

52 For a detailed discussion on these movements, see Gadgil M and Guha R. (1994) Ecological conflicts and the environmental movement in India. *Development and change* 25: 101-136.

53 See official website of OFAI for details http://ofai.org/organisation/ (accessed 8th August, 2015).

The efforts of LSP and Sambhav can be seen in the national context of alternate globalisation movements. Similarly, various NGOs in India have highlighted the importance of community saved seeds for resisting the industrial mode of production and the resulting metabolic rift. Organisations like Navadanya, the Deccan Development Society (DDS) and Sahaja Samrudha are working in different parts of India to stimulate and assist farmers in collecting and saving landrace seeds.[54] The discourse these NGOs promote is the struggle to realise seed sovereignty[55] through repossessing local seed varieties and maintaining biodiversity. They believe conservation of inter and intra species biodiversity in village and community based in situ seed banks can free farmers from their dependence on the external seed supplies of multinational corporations and ultimately increase agrobiodiversity.

In order to achieve agrobiodiversity and maintain the metabolic fit these NGOs employ techniques of conservation alongside their organic farming practices through the collective activities of farmers. Their aim ultimately manifests in making farming families independent producers of a wide variety of food products. These meta-industrial labor practices create metabolic value that sustains and maintains the metabolic fit attuned to the green economy. In this way, the farmers also develop a space for commons at once both based on and introducing new social relations. For example, in the case of DDS, the Dalit women members govern community seed banks and develop a space in which new social relations emerge (See third chapter of this thesis). Thus, bringing seeds back to the farmers as represented in these concrete practices that operates in opposition to the thrust of neo-liberal market ideology, such as the development and deployment of HYVs, enclosure through IPRs and use of GM seeds.

4.4 Methodology: Case study

The two Indian cases focus on the social arrangements adopted by grassroots NGOs in interior parts of Odisha (state) maintaining agrobiodiversity by reclaiming seeds to realise farmer autonomy and thus reinstalling a metabolic fit. The aim here is to develop insights into how the seed bank strategy to repossess seeds as commons is related to the social-economic and agro-ecological context in which the practices of resistance to metabolic rift emerge. Then, in comparing these initiatives with the open source cases of OSSI and OFAI I aim to problematize the politicising content of seeds by challenging property relations. Thus, the aim is to develop a holistic

54 See official website of these NGOs for details http://www.navdanya.org/, http://ddsindia.com/www/default.asp and http://www.sahajasamrudha.org/ (accessed 12th September, 2014).

55 Sovereignty in this chapter is understood as autonomy, independence and freedom from external sources of seed.

picture of initiatives working towards the realisation of repossession, metabolic fit and commonisation in the domain of seeds. Figure 4.1 represents the four initiatives and aspects of the metabolic rift they challenge.

The case study method is used to investigate the resistance and repossession at a local, grassroots level in a holistic manner dealing with the complex social phenomenon (Yin, 2013b). The empirical analysis on resistance and repossession practices of the two Odisha in situ seed banks is done by applying various methods of data collection. These methods comprised of semi-structured and unstructured interviews, participant observation and workshop attendance as primary sources. In addition, researching relevant printed and uploaded material (published and unpublished documents, reports and official websites) served as secondary sources of data. Study of the open source cases for comparison consisted of analysis of secondary sources (published articles, organisation documents, etc.) along with a check of the official OFAI website for information on recent activities.

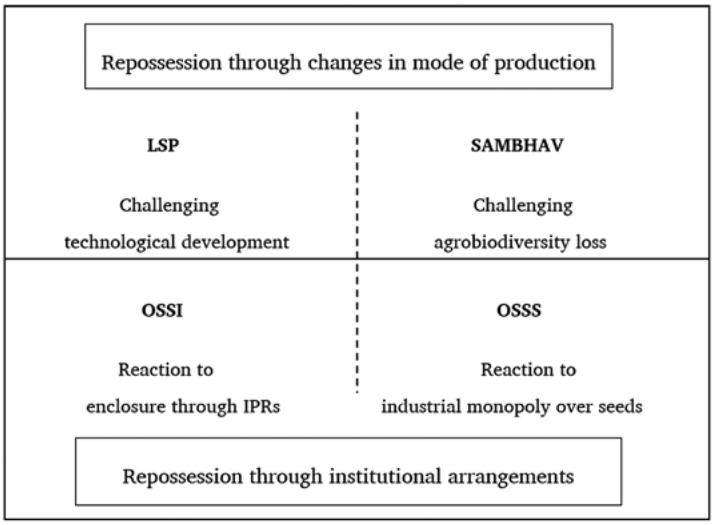


Figure 4.1 The four initiatives and metabolic rift aspect challenged

Interviews and participant observation method served as the main primary sources of data for the commons cases. The first NGO, LSP, was visited during the month of April, 2013 and the second, Sambhav, during the month of March, 2013. During these visits, NGO founders and farmers associated with them were interviewed. Fifteen farmers associated with each NGO were interviewed to gain a holistic perspective of what metabolic rift and the repossession of seeds meant to them. The semi-structured interview method employed for data collection gave a predetermined structure to the interview while affording opportunities for the interviewee to address issues of his/her choice.

Participant observation was carried out while attending several workshops on the conservation of agrobiodiversity through seeds at which LSP and Sambhav were represented. These workshops provided spaces where farmers, scientist and NGOs activists from all over India came together and shared their views on the conservation of biodiversity by saving seeds. The various participant NGOs and farmers had similar objectives and backgrounds as those of LSP and Sambhav. This enriched the study perspective and helped in understanding the meaning of seed conservation and repossession to grassroots NGOs in India. These workshops were also used to conduct unstructured interviews with additional ten farmers from different NGOs attending the workshop to showcase their conserved varieties. Thus, information from a total of forty interviews is employed. In addition to this the founders of both the NGOs were interviewed for additional information for over an hour.

4.5 Case studies: LSP and Sambhav

LSP and Sambhav both have their own seed banks and both practice organic farming registered under Society Act of India (1860), thus reflect ideologies of alternate practices of doing agriculture through organic farming. Geographically, LSP is situated in Narisho village, Khurda district with Sambhav in Rohibanka, in the Nayagarh district both in Odisha (state). Odisha also houses the internationally important Central Rice Research Institute (CRRI), studied in Chapter 2. Situated in the same state as CRRI, both the NGOs were deliberately selected to reflect on the social arrangements adopted by grassroot NGOs in the interior parts of Odisha. LSP conserves only rice germplasm, whereas Sambhav conserves the germplasm of various crops, including, in addition to rice, vegetables and fruits. Further to its seed conservation activities, Sambhav also focuses on women farmers, providing training for them in crafts like stitching and weaving to maintain their livelihoods in the agricultural off-season.

4.5.1 Organisational arrangements of the in situ seed banks

LSP is a small organisation with limited infrastructure but catering to the needs of hundreds of farmers in the nearby villages and from all over India each year.[56] The organisational seed banks of LSP are situated in small rooms in various farm outbuildings, huts and houses in Nariso village. Some seed samples are also saved in cloth packets and rolled in newspaper in the founder's house. LSP maintains and conserves the seeds of landrace varieties using its organisational seed bank which

56 See Global Green Grants Fund website for details, at http://www.greengrants.org/2011/11/02/a-retired-teacher-seeds-organic-farming-in-india/ (accessed 30th June, 2015).

is managed by the organisation. LSP is a relatively new organisation with limited infrastructure, but its practices reflect the regional worldview on conservation, sharing and seed sovereignty. Similarly, Sambhav as an organisation is small but spread across a relatively wide area, ninety acres of land in the village of Rohibanka. The conservation of seeds at Sambhav takes place at two levels. First, at the level of the organisation, members collect seeds from different places (their farms, neighbours, farmers from elsewhere) and conserve them. Secondly, farmers in different villages form groups and conserve varieties. The Secretary of Sambhav explained how farmers form self-help groups (SHGs) at block[57] (sub-district) level. Every group has an elected member who manages the SHGs functioning in this capacity as its designated representative with the organisation. The SHGs representative may thus be considered a full member and other SHG farmers associate members of the organisation, although this distinction is not formalised and its practice is quite informal. Indeed, informality may be identified as characteristic of social (human) relations in these NGOs.

LSP does not support farmers financially neither does Sambhav. LSP provides training in the skills necessary to cultivate the landrace varieties, however, as does Sambhav. Sambhav has also started an initiative encouraging farmers to adopt a seed variety through a written commitment, a preamble. This preamble is of two pages. The first page consists of a *Sapatha*, which means promise in local (Odiya) language, indicating that the individual promises to take care of the seeds. The second page is a plain, typed form mentioning the name of the variety and the person adopting that variety, along with the date. This is a non-official, non-legally binding contract, thus formalising individual-institutional informal relations without invoking structures outside the organisation, such as those of state law.

According to members of Sambhav, if they work with a thousand farmers, they motivate at least five hundred of them to sign the preamble and take an oath to conserve seeds of at least one variety. Through this practice, seeds are adopted and conserved by different farmers and communities of farmers. While LSP and Sambhav both emphasise conservation and sharing and apply similar (organic) farming methods, they differ in their organisational practices of conserving the seeds, insofar as Sambhav structures and formalises this through the preamble system.

Both LSP and Sambhav work towards conserving and sharing seeds with farmers through the organisational seed bank. They aim to propagate the idea of self-sufficiency in matters related to seeds (resources) and the importance of repossession

57 In India, States are divided into different administrative units of districts and further divided into sub-districts or the blocks.

by communities through their practices of seed banks. The seed banks at LSP and Sambhav are both managed by the organisations and not by the communities. This has the effect of limiting the direct involvement of farmers in managing the seed banks. However, the linkage between farmers and the landrace varieties remain connected, because the practices of conservation and sharing of resources occurs at a local level. These practices create an alternative to the dominant form of conservation of the ex situ genebank at CRRI which will be discussed later. Thus, for LSP and Sambhav, conservation and the sharing of landrace varieties by the farming communities challenges the dependence of these communities on external sources of seeds.

4.6 Metabolic rift and evolution of the organisational seed banks

For LSP the ecological damage that pesticides have on people and the ecosystem was the major factor returning to the practice of conserving seeds and re-engaging in traditional agricultural practices. Specifically, it was the LSP founder's experience of cultivating HYVs that motivated him to look for alternatives to formal seed supplies and for non-industrialised means of practising agriculture. During his search for alternatives, Natabar Sarangi (the founder) came across landrace varieties, which can be conserved and cultivated season after season without affecting the ecology. Thus, according to him, non-industrial agricultural mode of production provided freedom to conserve, cultivate and access resources according to the needs of the communities. It was this sense of metabolic fit that motivated Sarangi to build an in situ seed bank and guide its development to the current state (there are over 450 varieties of rice in the organisation's seed bank now).

Natabar Sarangi reports that in 1992 he cultivated the then popular HYVs, such as CR 1009. This variety was well known among farmers for its high yields. It had acquired the acronym 'CR' from the CRRI, the institute that developed it, but was also known as Savitri by the farmers. This name came from *Savitri Amabasya*, a festival in the state of Odisha, as the variety is sown just before the beginning of that festival. Savitri was a significant product achievement by CRRI for lowland breeding in the 1980s (Das, 2012). Although high yielding, however, it also required the use of pesticides and fertilisers and, according to Sarangi, like other varieties developed by CRRI, was actually quiet susceptible to pests:

On the day of spraying pesticide the person who was engaged in the task fainted after spraying just one acre. This incidence shocked me. Then, the next day I found all the small fishes, crabs, snails and earthworms lying dead in my field. Spraying

pesticide killed these creatures and will even kill micro-organisms and worms useful for soil fertility. (Interview with LSP founder Natabar Sarangi, April, 2013)

Thus it was the ecological losses caused by the cultivation of improved varieties that led Sarangi to look for alternate means of doing agriculture. The use of improved varieties developed by CRRI was effectively seen as creating a metabolic rift between nature and society through the use of chemical fertilisers and pesticides required by these varieties. As a school teacher, so an educated person, Sarangi looked for closure to this rift through natural farming and adopting ecological ways of doing agriculture informed by local knowledge and by reading books. He found out that the main requirement was to use landrace varieties, which do not need intensive pesticides. Sarangi started using natural inputs like neem cakes as pesticides and cow dung as manure and, inspired by the ethos of organic farming, began looking out for landrace varieties in nearby areas and then saving and storing them. Thus, the establishment of the LSP seed bank can be seen as a reaction to the ecological damage wrought as a consequence of the productive ethos of the HYVs. LSP thus addressed the metabolic rift between agriculture and nature resulting from the introduction of an industrial mode of production.

In contrast to the foundation rationale of LSP, the main objective behind collection and conservation of landrace varieties for Sambhav was to protect the environment by conserving agrobiodiversity. Thus, Sambhav visualised the rift between man and nature in terms of loss of agrobiodiversity through chemical farming. According to the Secretary of Sambhav, the founders of Sambhav were inspired by different organic farms in India that employed an ecological farming approach. These farms conserved the relationship between nature and the environment, and Sambhav founders started looking for land that could be devoted to this. Thus, the founders started to counter metabolic rift by establishing a NGO to initiate ecological restoration though agrobiodiversity conservation.

According to the Secretary of Sambhav, the place where Sambhav is now situated was a first grade forest with wild animals in the 1950s. This changed with modern farming, partly due to improper care on the part of the local people cultivating upland rice varieties, and ecological resilience was degraded. Until, in 1987-88, the top soil was washed away then being porous and laterite in nature the land became infertile. Before establishing the organisation, the founding members of Sambhav conducted several meetings. These meetings were with local people, forest officers and headmasters of the local schools to promote their project of ecological farming and to take suggestions. The people who participated in these meetings thought it was impossible to bring back cultivation to that patch of land with natural methods, even naming the project *asambhav*, a word in the local Odiya language that means

impossible. It was in response to this that the organisation was registered on 8th March, 1989 using as its name the word *sambhav*, which means possible.

Sambhav focuses on issues like seed conservation, ecological agriculture and biodiversity. Its adherence to the practice of ecological farming demands support for the conservation of landrace seeds. It is through this ecological agriculture that the cultivation of landrace varieties is ensured. Thus, the motive of conservation as in this case may be linked to the establishment of organisational seed banks as a means to maintaining and developing agrobiodiversity and ecological restoration. Sambhav now has more than four hundred varieties of rice conserved, along with three hundred varieties of pigeon peas and many varieties of vegetables. In the cases of both LSP and Sambhav, ecological factors were originally and, I found, continue to be one of the major factors for conserving seeds through in situ seed banks.

4.7 The struggle to transform seeds from a public good into seeds of social transformation

The cultivation of HYVs in Odisha accounts for more than seventy percent of the total rice cultivation in the state (Das, 2012) as a result of which, finding landrace varieties for cultivation also became a challenge for both LSP and Sambhav. During 1994 and '95, the founder of LSP could find only four to five traditional varieties conserved by farmers, who did this because of their love for the varieties. For Sarangi, challenging the institutional practices of using HYVs was the main concern, and initially he just started by collecting and sharing landrace varieties with interested farmers. Over time, however, he was able to appoint some people to collect landrace varieties from different villages and different states through informal networks, which later was to become the main LSP strategy. Thus, the disconnection caused by institutional practices of using HYVs motivated the practice of collecting and conserving landrace varieties by LSP.

Sambhav, from the first, collected seeds for storage at the organisation's seed bank. Seeds were collected from all over India, in order to bring more and more seeds to the organisation and ultimately to the farmers. The members of Sambhav initially collected seeds from wherever they could, which is still a practice now. For example, if they visit a seed fair in a nearby village or district, they make it a point to collect some local varieties, and they request individuals or organisations visiting Sambhav to come with their own, local seed varieties. This is how Sambhav started collecting varieties of seeds ultimately to challenge the use of HYVs. Thus, a fluid, informal network served as an important means of collecting and sharing varieties,

in contrast to the marketing of the public seeds, HYVs, developed through public institutions with international collaboration.

It should be noted that the HYVs in India are public goods insofar as they are developed by public research institutes (formal networks) and through public funding (from state), with no private company interference. However, the HYVs are not considered for cultivation by the two NGOs, rather in both cases, the NGOs saw the spread of HYVs as a major reason for a decreasing diversity of crops. For them, the research institutes develop few varieties and using these varieties creates uniformity. This idea was also shared by the farmers who attended the organic farmers' workshop on 27th March, 2013, held by Nirman (an 'Initiative for Sustainable Development'), at the Institute of Management & Advance Global Excellence (IMAGE), in Bhubaneswar, Odisha.[58]

According to the farmers interviewed at this workshop, India as a country possesses many different varieties of rice, which are suitable for (adapted to) different ecology (climate, soil, etc.) types and from which also specific foods have evolved. Certain varieties of rice and not others, for example, are best for *chuda* (flattened rice), *mudhi* (puffed rice), *usuna* (par boiled rice) and *arua* (basmati rice), which are themselves distinguished as preferred for different dishes. According to them, with the use of HYVs, this range of diversity is reduced as farmers drop the traditional practice of conserving seeds and lose the different landrace varieties. The farmers find that through a rejuvenation of the practice of cultivating landrace varieties, however, this range can be recovered and even extended within specific localities. The practice of conserving seeds becomes important again to maintain diversity, which, in turn, leads to further landrace cultivation. Here, I find the urge to reconnect resources (landrace seeds) with the farmers through conservation and sharing by the two NGOs as a tool to counter the metabolic rift created by the cultivation of the HYVs.

Thus, the objective of LSP and Sambhav in collecting different varieties to enrich their seed collections and protect biodiversity also leads to an act of repossession where the increase use of landrace varieties by farmers enable them to reclaim their control over the resources (seeds). Thereby, returning to the farming community's freedom that they have lost (and even extending them, through varieties that grow well in the specific area). The seeds conserved through the activities of LSP and Sambhav give access to farmers and come to serve as agents of change (social transformation). Sharing of conserved seeds in these cases become important factor for repossession since farmers challenge the industrial mode of production by conserving and cultivating the landrace varieties.

58 For details on Nirman and the IMAGE workshop, see http://www.nirmanodisha.org/index.php (accessed 12th September, 2015).

This transformative role cannot develop unless seeds are shared and the practice of conserving and cultivating the landrace varieties spreads across different regions. Here, the informal networks through which LSP and Sambhav share seeds form an important aspect in their activation as agents of social transformation. This reflects the need to share the conserved seeds to enable repossession, based on wider networks to which these NGOs' networks contribute (below). These grassroot organisations play an important role in strengthening informal networks and exchanges among farmers in a more general sense, which have always been crucial for farmers all over the world (Almekinders et al., 1994; Chambers and Brush, 2010; Coomes, 2010; Pautasso et al., 2013). Again, this involves a virtuous circle: the manifestation of in situ seed banks results in a strengthening of the informal seed networks upon which they also depend leading to the commonisation of seeds.

Summarising, the struggle of the two NGOs to challenge the use of HYVs and biodiversity loss has been and continues to be characterised by i) finding materials (landrace seeds), ii) organising to conserve these varieties, and iii) extending the network of seed conservation through sharing with other stakeholders. Through this struggle, seeds are reclaimed from the private and public spheres for sharing, and thus they become agents of social change and for commonisation.

4.8 Women, indigenous knowledge and repossession

In various societies, women have traditionally been associated with seed saving and conserving activities (see Christinck, 2002; Oakley and Momsen, 2007; Shiva, 1988; Zimmerer, 2003). Both LSP and Sambhav take this into consideration and employ women farmers from the villages where the organisations are situated to evaluate and select seeds for conservation at their seed banks. LSP hires women to clean and select seeds to be saved (generally surplus seeds after harvest) in the belief of its members that women in particular are the carriers of indigenous knowledge, of the traditional wisdom of native agriculture and its practices. The case with Sambhav is similar, where members conserve, maintain and cultivate the seeds every year employing women farmers to select the seeds based on their traditional knowledge. These women employ longstanding techniques, such as winnowing to select '*good seeds'* and determining viability by the shape and size of seeds.[59] Thus, local cultural practice becomes embedded in the evaluation of seeds contributing to the collections in the two organisational seed banks. These practices help in reconnecting resources with indigenous knowledge and farmers. Thus, these NGOs further link the indigenous knowledge associated with the landrace varieties through

59 Good seeds' term was used to address the selected seed to be conserved by the respondents.

the practices of conserving seeds by women. Hence, the importance of including women and traditional knowledge in the conservation of landrace varieties as seen by the two NGOs forms an important part of the repossession process. This, in turn, recovers the social relations that women have had with seeds and in farming society more broadly that tends to become lost when farmers cultivate crops using HYVs where relations are established by the scientists and plant breeders (see Chapter 2).

4.9 Conserved seeds, their utilisation and implications for repossession

Conserved seeds from both the organisations are shared with other farmers interested in cultivating the landrace varieties, thus extending, through the landrace varieties, the struggle against the industrialisation of agriculture. Hundreds of farmers each year come from different places in India to get seeds from LSP, and Sarangi trains them in 'organic farming techniques, allowing the whole process to be sustainable and expanded across India'.[60] Although farmers were initially asked to return double the amount of seed they borrowed, this did not work, as farmers from different villages who took seeds did not come back to restock the supply. Thus, LSP now asks farmers to pay money for the seeds. At ten to twenty Indian rupees per packet of seeds, the amount fixed for the varieties is still low compared to the cost of buying HYVs, especially along with required fertilisers and pesticides.

The income LSP gains from selling its seeds helps to maintain the in situ seed banks and also to ensure that farmers develop a sense of cultivating and saving the variety for next season. Indeed, the people who buy seeds replenish them, harvesting and storing their own stock for the next season as per traditional practice. This is also cost effective as against the situation with HYVs, which needs frequent seed purchase for better cultivation. The training and other technology needed for cultivation and better management of the landrace varieties is provided by LSP, free of cost making this system less expensive. In addition to this, LSP has partnered with Living Farms, another NGO working in the backward districts of Odisha. Living Farms collects seed from LSP and distributes it in several of the poorer districts in the state (Kalahandi, Bolangir, Ganjam, Bargarh, Kalinganagar, etc.). As a result, seeds conserved at LSP do not remain inside the seed bank but travel across the state to be shared among disadvantaged communities. This sharing creates alternatives to buying seeds from external sources and becomes a strategy for impoverished communities also to overcome their dependence on HYVs.[61]

60 See Global Green Grants website http://www.greengrants.org/2011/11/02/a-retired-teacher-seeds-organic-farming-in-india/ (accessed 23rd August, 2015).

61 Demeulenaere (2014) explains a similar social transition in her analysis of the French farmers' movement emphasising peasant seeds.

Sambhav follows the double-return system for replenishing its seeds in the seed bank. Along with this, Sambhav encourages farmers and organisations that come to borrow seeds to bring some of their own, local landrace varieties, thereby developing a parallel exchange (barter) system. Sambhav objective of conserving seeds as part of ecological conservation and restoration leads members to believe that the more varieties are conserved and shared, the more sustainable nature becomes. In addition to this, Sambhav imparts training to individuals or groups who are interested in organic farming and disseminates the indigenous knowledge and practices associated with organic farming, such as the use of organic manure of earthworms (veri-compost). Sambhav also participates in programmes organised by the Odisha state authority to motivate youths to take up and become self-sufficient in/through organic farming.[62] This practice of transmitting knowledge through training also widens the network within and across the state. Here, Sambhav is defending its goal of conservation resisting the cropping system inculcated by the HYVs through its networks. Like LSP, it is also developing a space of commons.

Combining Bourdieu's (1985, 1989) notion of social space with the notion of Aistara's (2011:494) '*new culture of relatedness*' I use the concept of a space of commons. Space of commons refers to a space in which the marginalised but empowered community encounters and negotiates a common lived experience. This space of commons becomes a platform for defending the common goals and negotiating subjectivity with others located outside this space.[63] Following Gaventa (2006: 26), space here may be regarded in terms of '*opportunities, moments and channels where citizens can act to potentially affect policies, discourses, decisions and relationships that affects their lives and interests*'. In both the cases here, farmers adopting the landrace varieties and applying organic farming collectively resist the use of HYVs. These practices ultimately challenge the industrial mode of production defending their autonomy and freedom in matters related to seeds. In doing so, they create informal seed networks that are based on a common goal of repossession and conservation of agrobiodiversity. The space of commons here based on common goals creates opportunities through which individuals or communities collectively act to redefine relations that affect their lives or interests. Thus, I conclude, while the practices followed by LSP evolved as a reaction to technological determinism and by Sambhav as a form of ecological conservation, the system they both developed, of managing resources by establishing in situ seed banks and sharing knowledge, contributes to the widening of the organic network. These practices lead to repossession of the resources by a larger community of farmers. Both of these projects are thus developing spaces of commons through their practices.

62 See The New Indian Express e-paper http://www.newindianexpress.com/education/edex/article554116.ece (accessed 20th September, 2015).

63 For detail description of the concept of space of commons, see the third chapter in this thesis.

4.10 Comparative study: OSSI and OSSS

In the following sections, I discuss repossession of seeds through open source systems using the Open Source Seeds Initiative (OSSI) and Open Source Seed System (OSSS). I compare the two in situ seed banks from the perspectives of first direct and indirect approaches, and then, as commons.

4.10.1 OSSI and the repossession of seeds: Direct vs. indirect approaches

For the USA based OSSI, the repossession of seeds is achieved by denying corporate dominance created by intellectual property laws. In contrast to the closed system of IPRs, OSSI seeds remain in the protected commons for further use. Thus, repossession for OSSI challenges restrictive institutional arrangements, such as that of the IPRs. In the Indian context the impact of IPRs in agriculture is at an initial stage (Ramanna and Smale, 2004). Moreover, India is primarily an agrarian economy, where the public sector is robust; the seeds of different varieties have mostly remained in the public domain, within the public research institutes (such as CRRI). This makes the Indian agricultural scenario very different from that of the USA. However, as Kloppenburg (2014) recognises, the structure of open source initiatives as productive under certain political and economic contexts does enable sufficient similarities to be identified for instructive comparisons to be made.

Referring to the practices of the two NGOs studied here, I find a different understanding of repossession in the case of OSSI. With the introduction of open source into seed management, seeds tend to be seen as a protected resource under the state law, whereas the two NGOs still regard seeds as common property to be shared and used with communities having rights over the resource. OSSI uses laws and gaps in the current IPRs system to approach its goal indirectly, working through legal right by using a licencing system that broadens the horizon of access and sharing, like that of Open Source Software (OSS). The NGOs, however, employ the more direct mechanisms of an informal seed sharing system through networking and focus on changing agricultural production, without giving much consideration to legal mechanisms. While the reach of OSSI or the target groups is still not fully established, it does function in a way that caters to the needs of farmers as well as plant breeders. However, seed industries can also be a potential user, which again introduces the possibility of monopoly, in terms of collecting royalties. The two NGOs, on the contrary, function through informal networks catering directly to the needs of farmers and exchanging materials based on the principle of double-the-amount or for a relatively small payment. OSSI is primarily motivated to employ mechanisms to use plant material mostly for the goal of breeding, which, again, is quite different from the goal of the two NGOs of maintaining diversity.

Thus, it appears that both OSSI and the NGOs understand access and freedom as two pillars for seed repossession but their approach to achieve this is very different. Nevertheless, in its approach to repossession, OSSI creates networks of individuals and organisations. These networks defend their autonomy in breeding processes; adhere to the common goal of denying monopoly of private companies through IPRs in agriculture. Thus, I observe similar promotion of a space of commons by the OSSI where individuals and communities form networks through open source mechanisms. These networks help them in negotiating their subjectivities with others placed outside this space notably companies and industries that adhere to IPRs systems as opposed to the open source mechanisms. In India, the introduction of new technologies like genetic modification is regarded as a potential threat to the freedom and autonomy of farmers (Shiva, 1991; Shiva et al., 2000; Shiva and Jafri 2003; Visvanathan and Parmar, 2002). Initiatives like OSSI that adhere to no restriction on derivative use of the resource under the protected commons and its application in agriculture which also includes genetic modification (Kloppenburg, 2014) might be seen as contradictory to the goals of grassroots organisations. Indeed, the Indian (OFAI) OSSS initiative is aligned with open source principles that indicate a different perspective on the repossession of seeds which is discussed in the nest section.

4.10.2 OSSS and commons

On August 30-31st, 2014, OFAI organised a workshop aimed at finding ways to dismantle the industrial monopoly of seeds through the introduction and development of an Open Source Seed System in India.[64] The documents uploaded onto the OFAI website show an inclination towards the implementation of open source in India following the ideas of Kloppenburg (2010) and Michaels (1999), as indicated below.[65] The development of OSSS may be regarded as arising out of this. OSSS is still at an early stage, with the Centre for Sustainable Agriculture (CSA) in Secunderabad, Andhra Pradesh, currently anchoring the project.[66] This initiative is a reaction to the introduction of IPRs, particularly addressing the drawbacks of the Indian Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act and Biological Diversity Act (BDA), as explained, for example, by the 2014 CSA report on *Building Open Source Seed Systems.*[67] According to this report, the provisions of the PPV&FR Act in respect

64 For details, see official website of OFAI http://ofai.org/2014/08/invitation-for-open-source-seed-system-workshop/ (accessed 10th August, 2015).

65 See *Apna Beej Open Source Seed Network*, at http://ofai.org/2014/08/invitation-for-open-source-seed-system-workshop/ (accessed 15th August, 2015).

66 CSA is a professional resource organisation, registered as a trust in 2004. See http://csa-india.org/who-we-are/ (accessed 15th August, 2015).

67 See http://csa-india.org/wp-content/uploads/2014/11/141029-OSSN-report1.pdf (accessed 20th August, 2015).

to IPRs provide only residual rights to the farmers, concentrating the major rights on breeders and researchers. OSSS aims to address this by broadening the privileges of the farmers.

Various NGOs working on the conservation of PGRs through in situ seed banks felt the need to develop an alternative institutional framework for farmers that will combat the negative effects of the existing legislation. Thus, the OFAI conception of OSSS included the formation of a common pool, based on open source principles, through the use of a General Public License for Plant Germplasm (GPLPG), as advocated by Michaels (1999). The OSSS does not develop a license of its own but rather relies on the GPLPG or General Public License (GPL) for sharing of and access to seeds. According to the CSA report, the GPL does not require new legal institutions to operate as it works through the Material Transfer Agreement (MTA), which is well established.[68] OSSI, by contrast, is based on the principle of open source with a royalty bearing licence, which is developed under OSSI (Kloppenburg 2014). These differences in the choices of OSSI and OSSS can be seen as a reflection of their socio-political positioning.

Importantly, the OSSS aims at developing a Value for Cultivation and Use (VCU) data of seeds in OSSI. From the documents of OFAI, it is evident that VCU data are compiled by the farmers themselves delineating the plant characteristics, value for cultivation (under specific agro-climatic conditions) and value for use (food, fodder, cultural, commercial, medicinal, etc.). In fact, the farmers have documented data related to varieties of paddy, cotton, chilly, millets, pulses, wheat, vegetables and maize. Thus, OSSS also connects the varieties with farmers and their knowledge further providing data to the farmers that can help them in deciding which variety to choose for cultivation and breeding purposes.

For the implementation of OSSS in India, the CSA report advocated the development of open source principles through a seed network called the Open Source Seed Network (OSSN). This network comprises four teams functioning to maintain different aspects for the implementation of OSSS in India. These teams focus on (one of) the conservation and revival of seeds, generation of VCU, participatory plant breeding/ farmers varieties or seed multiplication and distribution. It should also be noted that OSSS visualises the public sector as one potential partner along with farmers for open source plant breeding. OSSS advocates for participatory varietal development together with the public sector to enrich the breeding process.

The idea for OSSN is to form the basis for coordinating efforts of various NGOs and public sectors at national level. It acts as a nodal agency for defending shared

68 See the CSA document on "Building the Open Source Seed System" available on its official website http://csa-india.org/wp-content/uploads/2014/11/Open_Source_Seed_Systems_1.0.pdf (accessed 10th September, 2015).

goals and negotiating with others to broaden sharing and access to resources based on commons principles (open source) rather than restrictive principles (IPRs). Here, therefore, the creation of a space of commons where individuals and groups negotiate and defend their common lived experience is visible. Through OSSN, the participating NGOs defend their autonomy from restrictive IPRs by creating a platform for their freedom in matters related to the management and use of seeds. Individuals and groups sharing this space are thus related through a '*new culture of relatedness'*, in which farmers are related not on the basis of kinship or biology but '*through the common management of other biological species – the plants and their seeds*' (Aistara 2011: 494). It is also interesting to see that the OSSN plans to bring in the public plant breeding sector into the network, finding parallels between the motive of state agencies and OSSN for plant breeding in respect of developing varieties without restrictive rights.

A fundamental difference between the OSSS and OSSI approaches is that the Indian open source system looks at the farming community as an important creator and facilitator, whereas plant breeders form the core aspect of the American initiative. Thus, community managed seed banks are seen by OSSS as prospective structures for an effective use of this open source mechanism.[69] In fact, LSP founder Natabar Sarangi is regarded as one of the prospective individuals that would be working for the conservation and revival of seeds under the OSSN.[70] The emphasis on grassroots involvement here is similar to that of the two NGOs in weakening the private-public control of seeds by focusing on local level stakeholders. Indeed, one may see the OSSS as modifying the OSSI framework through its incorporation of the grassroots network model. This model prioritises farmers and farming communities in developing open source systems on their own terms and its functioning as commons. Further analysis and reflection about these articulations await realisation through concrete examples in the implementation of OSSS.

4.11 Conclusion

Different practices of repossession have been analysed in this chapter, with two in situ seed bank initiatives (LSP and Sambhav) in India, an open source approach (OSSI) developed in the USA and its rather different instantiation (OSSS) in India. The two in situ seed banks in Odisha aimed at bridging the metabolic rift between nature and society created by industrial agriculture reducing the monopoly of public

69 See 'Building Open Source Systems', at http://csa-india.org/wp-content/uploads/2014/11/141029-OSSN-report.pdf (accessed 10th September, 2015).

70 For the complete list of individuals and organisations involved in OSSN, see http://csa-india.org/wp-content/uploads/2014/11/Open_Source_Seed_Systems_1.0.pdf (accessed 18th September, 2015).

extension services and of chemical fertilisers and pesticide companies. This was done by increasing local farmers' access to seeds (resources). This increased access was ensured through the grassroots structuring of collective activity by farmer groups for the organisational management of in situ seed banks. Therefore, these initiatives bridged the metabolic rift by bringing back seeds into the domain of the commons by resorting to collective activity through local community. Whereas the OSSI reclaimed seeds from the domain of appropriation and monopoly (through enclosure or restrictive rights) into the domain of sharing through collective practices based on open source principles. Thus, all the practices analysed employed commons as a means to encounter monopoly and the appropriation of resources (seeds).

The various practices developed in different socio-political context. The LSP initiative developed as a reaction to the scientific-technological developments inscribed in the HYVs, while Sambhav focussed on developing strategies to restore agrobiodiversity in its locality. Here, both the cases reflected alternative strategies to rebuild local self-sufficiency in matters related to seeds and bring more autonomy to the farming communities by building in situ seed banks. LSP focuses on just rice landraces, while Sambhav works with a wider range of varieties. These two NGOs both conserve and share seeds, but the crops conserved in the seed banks reflect different individual and organisation preferences. LSP conserves only rice varieties since the founder was particularly interested in cultivating landrace varieties of rice on his fields, while Sambhav conserves different crop varieties in its seed bank as the organisational aim is to maintain agrobiodiversity, which requires the conservation of different crop varieties. Thus, the social and agro-ecological contexts play an important role in what is being repossessed and commonised.

It was found that the practices of collecting different varieties by both LSP and Sambhav led to the use of landrace varieties, which in turn increased farmer's freedom and control over resources (seeds). This practice directly targets seed repossession, in the sense of freedom and autonomy in the production process through sharing based on the assumption that seeds are a part of the common heritage. In contrast, to the approach of the two NGOs, the approaches of open source aiming to bring seeds into the domain of commons using property relations operates indirectly. These efforts can increase sharing among breeders and farmers, but in the form of a formal network (property relations, such as of rights and duties) based on legal procedures rather than on the basis of informal network (with social relations of exchange and double-return). Repossession in the cases of open source means bringing resources back under a protective shield and the freedom to operate under a legal ambit, which is again susceptible to any changes in legal procedures and scenarios at a broader level.

All the practices considered here focus on the repossession of seeds by bringing them into the domain of commons. The changes in mode of production in the two NGOs also leads to reconnecting of resources with indigenous knowledge, which forms part of the repossession process and informs the functioning of the seed banks. For example, the two NGOs use the traditional knowledge of women farmers to select the seeds to be conserved, thereby providing a means to include local cultural practices in the functioning of the organisational seed banks. This was manifested also in the OSSS approach insofar as it was constructed from farmers' inputs. For the USA based OSSI functioning, however, indigenous knowledge does not play an important role; rather, knowledge about the criteria required for registering varieties and awareness of legal procedures, like IPRs, is relevant. In this case, therefore, repossession requires specialised legal training and knowledge.

However, all the initiatives acknowledge that access to the desired varieties form an important aspect of sustaining freedom and agrobiodiversity, which promotes repossession. The efforts of the two NGOs are aimed at sharing the conserved resources (seeds) along with information about organic farming with other communities and organisations. This results in a flow of resources as well as information broadening the perspectives of metabolic fit. The open source initiative of OSSI facilitates sharing through legal means under royalty bearing license as a means of reward for the individual/community who shares the resource under open source. These royalty-bearing licenses are closely related to the forms of IPRs. Thus, if initiatives like OSSS follow the mechanisms of OSSI, then it is possible that they will transform the role of informal networks among communities and sharing will become based on formal networks introducing the institutional practices into the grassroots organisations. However, the current OSSS practices involve the farming community in data compilation, seed saving and regeneration. For OSSS, like LSP and Sambhav, the decoding of genetic traits is not given importance; rather, priority is given to traits essential from the point of view of farmers.

Differences were also observed in the understanding of the commonisation of seeds (resources). The two NGOs on one hand, regard seed as a part of nature to be conserved and restored for maintaining the ecological cycle and thus creating metabolic value in terms of ecological benefit (maintaining soil fertility, providing sustainable agriculture, etc.) and thereby furthering the process of commonisation. For OSSI, on the other hand, the process of commonisation is furthered through legal mechanisms forming an important aspect of repossession in terms of gaining freedom from monopoly. Here, the two NGOs, LSP and Sambhav, visualises seeds as common property to be shared and used by farmers, for an easy access to resources wherein farmers are the direct beneficiaries. For OSSI, creating commons through open access under a royalty-bearing licence system prioritises plant breeders

over farmers. Thus, the study concludes that different practices understand the commonisation of resources differently and in respect of different stakeholders.

Implementing open access through OSSI creates a need to develop a formal network for the sharing of commons, while sharing through informal seed networks structures the two NGOs practices. It was found that the informal networks provide flexibility in terms of managing the resources. For example, sharing and access to the conserved seeds at the NGOs is managed by rules-in-use determined by the organisations themselves. This provides opportunities for the organisations to function according to their understanding of the situation, where rules may also be bent to accommodate exceptions for more possibilities of repossession. The open source initiatives work on rules crafted through legal procedure which are universal and thus might not consider exceptional cases and situations affecting repossession in a different way at grassroots levels. It has been noted that the OSSS in India taking the legal route of open source might become a party to this universalism, which may have effects on the way it functions. Thus far, however, OSSS has given priority to the farmers, who form an important part of the system.

Finally, and despite the differences in their strategies, the NGOs and open source initiatives investigated in this chapter all aim to bring seeds into the domain of commons. Nevertheless, LSP, Sambhav and OSSN go beyond this in creating a space of commons through networks that can become important facilitators for developing strategies for a commonisation of seeds in India. Further research should focus on the power relations within the NGOs and how OSSS can create protected commons useful for repossession of seeds in India and similar situations elsewhere.

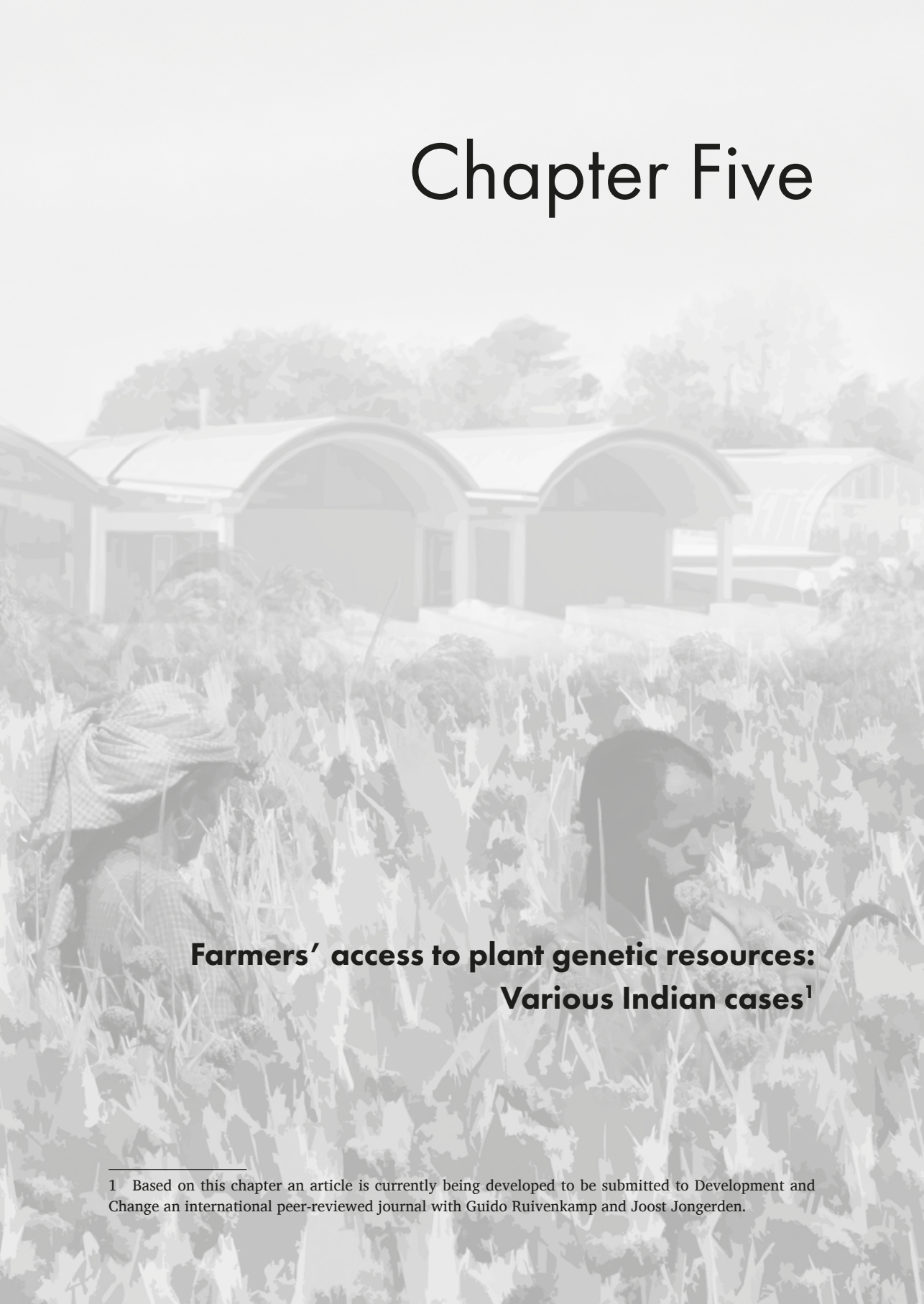
Appendix-3.1

Sample of seeds displayed at Sambhav and the oath during Women's Day celebration (March, 2013) [Picture from the field by the researcher]

Appendix-3.2

Seeds saved at Loka Samabaya Pratisthan's founder's house wrapped in newspaper (April, 2013) [Picture from the field by the researcher]

Chapter Five



Farmers' access to plant genetic resources: Various Indian cases[1]

1 Based on this chapter an article is currently being developed to be submitted to Development and Change an international peer-reviewed journal with Guido Ruivenkamp and Joost Jongerden.

5.1 Introduction

The limitations on the use of plant genetic resources (PGRs) and the difficulties stakeholders face in accessing them have been the concern of many scholars since the introduction of intellectual property rights (IPRs) (Esquinas-Alcazar, 2005; Ramanna and Smale, 2004; Shiva, 2001; Kloppenburg, 2010).[71] There has consequently been an intensive debate on the issue of access to PGRs, framed through the investigation both of opportunities within the framework of the intellectual property rights and of the ability of farmers to create their own forms of accessibility (Deibel 2013, 2014; Kloppenburg, 2010, 2014; Nightingale, 2011; Satheesh, 2000; Shrestha et al., 2005). In this chapter, access to PGRs is analysed using an ability rather than rights perspective in an investigation of how farmers in India organise their access to conserved landraces in the context of two very different conservation practices, ex situ and in situ. Taking this ability perspective, I focus on the social mechanisms through which small and marginal farmers gain access to the conserved landraces. Alongside this analysis of farmer competencies to gain access to the PGRs, this study also analyses the various socio-political and cultural relations that facilitate or inhibit the farmers in realising PGRs accessibility.

This analysis aims to develop insights in the ways PGRs are accessed by small and marginal farmers and how access to PGRs can be made more accessible. In this chapter, I argue that access to resources through informal seed networks leads to continuous interaction between the resources and the stakeholders, which strengthens the biosocial[72] relations providing both biological and social benefits to the stakeholders. This argument line is constructed in this chapter. First, an explanation is provided for choosing the ability and not the rights perspective within the access theories. It is argued that the rights perspective limits a critical reflection on the possibilities for enhancing accessibility to the PGRs on three different grounds. Then, having exposed the limitations of the rights perspective, the chapter continues with a presentation of the main characteristics of the ability perspective, describing the ways in which this is distinguished from the rights perspective and elaborating the core aspects of the ability perspective.

Next, there follows a description of the research methodology used in the analysis

71 By PGRs, I mean 'all materials that are available for improvement of a cultivated plant species. The entire gamut of plant material, of current as well as potential use in breeding of a crop, thus qualifies as plant genetic resources' (Bains et al., 2012: 52-53).

72 I draw on van Dooren (2009: 375) definition of biosocial in an agricultural context, as 'the way in which humans are inextricably entangled with various non-humans in both the cultivation of crops and the making of agricultural socialities, knowledges and practices'. Thus, biosocial in this chapter refers to interactions between the human (social) and non-human (ecological, biological, and cultural) through different processes that create different social relations.

of the different mechanisms and biosocial relations for the collective management of landrace varieties as biosocial commons. Two different types of analysis are employed here:

(i) a historiographic analysis of the implementation of intellectual property rights in the domain of PGRs, describing the abilities of farmers, Non-Governmental Organisations (NGOs) and lobbying groups to react against global juridical IPRs pressures and preserve a juridical space for farmers' and communities' plant variety rights, which is followed by;
(ii) an analysis of four concrete case studies describing farmers' abilities to create different mechanisms and biosocial relations for preserving plant varieties as biosocial commons

The chapter concludes with a comparison of the various mechanisms presented in the in situ and the ex situ conservation banks to reflect on possibilities to enhance accessibility of farmers to landrace varieties.

5.2 Going beyond the rights perspective

The debates on access to PGRs carried out within the rights perspective focus on how resources are governed by laws and how various politico-legal institutions regulate access to PGRs.[73] This access assumes the existence of property rights through which the use of a resource is controlled; it neglects other, socio-cultural factors that also affect different stakeholders' access to resources. Such a focus limits a critical reflection on the possibilities for enhancing accessibility to the PGRs on the following grounds.

First, the rights perspective restricts one's understanding of the various webs of social relations that exist alongside the property relations, even as these influence the actual access to PGRs. Supporting this claim scholars like Ribot and Peluso (2003) suggest that social relations which are constructed around the positions of different stakeholders in respect of conserved resources may, in turn, affect the appropriation, management and use of these resources by the stakeholders. For example, Nightingale (2011), in her study of a Scottish fishing community, found that in-shore fishing had legal enforceable institutional rules of access to and management of the fishing grounds. However, in-shore fishing was also regulated by the fishing community itself, through community obligation, identity patterns and associated identities. In particular, it was observed that individuals who

73 By rights perspective, I mean the overall structure that establishes the relations of stakeholders with resources through legal rights sanctioned by the state or through international conventions or treaties.

deviated from the established norms were not allowed to continue their access. Thus, situations exist in which the accessibility of a resource is shaped by the social relations that various stakeholders have with the resources and other community members and which go beyond the concrete construction of property relations.[74]

Second, the rights perspective neglects the informal social ties, such as relations built through community membership, which also determine access when resources are held in common. For example, Blaikie (1985) gives importance to political economic relations affecting the use of land between land users, their communities and policy makers. According to him, access and use of the land in this case was determined through informal ties rather than property relations. Similarly, McCay and Acheson (1987) provide an in-depth review analysis of various studies of commons that establishes how the behaviour and ideology of individuals determine access and resource use. These informal social ties are not acknowledged in the rights perspective, in which the formal relationships established through property relations are given exclusive attention.

Third, the resistance movements initiated by the communities to protect their common resources against private and/or public enclosures are also neglected by the rights perspective. For example, hardly any attention within the rights perspective based debates is afforded to the work of scholars studying the resistance of communities to protect common resources like forestry, fisheries and land against enclosure by private or public agencies. The work of scholars like Blaikie (1985), Guha (1989), Peluso (1992) and Schmink and Wood (1987) reflecting on the resistance of communities in protecting common resources provides another perspective to enclosures and access, but these aspects are not reflected in the rights perspective. Indeed, the rights perspective in general focuses on how resources are governed by laws sanctioned and administered through the state and neglects the efforts and histories of different, local stakeholders to self-organise access to resources, such as through collective management.

In addition to this, the rights perspective employs assessments of benefits that are based exclusively on the differential rights conferred on different stakeholders. These benefits are calculated in terms of economic benefits. The idea of benefits here thus becomes merely the value that a resource has for its stakeholder as determined by property relations and the position of the stakeholder in relation to that property. Again, this limits understanding here, of other types of benefit (social, ideological and cultural) that a stakeholder may gain from access to resources.

Rather than the rights perspective, therefore, in this chapter I analyse access to

74 For a detailed discussion, see Ribot JC and Peluso NL. (2003); also below. A theory of access. *Rural Sociology* 68: 153-181. We also describe this point in the following section in detail.

PGRs using an ability perspective. An access theory based on ability perspective goes beyond the restricted perception of formal rights. It differentiates accessibility to PGRs from property claims and acknowledges that some stakeholders might even violate ownership to benefit from a resource that is not only unjustified but also unjustifiable under the rights perspective. As Sikor and Lund (2009: 6) explain,

> '*Property relations may reflect the influence of a set of laws and norms lending legitimacy to claims on resources. Access, in turn, may be constituted by a different set of processes conditioned by a broader range of social institutions. As a result, property and access may be distributed among social actors in different ways*'.

Thus, analysing access to PGRs through an ability perspective implies that one goes beyond the politico-legal institutions that regulate access to the resources. Taking this perspective I will introduce an analysis of social relations and institutions as facilitating or inhibiting the abilities of stakeholders to access resources. Working within such an ability oriented conceptual framework, this chapter thus highlights collective arrangements through which resources are managed beyond the purview of politico-legal institution.

5.3 The access framework based on ability perspective and access to landrace varieties (PGRs)

The empirical focus of the access framework based on ability perspective is on exploring the social relations among various stakeholders using resources collectively and on understanding who, when and in which ways these stakeholders benefit from the resources. The benefits are not just economic benefits, as emphasised by the rights perspective, but also socio-cultural and ecological. This study aims to develop insights into the abilities of small and marginal farmers to enhance their access to landraces (the PGRs) conserved under different institutional settings (ex situ and in situ). To analyse access, argue Ribot and Peluso (2003), it is necessary to investigate the complex web of social relations that the individual community members establish and with which they engage in controlling and managing the resources (here, PGRs). The different social relations may enable certain individuals or communities to control access or to maintain access, while others might struggle to gain access or to establish access through various social mechanisms (see next section). Any study of the accessibility of PGRs, it may be argued, ought to study this distribution of power among the various community members. For example, if an individual or group is in a position to control the access of others to conserved resources then the individual or group is in a dominant position to those of the

others. Ribot and Peluso (2003) borrowed from Ghani (1995:2) the concept of a '*bundle of powers'* to investigate this distribution of power among community members so as to discern which members receive benefits from the accessibility to the resources and which do not. Apart from the power relations, it is also important to gain insights into the possibilities for enhancing farmers' abilities to use of the stored PGRs deriving both biological and social benefits. It is necessary to carry out a '*grounded analysis of who actually benefits from things and through what processes they are able to do so*', since this may provide insights for enhancing the abilities of stakeholders to achieve access to the resources and deriving benefits from them (Ribot and Peluso, 2003: 154).

In light of the above, the abilities of small and marginal farmers to enhance their abilities to access conserved PGRs in the form of seeds stored in three in situ and one ex situ focussing on the following three issues are investigated. First, the mechanisms through which the various stakeholders maintain and access the stored PGRs are investigated. Second, this investigation of social mechanisms is studied through the interactions between community members through the web of social relations and ultimately including their relations with the conserved PGRs. The study of this interaction, therefore, aims to establish the relevant human and non-human relations, or the biosocial relations. I draw here on van Dooren's (2009: 375) definition of biosocial in an agricultural context, as '*the way in which humans are inextricably entangled with various non-humans in both the cultivation of crops and the making of agricultural socialities, knowledges and practices*'. Thus, biosocial refers to interactions between the human (social) and non-human through different processes that create different social relations. This study on the biosocial relations in case of PGRs focusses on;

(i) who controls access to PGRs
(ii) how and through which social mechanisms access is gained
(iii)how access is maintained

In the following sections I elaborate further on how I have investigated the accessibility of stakeholders to PGRs through their abilities to apply and develop various mechanisms, biosocial relations and biosocial commons.

5.3.1 Various mechanisms (negotiation, social identity, and knowledge)

The ability perspective propagated by Ribot and Peluso (2003) emphasises the need to focus on those social mechanisms apart from the property relations created by different stakeholders to gain access to the resources that deliver benefits for them. This study focusses on how small and marginal farmer's access conserved resources

(landraces) through their abilities to negotiate, through their social identity and through their knowledge. By way of explanation, we may take the example of individuals who invest in social relations such as friendship with and developing trust among those individuals who control the resources. Investing in these social relations may facilitate them in negotiating their access to the resources. In case of farmers access to resources can be gained through their social identity or membership of a community or group. For example, farmers who share the same caste, ethnicity or religion with the individual or community controlling the resources might gain relevant opportunities to access resources based on a shared identity. In addition to these mechanisms, specialised knowledge or skills may also entitle individuals to the resource access. For example, individuals possessing particular expert scientific or indigenous knowledge or a desired skill-set might gain access to a resource and/or derive benefits that otherwise would not be possible.

However, these mechanisms may not be complete to guarantee access to PGRs given their complex nature, as containing both tangible and intangible components. Roa-Rodríguez and van Dooren (2008), for example, explained that the combined tangible and intangible nature of PGRs makes it difficult to bring them under one overarching property governance regime. Moreover and more pertinently to the present discussion these PGRs are not only complex resources but also impure public goods. Eyzaguirre and Dennis (2007) explain how PGRs provide not only public good benefits (maintain sustainability, increase resilience, maintain cultural food preference, etc.) but also private good benefits (farmers are benefited by cultivating varieties that enrich them and their individual collections, e.g. for further breeding purposes). These characteristics of PGRs mean that they can no longer be strictly categorised as only public resources. However, it is also due to this additional complexity that small and marginal farmers can employ their abilities to negotiate access to PGRs, which will be illustrated in the next section.

5.3.2 Establishing biosocial relations

Alongside an investigation of the access mechanisms, this study also investigates the complex web of relations related to small and marginal farmer's biosocial relations with the resources. The study will analyse how factors like culture, religion, indigenous practices and belief systems entangle with agricultural practices and their influence on PGRs accessibility. In studying these biosocial relations, the study highlights the sharing practices influenced by various socio-political and cultural relations in each of the four case studies analysed in this chapter.

5.3.3 The collective management of resources as biosocial commons

In addition to the investigation of biosocial relations, this study looks at the concept of biosocial commons. PGRs in this study are considered not as tangible or intangible goods rather as biosocial commons, as resources in which biological and social characteristics of the PGRs are intertwined and collectively shaped by farmers. PGRs function as biosocial commons when farmers are able to gain both the biological benefits (improving and sustaining life forms through genetic qualities) and social benefits (ecological balance, food supply, biodiversity and sustaining various cultural practices) by using PGRs in farming activities collectively. The collective arrangements of access through community seed banks (CSBs) to access PGRs as tangible (seeds) and intangible (maintaining agrobiodiversity through community practices) organised through informal seed networks would seem to constitute such a case where communities derive both the benefits (Khedkar, 1996; King et al., 2015; Ramprasad, 2007; Satheesh, 2000; Shrestha et al., 2013; Shrestha et al., 2006; Shrestha et al., 2005; Sthapit et al., 2012; Sthapit, 2012). Thus, in this study I analyse collective management of resources and their functioning to provide insights into PGRs as biosocial commons.

5.4 Research methodology

This study involves the application of two methods, one a historiography and the other a case study analysis. First, a historiography of IPRs in the case of PGRs in India is presented, taking into consideration the global scenario. By historiography I mean '*both a general term that encompasses a range of historical discourses and as a more specific term that refers to one particular collection of these*' (Gale, 2001: 384). Here, I use historical accounts to trace the trajectory of IPRs in case of PGRs and to explain the present scenario in the light of past events. For this, I have used various secondary sources, including documents, policy reports, media releases, published, unpublished data and relevant official websites.

Second, an empirical analysis is made of four selected conservation banks, three in situ and one ex situ. In studying the abilities of farmers to organise their access to PGRs, I have selected three cases where landrace variety seeds are managed collectively by different stakeholders through informal seed networks and NGOs. In addition to this, one case where seeds are managed institutionally through a public research institute employing legal rules is also analysed. Each case involves an active engagement in seed collection, conservation and exchange, but the selected cases differ in their practices of managing the resources (seeds). The comparison between the three NGOs and the public research institute manifests different perspectives of access to PGRs by the different stakeholders.

Several institutes and organisations across India were approached and the most willing and appropriate cases among them were selected. These cases have already been introduced and examined in the previous chapters (2-4); here I draw together the cases for a comparative study in terms of the perspectives listed (above). The first case, the Deccan Development Society (DDS) involves the collective practice of managing seeds through community seed banks (CSBs). The second and third cases, Loka Samabaya Pratisthana (LSP) and Sambhav, were selected due to their efforts to repossess PGRs. The fourth case, the Central Rice Research Institute (CRRI), is a public research institute that manages PGRs as public goods and functions particularly from within the rights perspective.

Both primary and secondary sources were used for data collection in these cases. I relied on published and unpublished documents, reports and official websites as secondary sources of data. Interview method, focus group discussions (FGDs), and participant observation serve as primary sources of data. In the first case, key informants (*sangham* heads and members) from the DDS were interviewed during the month of September, 2013, and five FGDs was carried out with the heads of different *sanghams* covering thirty-three villages. The second Non-Governmental Organisation (NGO), LSP, was visited during the month of April, 2013, and the third, Sambhav, during the month of March, 2013, at which times interviews were carried out with farmers associated with each NGO. Respondents were identified using snowball sampling. All the farmers associated with DDS, LSP and Sambhav were small and marginal farmers. The field work at CRRI was carried out in October-December, 2011 and in February, 2012. In-depth interviews were carried out with scientists from the crop improvement division. In addition to visits to CRRI, several farmers' meetings organised by CRRI and workshops on conservation organised by NGOs were attended. These meetings and workshops brought different farmers, scientists and NGOs from all over India who shared their views on the conservation of PGRs. This enriched the analysis and helped in cross-checking the data collected during the field visits.

5.5 Research results

As stated, the research methodology for this chapter contains two pillars, a historiographic and a case study analysis. The historiographic analysis of current legislative measures on PGRs in India and particularly the Protection of Plant Varieties & Farmers' Rights (PPV&FR) Act is carried out. The analysis aims to highlight the abilities of farmers and NGO groups to counteract the global pressures in introducing legislative changes that lead to a fixing of farmers rights in the Indian patent system. These abilities are described, explained and illustrated along with

insights into the possibilities for farmers' and NGOs to resist global pressures to implement legislative changes in PGRs accessibility. Parallel to this, the in situ seed bank cases illustrates on the abilities of small and marginal farmers to create a web of biosocial relations. This is reflected through the in situ conservation of the PGRs by DDS, LSP and Sambhav and the benefits derived from their practices of conserving and using the PGRs collectively. The ex situ conservation methods of CRRI are analysed in addition to provide insights into the institutionalised access arrangements of the genebank. The historiography and four case studies are thus all focussed on the abilities of small and marginal farmers to counteract/resist and to create and reorganise legislative measures and webs of (bio)social relations. The study of these struggles aims to deliver insights into the possibilities for small and marginal farmers to enhance their access to the landraces stored within these different institutional settings (in and ex situ).

5.5.1 Abilities to resist and to create juridical space of manoeuvre

Before the implementation of IPRs in the domain of PGRs, farmers' practices were characterised by the development and exchange of varieties with other fellow farmers without any legal binding (Srinivas, 2006). In principle, this enabled accessibility to the seeds of different varieties from all over the world. The situation changed with the introduction of IPRs, a global and globalising effort to enact legislative change establishing PGRs-related property rights. It started with the 1930 implementation in the USA of the Plant Patent Act. Through the Plant Patent Act, plants including asexually reproducing plants were covered under IPRs for the first time. This Act created new practices in agriculture, as a result of which exclusive rights were vested in individuals, institutions, organisations and groups for the management of PGRs in the USA. Exclusive rights eventually came to determine access to PGRs by different stakeholders in the USA. Introducing rights over PGRs was later taken up internationally further through the 1994 Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement, to which India as a World Trade Organisation (WTO) member was party.

The TRIPS Agreement reduced the sovereign powers of states over its patent laws as intellectual property legislation gained global characteristics (Garde, 2009). Thus, the introduction of property rights in the domain of PGRs in India did not come as an independent move but rather emerged as part of a process in the context of global power relations. Various social-economic factors and several interrelated incidents ensued that led to India's 2001 Protection of Plant Varieties & Farmers' Rights (PPV&FR) Act. Here, I present an overview of this development, focusing on the negotiating ability of farmers, NGOs and indigenous communities within politico-legal institutional framework.

The history of the PPV&FR Act can be traced back to the Indian Patent Act of 1970, which came under global pressure to be amended for compliance with TRIPS.[75] The Indian Government had drafted its first Plant Breeders' Rights (PBR) bill in 1993-94, based on International Union for the Protection of New Varieties of Plants (UPOV) farmers' and community rights as key elements in selling propagated varieties.[76] The 1961 UPOV framework essentially governed plants and brought PGRs under the domain of property regimes. It established international norms for the recognition of varieties (required to be novel, distinct, homogenous, stable) enabling intellectual claims that supported breeders' rights, although exempting the use of these for non-monetary benefits, such as subsistence farming. Notwithstanding the protective provision, Indian NGOs, farmers' lobbies and indigenous communities began to resist this extension of the property regime, which they saw as promoting Western interests and bio-piracy[77] (Ramanna and Smale, 2004; Shiva, 2000a).

Shiva (2001) described patenting through IPRs as a tool used for the re-colonisation of the Third World by the developed nations where not territory but knowledge became the object of conquest. Several farmers' movements in India opposing the IPRs in agriculture developed, including, notably, Karnataka Rajya Raitha Sangha (KRRS), in Karnataka. Assadi (2002) explained how the KRRS viewed the introduction of patenting in agriculture as a means of neo-colonisation by the Western World to control the Indian market and food system. These farmers' movements, among others, created pressure on the Indian government to reject the implementation of IPRs according to Western principles and to develop its own system of PGRs protection by granting differential rights to farmers, breeders and indigenous communities.

Against increasing international pressure to end the farmer's privilege embodied in the UPOV framework and to declare that farmers were not allowed to claim rights on varieties, NGOs and other pressure groups in India fought for the farmers' rights. A Plant Breeders Rights Bill in India drafted in 1996 and redrafted in 1997 was heavily criticised by the pressure groups for not providing adequate protection to the farmers' privilege and rights. As a result, in 1999, another draft was formulated and sent to various communities and stakeholders across the country for their opinion

75 The Patent Act of 1970 had been more aligned with the British system, with importance given, for example, to processing patents in domestic pharmaceutical industries, but for a limited span of five years (earlier fourteen years); product patentability was ceased to create a space for Indian pharmaceutical companies, but plants were not covered under this Act. See Ragavan (2006).

76 The 1961 UPOV framework established international norms for variety intellectual rights claims that supported breeders but exempted use for non-monetary benefits, e.g. subsistence farming.

77 Bio-piracy refers to creating products and patents using traditional knowledge or resources from Third World countries considering this knowledge and resources as common heritage, but when the product is developed it are considered as private invention of the developed world.

(Ramanna and Smale, 2004). In the end, the internal resistance by the pressure groups forced the Indian Government to develop the PPV&FR, which became an Act of Parliament in 2001. The current PPV&FR Act is thus the result of all the historical and collective efforts by the NGOs, farmers' groups and indigenous communities pushing back against the global force of the extension of property rights to PGRs.[78]

IPRs operate for the immediate interests of breeders, which, in the contemporary context, primarily mean transnational corporations enabled by liberalising trade agreements (Shiva 2000a, 2001, 2005a). In India, the success of the various pressure groups in developing a counter pressure related to the social relevance of non-industrialised farming styles in the country prevented a complete removal of the farmers' rights, as was originally envisaged. If we look at the history of the PPV&FR Act, then the final version can be seen as the result of the lobbying by different pressure groups to create a space for manoeuvre by recasting the legislation formulated by international agencies.[79]

Further to this negotiating ability of NGOs, farmers' groups and indigenous communities to reformulate legislative changes to the Indian patent system, another counter mechanism to the politico-legal institutionalisation of resource access that developed was known as the open source model. Following Srinivas (2006), open source model here refers to principles where the source code of resource is open, made common, basically free and restricting users from enclosing the resource-use through IPRs. In order to combat the exclusion created by IPRs in the case of PGRs, various scholars suggested the creation of commons through open source models as another mechanism granting access to different stakeholders (see Deibel 2013, 2014; Srinivas, 2006; Kloppenburg, 2010, 2014).

Open source as an alternative to enclosure rests on the premise of inclusive rights, where rights are framed in a way as to create possibilities for the inclusion of stakeholders (through structures facilitating commons) rather than exclusive rights that IPRs create. Here, the benefits that stakeholders derive come through access to PGRs. One example of the open source models currently prevalent in PGRs is the Open Source Seed Initiative (OSSI) in the USA, introduced in Chapter 4 (see Kloppenburg 2014). The OSSI initiative revised institutional arrangements to create access mechanisms using authority linked with legitimacy. Here, legitimacy of

78 For a detail discussion on the evolution of the PPV&FR Act, see Ramanna A and Smale M. (2004) Rights and access to plant genetic resources under India's new law. *Development Policy Review* 22: 423-442.

79 There was lot of resistance from the NGOs, farmers' lobbies as they visualised TRIPs as promoting Western regime to promote 'bio-piracy'. For details refer Ramanna A and Smale M. (2004) Rights and access to plant genetic resources under India's new law. *Development Policy Review* 22: 423-442. Shiva V. (2000a) North-South Conflicts in Intellectual Property Rights. Peace Review 12: 501-508.

access and resource use is gained through legal procedures that are assumed to be more open than the restrictive rights. This mechanism increases the ability of stakeholders to gain access to resources based on legal procedures creating new mechanisms based on sharing rather than enclosure and opposed to IPRs. The study of such initiatives through an abilities perspective can further add to the literature on commons. In the next section, I present the research into other abilities of small and marginal farmers to enhance access to conserved PGRs as observed in the four concrete cases from India.

5.5.2 Abilities to manage PGRs collectively and create a web of biosocial relations

The three in situ cases referred to (DDS, LSP and Sambhav) are considered, looking at each in turn and how stakeholders' various abilities enhance their access to the conserved resources (PGRs, in the form of seeds stored in seed banks). For each analysis, first, the different mechanisms of access devised by stakeholders are described, then the creation of specific biosocial relations to derive benefits from the conserved landrace varieties are explicated, with specific focus on an understanding of this in terms of biosocial commons.

5.5.2.1 Common social identity, hierarchical relations and the collective management of CSBs

The DDS CSBs are community managed resource systems where access to the conserved resources is controlled by community members through an established system. As described (Chapter 2), a specific feature of the DDS CBSs is that they are managed by the Dalit women. Dalit women are part of the lower caste in the Indian caste system which also implies being oppressed, economically poor, socially and educationally backward (Chatterjee, 2012). It is this common identity which brought these Dalit women together and also shaped their collective practice of managing millet seeds. The stakeholders who identified themselves with the same social identity became the member of the *sanghams*. Thus, social identity that members shared led to their inclusion in the collective practices of managing the resources and ultimately became a mechanism leading to their access.

For the management of the CSBs, the women formed voluntary groups, *sanghams* and appointed one woman as head. The *sangham* head, generally an elder, plays a key role in controlling access to the conserved resources within the CSBs. This stratification introduces a differentiation of power within these voluntary groups. As one *sangham* member expressed,

> We all participate in the decision making process, but the *sangham* head has the ultimate say in the decisions. We all abide by it.

This illustrates that apart from the common social identity among the Dalit women as an important foundational feature of the collective management of the resources within the CSBs another key feature of the social organisation of CSBs is that there are hierarchical social relations present. Within this hierarchical system of collective management the heads are generally elders; this invokes the authority of age as a socio-cultural norm for determining access of other stakeholders.

Despite the presence of this internal power division between the *sangham* heads and members in determining who gets access to the conserved resources, however, the main feature of the web of social relations between the women and the PGRs is the collective procuring, maintaining and conserving of the seeds. Although there is hierarchy, CSBs rests on a fundamental equality of a connectedness based on collective management of resources in which the head is not set apart from the rest in the management of the CSBs. The *sangham* members collectively procure seeds by using their informal social ties with neighbouring villages (through marriage, friendship, work, etc.). Similarly, the maintenance of the conserved resources is also carried out collectively, with the different capacities and knowledge of each individual forming the basis on which they contribute to the CSBs. For example, each *sangham* has one good seed-keeper whose understanding of seeds is used to select seeds to be stored in the CSBs which might not be same as the *sangham* head.[80]

Similarly, different forms of indigenous knowledge present among the various individual CSBs members are used collectively for the specific practices, such as storing seeds. This also highlights another key feature of the CSBs, their employment of a plurality of knowledge for collective management of the landrace varieties. For example, the knowledge of using ashes to conserve seeds is used as a common practice. In this conservation practice the selected seeds are mixed with ashes and then stored in traditional baskets made of bamboo sticks to protect them from moisture and pests. Along with this, the *sangham* members also have their understanding of the best period for cultivation of different crops and varieties, which is also taken into consideration for day-to-day activities. Thus, the plurality of indigenous knowledge forms among the various individual CSBs' members is used collectively in cooperative arrangements for better linkages between the resources and the members. These activities not only create direct relation between the stakeholders bringing them into co-operative arrangement, but also, help in creating biosocial relation between the stakeholders and the resources. This is possible through informal seed networks where socio-cultural practices of the community intersect and evolve.

80 DDS initiated the identification of at least one 'good seed-keeper' in every village using the local knowledge of community members understanding of who could save seeds efficiently. Community members understanding of good seed-keeper was based on general observation and longstanding relationships. These good seed-keepers were then specifically approached to join the *sangham* and take up the seed-keeper role.

Another feature of the Dalit CSBs is their dynamism and the efforts to enlarge the web of social relations by setting up additional connections to other people and villages. This happens through the organisation of biodiversity festivals in which seed sharing relations are established. DDS has organised these festivals since 1998, aiming to bring together farmers from different villages and show the different varieties of seeds they possess. This activity also provides the non-members with an opportunity to integrate into the existing informal seed networks. Making the festival mobile and extending it to a month in 2001 facilitated a further expansion. Through these informal seed network varieties became still more accessible to farmers from neighbouring villages (non-members). This network also facilitated a further expansion of the seed networks and their webs of social relations, through the dissemination of informal social relations around seed exchange. Indeed, the festival enhanced a sense of belongingness among the CSBs participants in particular. The fact that these Dalit women exhibit their seeds in small earthen pots, carrying them through different villages using decorated bullock carts creates an increased self-awareness that they belong to this seed exchange network. These activities extend the biosocial relation that resources have with the stakeholders by bringing in a sense of belongingness.

An interesting development occurred when the CSBs members decided that the exhibited seeds are not free as such they do embody a labor, after all and applied two specific social mechanisms for granting non-members access to the exhibited seeds. Thus, another feature of the CSBs is that there is an objective to expand the seed network, but this develops through the establishment of specific mechanisms that shape the relations with non-members. The first mechanism is exchange. In what may be regarded as an anti-free-rider initiative, non-member farmers who desire the exhibited seeds were required to exchange some of their varieties with the CSBs. The second mechanism is borrowing. Access to exhibited varieties for non-members was made conditional on the 1:2 principles, whereby they commit to returning double the amount of the variety taken from the CSBs in the next harvest season. It is through these negotiations with the *sangham* members that non-members can gain access to the exhibited varieties.

The social relations of the CSBs with the non-members are not only regulated through these mechanisms of exchange and borrowing, however there also develops a bond with the non-members. This bond is developed if they share the same kind of farming ideology, which makes the system of exchange and borrowing less strict and more flexible. If the non-members show to the *sangham* heads that they have the same low economic background as the CSBs members or belong to an equally less privileged caste and live under similar conditions as the CSBs' members, then

the *sangham* heads may grant their request for exhibited seeds with reduced or no conditions. Another feature of the Dalit CSBs system, therefore, is its flexibility in granting access to the conserved varieties for non-members if they share a common ideology and living conditions with its members.

In this case benefits are mostly derived by farmers through access to conserved seeds as a means to agricultural production. Access of farmers to seeds for cultivation and becoming independent in deciding what and when to cultivate is seen as benefit in this case. Some members emphasised that when the millet seeds are stored in the village, it becomes easier for them to reach and collect the variety they want. Other members stressed how, with resources stored within reach through CSBs make it easier to use the resources. As one respondent testified,

> Before, we relied on the landlords to access a variety as landlords stored the variety at their house. We had no choice in selecting the variety or deciding what to cultivate, but involvement with the CSBs has changed all this.

Thus, the storage place of the conserved resources also affects accessibility for the farmers. The increased opportunities to use the stored landrace varieties implies that when collectively stored and managed through in situ, seeds, may become common resources for farmers and contribute to their agricultural production. In this sense, the conserved landrace varieties are transformed into a biosocial commons in which the extended informal seed networks deliver opportunities to farmers for using the resources in their agricultural production, built upon their knowledge and their practices.

Concluding, I find that the complex web of social relations built upon the farmers abilities to collectively procure, conserve and manage the landrace varieties and their abilities to develop specific biosocial relations with neighbouring villages, expands their informal seed networks. Thus, establishing specific relations with non-members, all contribute to a transformation of the landrace varieties into biosocial commons enabling farmers to derive biological and social benefits from these conserved and stored landrace varieties in the CSBs. The CSBs activities have led to conservation of over five hundred varieties of millet (Kumbamu, 2012). In addition to this, the collective arrangements make these varieties accessible and cater to the needs of some seventy-five villages in Medak involving nearly five thousand, mostly Dalit and other lower caste women. These resources are further shared with other farmers during the Biodiversity Festivals broadening the biosocial relations at a larger societal level. Thereby the study finds that the landrace varieties through their contribution at biological and societal level strengthen the biosocial relation among the stakeholders and the resources, thus functioning as biosocial commons.

5.5.2.2 Common ideology, travelling seeds and extension of the social web of organic farming

The seeds conservation practices of the NGO LSP is characterised by a relatively strong vertical structure in which the organisation committee of the NGO manages and decides who gets access to conserved varieties. The power structure is even personalised, in the sense that it is the head (founder) of the organisation, Natabar Sarangi, who determines access to the resources. Thus, instead of a collective structure of managing stored varieties as with the DDS CSBs, LSP applies an organisational structure in which the authority of the head of the organisation is decisive in deciding on the ability to access. Alongside the vertical organisational structure, however, the LSP is also characterised by a collective participation of LSP members and other farmers in the collection, storage and cultivation of seeds, as a result of which the organisation has successfully conserved around three hundred and fifty varieties.[81]

The centralised decision but collective participation structure is based upon an underlying objective: to promote organic farming. Sarangi made this explicit, stating that anyone can take the conserved varieties, provided that s/he is a farmer or organisation sharing with the LSP the desire to develop the practice of organic farming.[82] Thus, access to the conserved resources at LSP is controlled by the head of the organisation, who applies the organisational principle. According to him, farmers willing to promote organic farming (saving seeds and using organic fertilisers and pesticides) and extend the struggle against conventional farming (using pesticides, chemicals and HYVs) can borrow the stored varieties. Instead of referring to legal procedures, the sharing of the LSP resources is based on trust (that the farmers borrowing the stored varieties share the same ideology). Sarangi has no formal protection, since he does not claim any ownership none, that is, other than that endowed through natural right (the seeds belong to the LSP since it has provided the labor to collect them or usually, in fact, grown the plants and then harvested and from them stored the seeds).

This web of social relations between LSP and farmers based upon trust is further characterised by the application of two principles through which the extension of the web of biosocial relations is regulated. First, LSP applies the 1:2 principles,

81 See http://www.greengrants.org/2011/11/02/a-retired-teacher-seeds-organic-farming-in-india/ (accessed 20th August, 2015).

82 For example, Sarangi described a situation in which he refused to grant access to a specific conserved variety to a private (foreign) organisation because this it had a different ideology to that of LSP and could not be trusted to contribute to organic farming (rather he foresaw that access to the variety would by this organisation in the services of conventional farming).

asking for a return of double the amount of seeds given. This applies to borrowers known by the organisation personally or living in a nearby village, when getting (back) the seeds is reasonably easy. Second, for sharing the seeds with farmers who come from different parts of India, when it is difficult for LSP to regain the seeds, LSP asks for a small financial payment. The amount collected thus is used in maintaining the organisational seed bank.

Related to this financial consideration, another important feature of LSP is that it economically remunerates farmers for their work, time and energy used in collecting and storing seeds in the LSP seed banks. Moreover, the organisation sometimes employs specific groups of farmers. For example women farmers to evaluate, select and clean seeds valorising their knowledge about the traits (size, colour, and aroma) of the seeds gathered over earlier farming experiences. This practice of involving women in the activities of conserving seeds at LSP enables the organisation to stimulate a reconnection of the stored seeds to the agricultural practices related to the important role of the women farmers and their indigenous knowledge. This particular web of biosocial relations between the women farmers, the collected resources and the LSP organisational structure creates a social space for these farmers to improve their (organic) farming built upon their experience/knowledge and the conserved resources. Indeed farmers stated that the access to landrace varieties through LSP had led them to change from conventional to organic farming. In the words of one respondent,

> We used to depend on the extension officers for seeds and industries for fertilisers and pesticides, but now we save our seeds, make our fertilisers from cow dung, make neem cakes for pesticides and have become independent as producers.

Reflecting on the activities of the LSP seed banks, the farmers not only gain the biological benefits that the landrace varieties provide for their agriculture but also receive and deliver socio-cultural benefits. Socio-cultural benefits are delivered in the sense that it becomes possible (again) to refer to indigenous knowledge and agricultural practices, as stimulated by use of the conserved landrace varieties. Indeed, when the conserved seeds are exchanged through informal organic seed networks, the farmers are also building and rebuilding the (bio)social relations among themselves. This dynamic development is further stimulated by the LSP practice of hiring men with knowledge of varieties to travel from place to place to collect seeds of different varieties to be conserved at the LSP seed banks. Involving a continuous interaction between resources and farmers through these activities also strengthens their biosocial relations.

Another feature of the LSP seed bank is that it consciously aims to broaden this web of biosocial relations built around these informal seed networks. For this purpose, LSP's partners with the other NGO Living Farms, which collects seed from LSP and distributes it in what are backward, poor districts in Odisha (See Chapter 4 for details). The seeds conserved at LSP do not remain inside its seed bank, but travel right across the state to be shared among disadvantaged communities. This further broadens the informal seed network. The travelling seeds become commonised through the expanding seed networks and thus contribute to an expansion of organic farming. The dissemination and spreading of the web of biosocial relations around these travelling seeds making these resources function as biosocial commons.

Further to this spread, LSP also trains hundreds of farmers from all over India in '*applying organic farming techniques, enabling them to expand organic farming across India*'.[83] Sarangi also participates in organic saving and seed sharing meetings organised all over India to showcase and share varieties conserved at LSP.[84] Through these activities LSP has been extending the informal seed networks enabling varieties to become more accessible to farmers from different parts of the country, no longer limited to the village where LSP is situated. In March 2014, the organic seeds networks, including LSP, came together, with '*several hundred farmers, seed savers, farmer-breeders, grassroots organisations and activists from 15 states across India showing to enhance public awareness of over 2,500 seed varieties of cereals (rice, wheat, millets), pulses, vegetables, tubers, medicinal plants and uncultivated/forest foods*'.[85]

These activities illustrate the expansion of the interlinking webs of informal seed networks at a societal level, based on spreading the ideology of organic farming. This determines the social process through which different farmers from all over India get (or do not get) access to the resources conserved at LSP. Thus, access to the conserved varieties is established by the abilities of farmers to assimilate the ideology of the informal organic seed networks and to establish biosocial relations with other organic farmers and the conserved landrace varieties. It is through this web of biosocial relations that farmers are enabled to become part the expanding organic farmers' seed networks, like that of the National Seed Savers Network. This extension illustrates the social perspective that the travelling seeds may become increasingly commonised, which may inspire other organisations to establish similar kinds of initiatives, in which conserved landrace varieties become biosocial commons, creating social spaces for organic farming styles.

83 See source http://www.greengrants.org/2011/11/02/a-retired-teacher-seeds-organic-farming-in-india/ (accessed 20th August, 2015).

84 For details, see source 'The Biodiversity and Organic Food Festival', at http://cintdis.org/wp-content/uploads/2014/04/SeedFestReport.pdf (accessed 17th February, 2016).

85 For details, see pp. 1 and 2 of 'The Biodiversity and Organic Food Festival' report (op. cit.).

5.5.2.3 The conservationist approach and seed banks as security funds for periods of distress

Like LSP, Sambhav is characterised by a vertical decision structure in which the organisation committee of the NGO manages and decides who gets access to the varieties conserved in its seed banks. Committee decisions on access are nevertheless collectively based, using criteria established by members. Thus, the power structure is disseminated through the committee instead of the authority of one person, as was the case in LSP but still considerably less than in the case of DDS, with its *sangham* CSBs structure.

Sambhav applies two criteria for granting access to the conserved resources at its seed banks. The first refers to the social identity of the borrower, who has to be a member of the Organic Farmers' Association in India. This criterion is similar to the granting mechanism of LSP. The second is based on sharing the same conservationist ideology (as Sambhav), this criteria differs from LSP. Although LSP and Sambhav both emphasise the relevance of a shared ideology, LSP focuses on sharing ideology in respect of expanding organic farming while Sambhav emphasises the importance of conserving varieties. Thus, farmers who share a conservationist ideology are granted access to the stored landrace varieties at Sambhav's seed banks. The mechanism Sambhav applies to grant access for the borrower is by adopting a variety from the Sambhav seed bank. The borrower signs a document stating that s/he will always cultivate, conserve and take care of the variety as his/her child. This mechanism aims to ensure that individuals adopting the varieties conserve them and over generations. Thus, disseminating the ideology of conserving landrace varieties at an individual level through time and generations as the seeds become a part of the family through adoption. Both the means to access resources conserved at Sambhav, therefore depends on certain social relation that the borrower shares with the organisation.

Another feature of Sambhav is that, together with its associated farmers, it collectively conserves and maintains the PGRs. Sambhav employs women just like LSP who are regarded to be a good knowledge source for seed selecting from among the varieties to be conserved at Sambhav seed banks. In selecting the seeds to be stored, women use their indigenous knowledge and traditional practices, such as using the winnowing technique. This involves the women using a winnowing basket known as *kulla* in local language (Odiya) to decide which seeds should be conserved, namely, those seeds which settle on the ground (the seeds that fly away with the wind are perceived as not good enough). Thus, local cultural practices of selecting seeds through traditional methods and knowledge become embedded in the evaluation of seeds that are stored at Sambhav. Through this collective effort of selecting and storing seeds with the help of women farmers, Sambhav creates a

continuous interaction and social relationship between farmers, landrace varieties seeds and the organisation. A web of biosocial relations is created wherein local cultural practices concerning the varieties are embedded in the collective practices.

A third characteristic feature of Sambhav's informal seed network is its effort to extend this web of biosocial relations between the stored landrace varieties and the non-members (individuals or groups). The non-members who are interested in organic farming are imparted training. So, Sambhav extends its biosocial relations beyond its members by disseminating practices of doing agriculture through organic means to interested farmers. For example, Sambhav provides training to farmers on how to make and incorporate organic manure using earthworms (veri-compost) in their farming practices. Alongside this, Sambhav also participates in programmes organised by the Odisha state authority to motivate youths to take up and become self-sufficient in/through organic farming.[86] This practice of transmitting knowledge through training and programmes widens the organic network within and across the state. The extension of organic network also fosters an extension of the web of biosocial relations among farmers and the conserved resources strengthening the social relevance of the informal seed networks.

The benefits derived by stakeholders from accessing seeds at Sambhav ranges from securing access to the resources to making them independent producers. Finally, in gaining access to Sambhav's PGRs, farmers are helped to create agricultural practices to become more independent producers. The farmers emphasised that by cultivating the Sambhav varieties they become self-sufficient over a period of time in matters related to means of production (seeds). This self-sufficiency involves not only self-provisioning but also one that operates on the basis of a reliable fall-back option:

> I save seeds from my harvest for the next season and do not depend on others for seeds, but if matters go wrong in case of natural disaster or some personal problems then I can always go back to Sambhav for the same variety.

Thus, farmers explained that the conserved seeds at Sambhav provide the farmers with both biological benefits (using the landrace varieties for organic farming) and social benefits (becoming more independent to the use of these resources and other inputs for the agricultural cultivation). Ultimately, they emphasised that the seed banks act as a 'seed security fund', from where farmers could always get varieties they want in times of distress.

86 See The New Indian Express e-paper http://www.newindianexpress.com/education/edex/article554116.ece (accessed 20th September, 2015).

This practice of conserving landrace varieties through an extending web of social relations in which all kinds of activities are organised collectively (such as selecting and storing of varieties, adopting a variety to conserve, setting up training programs) transforms the conserved landrace varieties into biosocial commons. It is this combination of biological resources (the landrace varieties) conserved, selected and managed through a web of social relations that made possible the conservation of over five hundred landrace varieties in the Sambhav seed banks.

5.5.3 An ex situ genebank and science based relations

In contrast to the three case studies described above, CRRI operates as an ex situ conservation system. A specific feature of the CRRI that makes it different from the other three NGOs is that CRRI is a public research institute, managed by the Indian Council of Agricultural Research (ICAR). CRRI has an established institutional system in which rights and responsibilities are categorised for each department along ICAR guidelines. The organisational structure of CRRI as an ICAR institute is characterised by disciplinary divisions.[87] There is a clear distinction between the divisions regarding their functioning, for which each division has dedicated scientists appointed with specific scientific knowledge and skill-sets. The scientists in each division work towards the realisation of that division's specific objectives, with their own responsibilities and accountable to their own division Head. The Head of each division is responsible to the Director of the CRRI who is again accountable to the Deputy Director General of Crop Sciences of ICAR. The Director of CRRI carries out the mandate of the institute and manages the functioning of each division at the institutional level. Within this hierarchical organisational setting, there is a general culture in which the use and discrete application of specialised scientific knowledge is emphasised. For example, some scientists use their agronomic knowledge while others use their plant breeding or microbiological knowledge. The scientists interviewed also pointed that the landrace varieties collected by CRRI are primarily used for identifying donors to be employed in breeding programmes for the development of High Yielding Varieties (HYVs).[88]

87 CRRI has five different divisions managing resources conserved at CRRI genebanks: crop improvement, crop production, crop protection, BPES (biochemistry, plant physiology, and environmental sciences) and extension, communication and training under the division of social sciences. The collection, characterisation and conservation of landrace varieties at CRRI is managed under the crop improvement division, while the crop production division deals with agronomy, soil sciences, microbiology and agricultural engineering. There is a clear distinction between the divisions regarding their functioning, for which each division has dedicated scientists appointed with specific scientific knowledge and skill-sets.

88 From the collected varieties, donors are identified for programmes such as for drought tolerance, salt tolerance, brown spot tolerance, yellow stem borer disease resistance and sheath blight resistance. For details on donors, see the CRRI Annual Reports CRRI, 2011, 2012, 2013, 2014).

For the development of the HYVs, the conserved landrace varieties at CRRI go through various processes, such as molecular characterisation, mapping and screening, in order to identify those traits that might be used to develop an HYV using certain resistant genes. These processes are executed in a stepwise fashion, passing through the various divisions, through which the HYVs are collectively developed and finally released. This collective activity may be characterised as procedural, emphasising the detached contributions of distinct units, in which the stored resources at CRRI are managed through an institutionalised administrative set-up, and through which the landrace varieties are collected, conserved and primarily used for the goal of HYVs development.

The institutional setting also affects the ways in which CRRI grants access to its conserved PGRs. CRRI shares freely its conserved varieties with other ICAR institutions, while universities and private companies have to sign a Material Transfer Agreement (MTA) to gain access. This mechanism aims to prevent any appropriation and privatisation of the resources. As a scientist explains:

> Material Transfer Agreement just states that CRRI is happy to share its material with others, assuming that products which come out from the material will be shared among the two parties. It should be clear that one cannot own the new products but has to share it.

As a public research institute, CRRI aims to protect the conserved materials against appropriation and privatisation, stipulating that the new products are shared and remain in the public domain. These principles, also affect CRRI's relations with institutes from foreign countries. For example, India follows a single window system, in which only the National Bureau of Plant Genetic Resource (NBPGR) is authorised to grant access to foreign countries to the resources conserved at CRRI. One scientist explained that:

> Any country's request that comes to CRRI has to come through NBPGR, and then only CRRI sends the material to NBPGR. NBPGR, in turn, sends it to other countries. Directly, CRRI does not send the germplasm nor is authorised to do so.

These descriptions show that access to the conserved resources at CRRI is built upon state-law measures regulating the relations between institutions at both national and international levels. Apart from these state-law mechanisms regulating the relations among institutions, it became evident that scientists, plant breeders and researchers are considered as the most important stakeholders of resources conserved at CRRI. Indeed, it is primarily scientists who have access to the stored landrace varieties at CRRI. The scientific knowledge the scientists possess plays a determining role in deciding who can get access to the conserved resources and who can derive benefits from them.

The science-based functioning of CRRI implies that the evolution of the biosocial relations between farmers and the conserved resources characteristic for the in situ seed banks becomes quite constrained within the context of an ex situ genebank. Here, although farmers are involved in the first stages of selecting varieties that may potentially be of interest (see Chapter 2), the social relations and interaction between farmers and landrace varieties become reduced. The farmers are converted into (passive) recipients of the final product the HYVs developed and thus quite indirect stakeholders overall in CRRI, its work and the conserved resources there.

The Indian government has made attempts to install Farm Science Centres, the Krishi Vigyan Kendras (KVKs) to link CRRI with the farmers. Set up by ICAR to impart vocational training to farmers and involve them in field-level extension activities, these centres aim to establish linkages between farmers and the improved plant varieties (HYVs). It is indeed through their contacts with KVKs that farmers gain access to the CRRI, HYVs. In addition to this function, the KVKs also act as intermediaries between the farmers and the landrace varieties stored at CRRI, since farmers in different parts of India can ask for different landrace varieties conserved at CRRI through the KVKs. However, the primary role of the KVKs is to distribute and conduct trial experiments to test the functioning of the HYVs developed at CRRI. Basically, farmer participation aids the final verdict on the work performed on the CRRI PGRs. The primary function of the KVKs is one-directional in form, mainly enhancing dissemination of the HYVs and thus facilitating the transfer of varieties and extension of knowledge from CRRI to the sector as a whole. Thus, a specific web of social relations has emerged through CRRI characterised by a strongly science-based functioning in which the relations of farmers with the stored landrace varieties at CRRI are valued only at the start and end of the process.

Farmers in this process book-end the development, which itself goes on behind closed doors, at least, to non-scientists. This web of social relations is quite different from the previously described biosocial webs of social relations in the three in situ seed banks. Despite the internal differences among the three in situ seed bank practices, their webs of biosocial relations were all characterised by strong inter-woven connections between resources and farmers. These biosocial relations were reflected in the collective procuring, selecting, conserving and managing of the resources, based upon the sharing of a collective identity and/or ideology. In contrast, the social web of the ex situ genebank is characterised by a separation of the farmers from the conserved resources at CRRI. Connected to that separation process, scientists, plant breeders, researchers instead of the farmers become the key stakeholders of a strongly science-based web. These science-based webs through the centres such as KVKs have been appended to play an intermediary role reconnecting the research product with its market, the farmer's field.

Among the issues raised by farmers attending a farmers' meeting organised by CRRI was that sometimes it is difficult for them to get to the KVKs for the distance from their fields during the time of cultivation. Thus, distance between the KVKs and the farmers' fields become the deciding factor whether farmers can access the improved variety or not. Here, the locational aspect of ex situ becomes highly relevant, in a negative way, as in the DDS case, although to opposite effect, where the in situ aspect of the CBS was a significant strength (Chapter 3). Accessibility in the case of material entities, like seeds and seed banks may be a basic, physical phenomenon for using the resources by the farmers.

Most of the farmers confirmed that access to HYVs through CRRI and KVKs brings them economic benefits as it gives them access to HYVs for agricultural production resulting in produce they can sell. However, it was found that there was no interaction between the farmers and the conserved landrace varieties stored within CRRI. This reduced direct interaction between farmers and the stored seeds limited the creation of biosocial relations between farmers and resources; rather, it furthered an instrumental relationship around the functioning of the improved varieties. The various mechanisms used by CRRI stakeholders through legal authority linked to legitimising rights over resources create benefits in economic terms but limiting the creation of biosocial relations and thus of a biosocial commons.

Taking the present case of the CRRI as an example of genebank functioning from the rights perspective, a problem, as Ramanna and Smale (2004) point out, is that the flow of resources among farmers is unsupported. As in this case, the flow of landrace varieties from the genebank to the farmers is limited to a few final (HYVs) products. Therefore, this study further suggests re-establishing the biosocial relations between farmers and the conserved seeds by providing better access to the conserved seeds. Access will increase the opportunities of farmers to use and derive benefits from them including sharing them with one another thus fostering the flow of resources among the public sector and the farmers. A consideration of possible ways to (re-) establishing this link is included in the next section.

5.5.4. Biosocial commons: Social spaces through which the landrace varieties can be made more accessible

Comparing the various linkages of the in situ and ex situ conservation banks may enable the identification of social spaces through which the landrace varieties can be made more accessible, transforming them into biosocial commons. Investigation (above) of the different webs of biosocial and science-based relations constructed around the four conservation banks has provided insights into three broad areas. The first concerned the inter-relationships between the abilities of farmers in the

three NGOs, biosocial relations and biosocial commons. The second involved the limitations of each case, which can be used to develop rooms for manoeuvre and new perspectives for utilisation of the resources. The third reached through the historiographic analysis of the implementation of IPRs in the domain of PGRs, identifies the open source mechanism as another possible system for farmer's access and sharing of seeds.

The study of the three NGOs provided a positive relationship among the abilities of farmers, biosocial relations and biosocial commons. Farmers who were able to access resources conserved at NGOs on the basis of their common social identity or ideology or through negotiation and seed network social relations were able to establish biosocial relations with the resources. Thus deriving both biological and social benefits and enabling the resources to function as biosocial common.[89]This enhanced accessibility to landrace varieties was affected through collective arrangements in seed collection, selection, conservation and storage furthered by seed festivals and informal (organic) seed networks. At CRRI, by contrast, collective arrangements between the farmers and the resources were not possible, due to the institutional structure and administrative set-up. Thus, the study finds collective arrangements as interwoven with the establishment of biosocial relations enabling a transformation of stored landrace varieties into biosocial commons.

Despite the advantages of the in situ over the ex situ conservation mechanisms, however, the study still identified some limitations within each of the cases studied. The three NGOs (DDS, LSP and Sambhav) all operated on a largely informal basis using a hierarchical structure, where it was the informal seed networks that largely formed the nexus through which farmers gained access to the conserved seeds. In addition to this, the NGOs granted access to farmers who most co-operated and established trust-based social relations with other farmers or stakeholders managing resources in the respective NGOs. Farmers with in situ seed bank access were primarily members of *sanghams* or belonged to the Dalit caste in the case of DDS and shared a similar ideology or developed social relations with organic farmers at LSP and Sambhav. These mechanisms depend most on pre-existing social relations among different stakeholders (farmers and the NGOs) through membership and the ability of the farmers in negotiating access to the conserved resources failing to do which might hinder their access to the conserved resources. Thus, for utilisation of resources in the three NGOs they should be motivated more to disseminate their seeds by organising farmers' seed festival. This step could bring different farmers from different places even without any social ties or relation with the organising NGOs into a relation of seed sharing through barter, sharing for double return or

89 For the NBPGR PGR access guidelines, see http://www.nbpgr.ernet.in:8080/repository/request.htm (accessed 20 February, 2015).

simply by buying the conserved resources. Here, DDS mobile seed festival can serve as one example. The mobile seed festival is a fairly well-known approach to outreach and a unique idea. In addition to the spread of networking in general, therefore, this study suggests that for utilisation of resources, the actual dissemination of seeds through (the organisation of) farmers' seed festivals could facilitate dissemination more widely including non-members of the NGOs. Specifically, this is facilitated through seed-sharing by barter, for double (1:2) return or simply by farmers buying the seeds from the NGOs.

Similarly, in case of the public research institute, CRRI the study found that institutional mechanisms controlled and managed the conserved resources. As a result of which farmers were basically indirect stakeholders of the conserved resources, with scientists and researchers forming the direct stakeholders' group. This division itself created differences between who, what and when the resources conserved at CRRI could be accessed. Indeed, the authorising NBPGR does not take farmer requests for PGRs into consideration in its guidelines, reducing the abilities of farmers to becoming direct recipients of the conserved PGRs. These mechanisms reduce farmers' chances of accessing the resources (seeds) conserved at CRRI and managed through NBPGR. Therefore, I suggest disseminating the conserved resources through the village seed banks (see Section 2.8.1). Such an extended dissemination can facilitate the establishment of biosocial relations among the farmers and resources, leading the resources to function as biosocial commons (as observed in the three in situ conservation practices).

Finally, the study finds through its historiographic analysis of the implementation of the IPRs in India that the open source mechanism may become another system for accessing and sharing seeds under this regime. Taking the case of India, the practical problem with implementation of the PPV&FR Act and the rights perspective in general is that most farmers are illiterate and quite likely are even unaware of the legislation. From the farmers meetings, it was evident that scientists from ICAR institutes are trying to inform farmers about the benefits of this Act, but to be beneficial to the farmers a lot needs to be done besides disseminating information and registering varieties under the Act. In fact, '*a fair and practical mechanism for promoting farmers' rights is an important goal that should not be reduced to a battle for the ownership of plant genetic resources*' (Ramanna and Smale, 2004: 439), as would happen with the complete implementation of PPV&FR Act.

Thus, I suggest the open source principles can in this case also be used to counter the limitations of the rights system. By way of example, a consideration of open source principles the Organic Farming Association of India (OFAI) Open Source Seed System (OSSS) aims at facilitating access to seeds. As explained (Section

4.10), the provisions of the PPV&FR Act brings only residual rights to the farmers, concentrating the major rights on breeders and researchers, which OSSS aims to address by broadening the privileges of (to) farmers. Such a mechanism for accessing PGRs under the IPRs regime might be analysed further by scholars as the initiative develops.

5.6 Conclusion

In this chapter, I have adopted a critical approach to the study access to PGRs within a broader socio-political context and to reflect on the abilities of farmers. Through the historiographic analysis the trajectory of the IPRs in case of PGRs in India was analysed. It was found that the attempt to enclose PGRs (seeds) by establishing a politico-legal institution was successfully counteracted by farmers and NGOs through a collective effort, creating and maintaining spaces within the rights perspective that facilitate farmers' access to the PGRs. The study also highlighted an alternative to the enclosure by politico-legal institutions through mechanisms devised by open source. This appears to have the potential to increase the abilities of stakeholders to access resources, leading to new mechanisms based on sharing through the legal procedures. The study suggests the extension of open source principles as a mechanism with which to devise access to the conserved PGRs under the implementation of the legal acts, such as the PPV&FR Act in the Indian scenario. The historiographic analysis thus reflected on how the negotiation abilities of farmers and NGOs have played an important role not only in defending the rights of the farmers but also in opening further possibilities for access to the conserved resources under the legal framework.

Parallel to the historiographic analysis and consideration of the rights perspective, the four case studies illustrated farmers' abilities to organise access to seeds stored within the different institutional settings (at in and ex situ conservation banks). From the research findings, it was evident that each of the four cases used a predetermined set of criteria to conserve, manage and share the resources with farmers. The three in situ conservation practices showed the relevance of farmers' identities of belonging, their abilities to negotiate, become a part of a group with a specific ideology and create social relations with community heads and other members as facilitators to access the conserved resources. In these cases, the informal web of social relations facilitated the whole process of access. The ex situ conservation practice was found to follow the rights perspective, determining access to its conserved resources based on institutional mechanisms. As a result, this setting did not provide options for farmers to establish the informal social relations or negotiate their access to the conserved resources.

Further, this research has shown the relevance of the informal basis of access to the landrace varieties, which the three NGOs practice in strengthening the biosocial relations between human (the social) and non-human (ecological, biological, and cultural) dimensions, ultimately leading to the functioning of resources as biosocial commons. These abilities of farmers to create biosocial relations also helped them in realising specific benefits enabling them to maintain biodiversity and sustain community life-styles through collective arrangements. Therefore, collective arrangements proved to be better facilitator of access to resources, furthering the commonistaion of the PGRs as a biosocial commons.

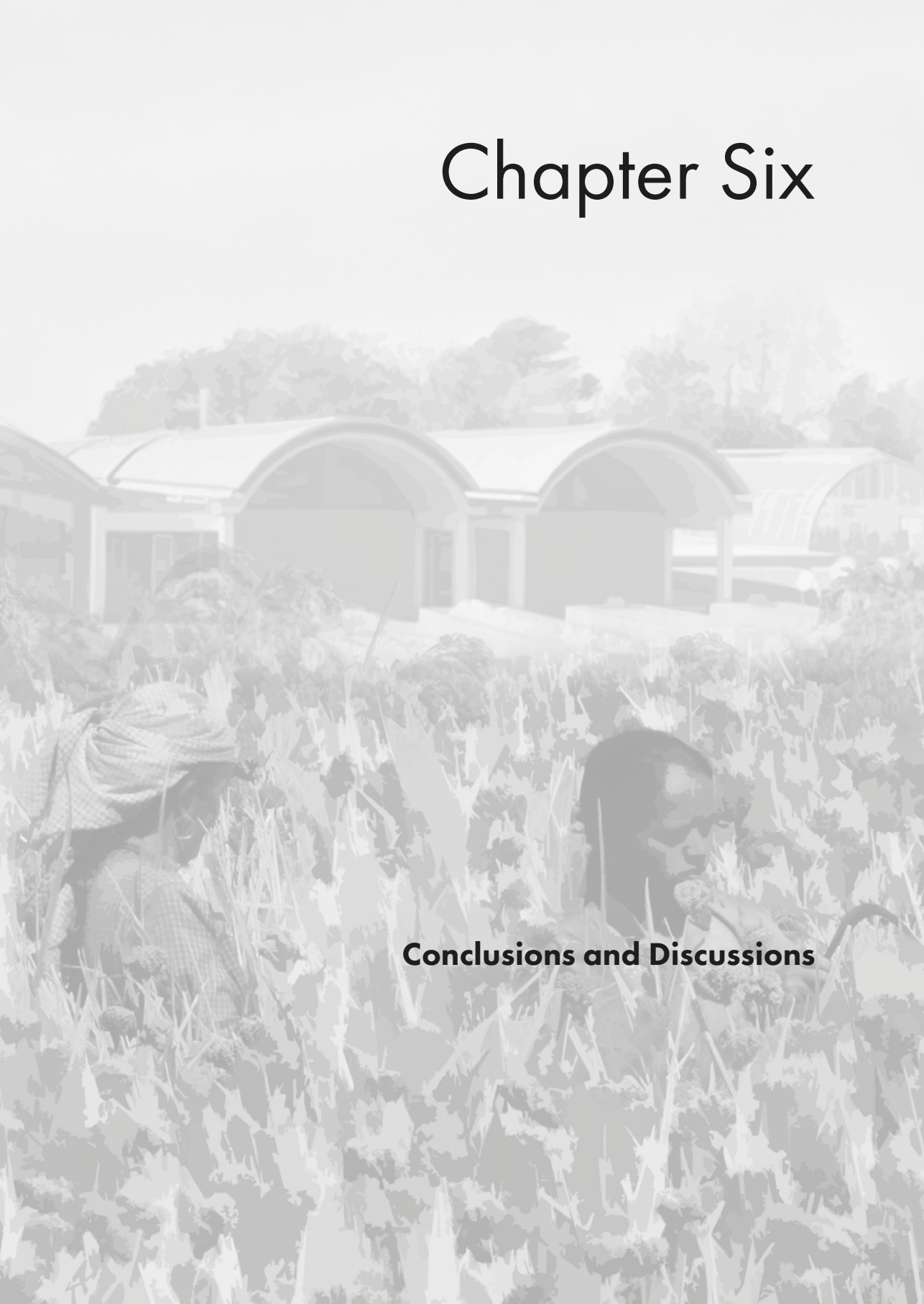
The study also indicates that the in situ conservation and sharing practices help farmers in re-building their indigenous knowledge, re-establishing their cultural practices and re-affirming their status as independent producers of resources (seeds). In addition to these practices, seed networks further extended the web of social relations and informal social networks leading to utilisation of the resources and furthering the process of commonisation. The ex situ conservation practices, however, revealed a disconnection of the resources from the farmers, inhibiting the web of social relations and commonisation of the conserved resources.

Apart from the access mechanisms operating in the various cases, the actual place where seeds are stored played an important role in determining who had access to those resources. It was found that location may be a vital determiner of access. The seeds stored ex situ were governed by formal structures (institutional mechanisms) that demanded formal procedures and proper channels for their access by farmers, whereas those stored in situ were governed by a more informal structure and operated through informal social ties which made them comparatively easy to be accessed by the farmers. Thereby, the study suggests that the location of conservation banks or other forms of storage can serve as a mechanism determining stakeholders' access to the resources, which adds to the Ribot and Peluso (2003) framework of access based on ability perspective.

The study concludes by suggesting additional mechanisms to facilitate better access to the conserved resources under different conservation practices. In case of the three NGOs, it is suggested to further their collective activities of resource sharing by creating a better platform for disseminating seeds through organising farmers' seed festivals. The seed festivals are observed to help in the spread of resources as they do not demand that recipients (farmers) meet the criteria of sharing with the festival organising NGOs a common social identity or ideology or particular social relations related to membership and networking. Similarly, for the ex situ conservation practice, the study suggests disseminating seeds through the village seed banks to increase farmers' access to the conserved resources.

Overall, the study finds that the access to conserved resources stored at the in situ conservation practices has created biosocial relations and biosocial commons. The role of in situ conservation in propagating the political agenda of organic farming in particular is noted, as are the internal power divisions through which the three NGOs control and manage the resources. Both of these factors were observed to play an important role in the structuring of access. Taken as a whole, the study concludes that the web of social relations extending through the informal seed networks exhibits a strong ideological underpinning with internal power divisions. Working within these specific, perhaps limiting combinations, however, the informal systems of conservation and sharing are still shown to provide better mechanisms with which practices of access based on ability can operate to the benefit the small and marginal farmers in India.

Chapter Six



Conclusions and Discussions

6.1 Introduction

This study has presented processes of commonisation of plant genetic resources (PGRs)[90], especially seeds providing insights into the ways this resource is and could be organised as commons in India. Drawing from various scholars who have used different methods to study PGRs as commons this study finds that a uniform framework cannot be used to study this complex resource. Thus, it has not limited itself to the theories and concepts developed within commons studies but have broadened its dimensions by borrowing from scientific debates on commons from seed network theories and an access framework. Borrowing from scientific debates on commons it has further considered analysing the interaction of the different components (tangible and intangible) of seed along with social and cultural relations within which this resource functions as commons.

Various theoretical frameworks and concepts served as a tool box[91] for the study. Commons studies informed the interrelations between resource (seeds) management and various stakeholders (scientists, farmers, women's self-help groups, NGOs). The seed network theories further informed the understanding of the relationship between the seeds and their socio-political use for commodification or commonisation. The social relations that facilitate or inhibit the abilities of different stakeholders to access the PGRs as commons was analysed using the access framework.

Considering the complexity of seeds as a resource and the ways in which they function as commons under different settings (ex situ and in situ), their interactions in society have been analysed not as traditional or intellectual commons but as biosocial commons.[92] Analysing seeds as biosocial commons was considered to reflect not only on the characteristics or to the governance and management of these resources, but also to bring in their biological and social benefits when they are used through the collective arrangements. The liquidity with which these different elements interact, intersect and co-exist within a community was emphasised for a broader reflection on the processes of commonisation of PGRs.

90 Plant genetic resources (PGRs) consist of 'the entire gamut of plant material, of current as well as potential use in breeding of a crop' (Bains et al., 2012: 53).

91 I used toolbox as a metaphor following Foucault (1974; cited in Patton, 1979), who urges scholars to treat his works as little toolboxes and use them for an understanding of different contexts and questions; here, I have employed various approaches for insights into a variety of issues adding to the overall understanding of the commonisation of PGRs.

92 'Biosocial' referred to interactions between human (social) and non-human (ecological, biological, cultural) through different processes that created different social and cultural relations; and by biosocial commons the study referred to those resources that have both biological benefits (such as improving and sustaining life forms through genetic qualities) as well as social benefits (maintaining ecological balance, supplying food, maintaining biodiversity, enabling various cultural practices).

The literature review on commons and PGRs guided the research in identifying four issues relevant for analysing PGRs, especially seeds as commons. These issues are disconnection of seeds from its natural and social environment, the collective resistance to the commodification of seeds, the strategies of repossession of seeds and the ability of stakeholders to organise access to PGRs.[93] These issues were established as the core features in discussing the commonisation of PGRs and were reflected in different chapters. The commonisation process was studied as a dynamic '*process through which a resource gets converted into a jointly used resource under commons institutions that deal with excludability and subtractability*' (Nayak and Berkes 2011: 133). To this end, various conservation practices were studied under different socio-political contexts and through different institutional mechanisms. In the following sections (6.2-6.5), I discuss how the four chapters (2-5) provided responses to the specific research questions, parallel to the four issues identified (above). Then, analyse these responses to reflect on the processes of commonisation of PGRs, especially seeds as biosocial commons in the Indian context. This provides a trajectory for further discussion about PGRs as biosocial commons enabling also recommendations for future research and implications of this study. The chapter ends with a concluding section that reflects on the overall discussion.

6.2 Disconnection: the transformation of PGRs into intellectual commons and processes for the commonisation of PGRs

Studies on PGRs and commons widely recognise the informational content of the PGRs as commons (Dedeurwaerdere, 2012; Halewood et al., 2013; Kloppenburg, 2010; Roa-Rodríguez and van Dooren, 2008), but fail to pay attention to the concrete process through which the transformation of the PGRs into informational resources takes place. The second chapter contributed to filling this gap with an empirical description of how the process of seed collection, selection, storage and use within an ex situ genebank transforms the PGRs into informational resources and then into intellectual commons. This description further provided insights into the interrelations between seeds, transformed informational resources, intellectual commons and their appropriation broadly contributing to debates on commonisation of PGRs under an ex situ institutional setting.

The process of selecting and conserving PGRs in the Central Rice Research Institute (CRRI), genebank in Odisha, points that these processes disconnect seeds from

93 It should be noted here that I discuss the fours issues in reference with specific context. Disconnection of seeds from their biosocial environment, resistance of the community to the state policies and caste discrimination, repossession of seeds through resistance at local level and ability is discussed in terms of access to the conserved resources.

their biosocial environment and transform them into informational resources. At CRRI once the collected variety from the fields enters the genebank, it is identified by numbers, letters and morphological characteristics and transforms into informational resource in the whole collection. This disconnection was found to be an essential step in creating the informational resources which leads to the development of an intellectual commons. The intellectual commons here does not develop just by storing seeds in the genebank, but by a gradual process of scientific intervention by the scientists and plant breeders. The seeds stored at genebanks undergo transformation where they are not only given new scientific names but also characterised on the basis of their informational content. This disconnection hampers the biosocial relations between the resources and the farmers. Thus, the study implied that disconnection of these resources from the biosocial environment and their characterisation based on the informational content creates possibilities for development of informational resources and intellectual commons. As in this case, the Genebank Information Management System (GBIMS) was used to document data on the germplasm collected and by using Information and Communication Technology (ICT) these data were shared with all the Indian Council of Agricultural Research (ICAR) institutes making them intellectual commons.

However, it was also observed that the transformation of these resources into intellectual commons makes them exclusive, to be used by only a certain group of researchers or plant breeders neglecting the role of farmers as stakeholders in this process. Thus, disconnecting resources diminishes their biosocial context and reduces them to a category of germplasm with informational (genetic) content for an exclusive group of stakeholders. This exclusive use of the resources does not lead to the creation of private property or enclosure on the contrary creates a pool of intellectual commons. The process of disconnection in this case, therefore, leads to the establishment of what Drahos (2006) categorises as a positive intellectual commons.[94]

Parallel to the process of disconnection the study also found a change in social relations among different stakeholders. The harnessing of the informational content of seeds by scientists gradually reverses the role of farmers (from primary to secondary stakeholders) and scientists (from secondary to primary stakeholders). Thus, disconnecting resources from their biosocial environment enables the development of a '*technonature regime*' (Escobar, 1999:11). Supporting Escobar (1999), this study found that contemporary technologies intervene and create possibilities for different understandings of the relationship between the social world and the nature. Escobar gives the examples of cloning, human genome projects and transgenic

94 Positive commons, according to Drahos (2006), are jointly owned resources which increases the collective responsibility of the community over the resources reducing the likelihood of monopolistic claims.

food as possibilities available in the technonature regime. A technonature regime that was also found produced at CRRI from the seed-storage stage when seeds lose their biosocial identity (including their names). It is expanded thereafter as the seeds are acted upon through different technologies, such as molecular breeding and genetic modification, to produce modified varieties, like hybrid seeds (with new, unrelated names). This intervention through different technologies changes the relationship between humans (farmers, researchers) and non-humans (PGRs, conservation techniques, laboratory conditions) creating practices, knowledges and socialities that transform seeds into intellectual commons. These practices inhibit the interaction between the farmers and the resources (seeds) stored at CRRI. Chapter 2 addressed this problem by suggesting the further development of biosocial relations and commonisation of seeds facilitating farmer access to the conserved varieties.

Specifically, the chapter suggested this reconnection referring to the concrete examples of seed village programme and seed vending machines (SVMs) or seed automated teller machines (ATMs). A Seed Village Programme (SVP) implemented by the Indian Government in mid-1960s already disseminates HYVs from the CRRI genebank. Thus, it was suggested that these SVP can be also used to transmit the seeds stored in the (distant) genebank for the use by farmers. Similarly, the use of seed Automated Teller Machines (ATMs) that are already functioning in India can be used to dispense seeds informed by the needs of farmers. This programme can be extended with greater SVP/ATM coverage on the provision of sufficient funding. Thus, the development of an extensive network of the SVP and seed ATMs are visualised as means to provide spaces through which biosocial relations that are disconnected by storing seeds at genebanks could be re-connected with the fields and farmers furthering the process of commonisation of PGRs in India.

6.3 Collective resistance: practices, community seed banks and the commonisation of seeds

The objective of the third chapter was to provide additional insights into the commonisation process by investigating the collective resistance[95] of a marginalised community towards the political (state policies)[96] and social factors (caste

95 DDS efforts with *sanghams* directed at creating CSBs for the storage of local seed varieties which are contextualised in this chapter as a resistance because these activities were directed towards the creation of an alternative to the dominant food system based on rice and wheat.

96 The resistance of the community here was to the Indian government Public Distribution System (PDS) which was viewed as a market-driven political intervention that contributed to the destruction of the local food system. For detail description please refer to Third chapter of this thesis.

discrimination)[97]. This was done by analysing the collective activity of the Dalit (lowest caste) women in Telengana, South India through Community Seed Banks (CSBs). The collective activities of these women aimed at defending local millet varieties by creating a common pool of seeds. This chapter thus provided insights on commonisation of seeds through the functioning of the CSBs within the context of broader socio-political relations (state and regional politics) and cultural dimensions (an informal seed network). The study further reflected on the multiple ways in which the community, its collective resistance practices and functioning of CSBs interact with and influence each other.

It was found that food, culture and religion play an important role in building the collective practices of these CSBs. These factors stimulate the functioning of seeds as commons only when the community members identify themselves with the local food (korra, jonna, etc., prepared from different millets) creating interactions between the resources and the members. In this case, millets were conserved, shared and cultivated only when the community identified that their dependence on the external food like rice through Public Distribution System was leading to the destruction of their local food practices and food culture based on millets. Thus, it was established that socio-cultural factors not only bring the community together through members' sharing of a common social identity[98], but also create possibilities for the development of collective activities furthering the commonisation of seeds. However, the importance of political (state policies) and social factors (caste discrimination) in generating resistance and creating collective activity cannot be overlooked. A positive relationship was established between the disconnection of a marginalised community from its food source, associated culture, local religion and the commonisation of seeds (through collective activities).

This case reflects the importance of social relations in the functioning of the CSBs through *sanghams* and in the commonisation of seeds. The CSBs functioned as common-pool resources (CPRs) where *sanghams* (voluntary groups) looked after the day-to-day functioning of the CSBs, such as procuring seeds, maintaining the stock and flow of the resources through rules-in-use (collectively established and informally structured). The *sanghams* in this case rebuilt social relations among the members and resources through collective practices of conserving and sharing seeds. The collective activities of seed conservation further re-established the community practices based on indigenous knowledge and sharing. From these instances, it is derived that the collective practices facilitated through informal social ties furthering commonisation also involve interaction between the resources and the

97 The community also resisted to the discrimination is that was based on caste (the control of resources by the higher caste) as well as gender. For detail description please refer to Third chapter of this thesis.

98 The members of the community shared common social identity of being Dalit and women.

community. It was found that apart from furthering the collective activities, the seed saving through CSBs also contributed to the members at an individual level. The members and their families through seed saving activities became self-sufficient in matters related to seeds as source of production and also attained self-confidence challenging the caste hierarchy and monopoly over these resources.

This chapter further established that identity of the community members plays a significant role in furthering the collective activity and commonisation of the seeds. Following Nightingale's (2011) interpretation, the research indicated that through the involvement in the *sanghams* and collective activities, members develop an empowering normative subjectivity. This normative subjectivity helps them in challenging the caste (and gender) system and extending the commons. Describing the empowering normative subjectivity in this chapter, the concept of space of commons is introduced to study the space in which this marginalised community encounters and negotiates its common lived experiences.

The concept of space of commons was developed in the chapter by referring to Bourdieu's (1985, 1989) notion of social space and Aistara's (2011:494) notion of '*new culture of relatedness'*. It is the common lived experience that the *sangham* members share with others as members of a (doubly) marginalised community in Indian society which brought the community together. Following Bourdieu (1985,1989) space is understood as multidimensional but at the same time demarcated structurally into social spaces where individuals are placed or agents act in relation to others placed outside this space. This space was reproduced when the *sangham* members (Dalit caste women) differentiated themselves from that of men and other higher castes through the seed saving activities of *sanghams*. Aistara (2011) is referred to understand the relation between the members of CSBs which is not based on kinship or biology but '*through the common management of other biological species – the plants and their seeds*' forming a '*new culture of relatedness*' (Aistara, 2011: 494). This culture of relatedness was reflected in the chapter through informal social ties and informal seed exchange among the members of the CSBs.

The evidence of a space of commons was found in the study when the marginalised yet empowered community encountered and negotiated a common lived experience. Thus, the collective activities not only foster the development of commons but also create a space of commons in which the marginalised community furthers the commonisation of the resources. This chapter found that the collective resistance of the marginalised community through the informal seed networks helped in preserving the traditional food culture and enhanced a space of commons that furthered the commonisation of seeds.

6.4 Strategies of seed repossession: processes, practices and commonisation of seeds.

The fourth chapter addressed the processes of seed commonisation by analysing various practices of repossession. The chapter established through the debates on repossession and commons that resources cannot be studied as an independent category to be governed and managed as commons. The mode of production and attempts to capitalise resources rather determine the process of commonisation. In the chapter, therefore I analysed the processes of repossession and commonisation through the concept of metabolic rift[99].

This chapter focused on analysing repossession through a comparative study of four different practices of resistance to the appropriation of seeds. Similarities and differences were identified for two farmer-oriented, local grassroot movements (Loka Samabaya Pratisthan [LSP] and Sambhav) and two open source practices, the Open Source Seed Initiative (OSSI) in the USA and Open Source Seed System (OSSS) of the Organic Farming Association of India (OFAI).

A positive correlation between the socio-political context of the metabolic rift, the mode of appropriation of seeds and strategies of repossession was established in this chapter. These strategies of repossession further determined the processes of commonisation of seeds. The two NGOs in India being based in different socio-political contexts resorted to collective activities to return seeds to the domain of commons through local communities. On the contrary, the two open source initiatives in the USA and India reclaimed seeds from enclosure (restrictive rights) through collective practices based on open source principles. The practices adopted to bring seeds into the domain of commons also varied across the four cases. The two NGOs relied on informal networks (with social relations of exchange and double-return)[100], while the open source approach of OSSI (employed also by OSSS) used property relations and formal networks based rights and duties. Thus, the socio-political context of the metabolic rift, mode of appropriation of seeds and strategies of repossession in this chapter played an important role in determining the processes for commonisation of seeds.

The chapter indicated through the four cases that access to resources is important for sustaining freedom of stakeholders, promoting repossession and commonisation of the resources. This was reflected in the sharing activities of the two NGOs through

99 'Metabolic rift' here refers to 'the effect of a specific mode of production, namely industrial capitalism, which destroys the human-nature metabolism in an endless pursuit of profits' (Salleh, 2010: 206).

100 Double return: a principle whereby borrowers agree to return twice the amount of seed that they take (the following year).

their informal seed networks which promoted access to the conserved resources, their cultivation and through that their repossession and commonisation. Similarly, the open source initiatives also facilitated access and sharing of resources through legal means providing freedom to stakeholders promoting resource repossession and commonisation. In contrast to these similarities, the chapter found differences among the practices in relation to the indigenous knowledge. On one hand the practices of the two NGOs re-established social relations between the stakeholders and the resources by relinking the practices of repossession with indigenous knowledge. For OSSI, on the other hand, indigenous knowledge did not play an important role rather knowledge of the criteria required for registering varieties were relevant, which mitigated for disconnection between the resources and the stakeholders.

The understanding of commonisation (of seeds) also varied among the NGOs and the open source initiatives. The two NGOs regarded seed in general as a part of nature to be conserved and restored to maintain the ecological cycle where farmers were the direct beneficiaries of this commonisation practice. The open source initiatives, however, visualised open access to seeds as restoring freedom under a royalty-bearing licence system that prioritised plant breeders as beneficiaries over farmers. Thus, the study concluded that different practices understand commonisation of resources differently and pertinently in relation to different stakeholders.

In spite of these differences, all the practices of repossession were found to create a space of commons. Combining Bourdieu's (1985, 1989) notion of social space with Aistara's (2011:494) '*new culture of relatedness'* it was established that a space of commons created opportunities for the four initiatives through which they redefined their relations with the resources. In case of the two NGOs, a space of commons was developed by the communities collectively defending their autonomy and freedom in matters related to seeds redefining relevant production relations. The space of commons was further extended by the two NGOs engaging in seed sharing with a larger community through the informal organic seed networks. A similar space of commons was also found in case of the open source initiatives where the open source principles broadened sharing and access to resources based on commons rather than restrictive principles (Intellectual Property Rights [IPRs]). Combining all these cases, the chapter established that the space of commons created through repossession of resources can become important facilitators for developing strategies for the commonisation of seeds in India. It also pointed out that for commonisation of seeds there is no singular strategy rather a multitude of strategies are possible based on socio-political and ecological context to counter appropriation of resources.

6.5. Abilities of stakeholders: access to PGRs and implications for their commonisation

This chapter used the ability perspective to investigate factors determining farmers' access to the conserved landraces within the context of two different conservation practices (ex situ and in situ) and investigated the implications of this for the process of commonisation. First, through a review of the literature this chapter argued that access to resources is not only determined through property relations but also through various other access mechanisms. The access mechanisms were identified as mechanisms via negotiation, social identity, knowledge and ideology. The chapter thus analysed the ex situ genebank (CRRI) and three in situ seed banks (DDS, LSP and Sambhav) introduced in Chapters 2-5 to consider issues around access from an ability perspective suggesting implications of this on commonisation of seeds.

The chapter found that the three NGOs provided positive correlations between the abilities of farmers to access resources, the biosocial relations and biosocial commons creating possibilities for commonisation of the resources. In these cases, the informal basis of accessing the resources through different abilities re-established interactions between the farmers and the resources. Access to the resources through ability of stakeholders also increased their independence and self-sufficiency in matters related to the resources. This provided the stakeholders with the means of production (seeds) as well as social benefits by restabilising the cultural practices and indigenous knowledge associated with the cultivation of the resources. Thus, stakeholders could derive both biological and social benefits from the resources by strengthening the biosocial relations between them and the resources. The chapter through the in situ conservation practices found that collective arrangements and an informal basis of access facilitated biosocial relations and thereby contributed to the functioning of the seeds as biosocial commons. This co-relation was missing in the case of the ex situ genebank, where legal mechanisms dominated in granting, controlling, managing and sharing the conserved resources. This hindered the formation and development of biosocial relations and ultimately affected the functioning of seeds as biosocial commons. The chapter through these descriptions established that organisations or institutions that manage resources collectively through informal seed networks create possibilities for the commonisation of the resources as biosocial commons. Institutions operating on formal or legal rules, on the contrary, inhibit the possibilities for stakeholders to establish working social relations through collective activity limiting possibilities for the commonisation of the resources as biosocial commons.

The study also reflected on the institutional structure through which access to the resources were controlled and managed in the four cases. The three NGOs based on internal power divisions determined stakeholder access to the resources through the social relations and informal social ties based on social identity (DDS and Sambhav), assumed ideology (LSP) and trust (Sambhav). For the ex situ genebank, however, access to resources was based on a centralised institutional structure determined by the property relations. The mechanisms through which resources were accessed also determined whether they were used collectively or exclusively. The NGOs used informal social ties which made the resource use collective (for farmers and communities), whereas the ex situ used property relations which made the resource use exclusive (for plant breeders and scientists). Thus, the chapter indicated that informal social ties and the location of PGRs storage also play an important role in the case of PGRs management and access leading to their commonisation.

The study also identified problem areas associated with accessing landrace varieties stored under different mechanisms affecting the commonisation of the conserved resources. Taking the case of the three NGOs, inhibiting factors identified were the qualitative traits that an individual or organisation has or have to build for access notably, creating social ties, gaining trust and having a similar social identity to that of the NGOs. These traits may be difficult or even impossible for some individuals or organisations to attain. Similarly, inability to contact the ex situ genebank due to its geographical remoteness acted as an inhibiting factor in this case. Referring to these drawbacks, the chapter further suggested activities that might increase stakeholders' access through a better dissemination of resources employing different mechanisms as appropriate to the different conservation practices (ex situ and in situ). The chapter also indicated the open source principle use which might counter the limitations of property rights system using the example of Open Source Seed System (OSSS) making access to PGRs more open.

This chapter broadly established that the web of social relations extended through informal seed networks exhibits a strong ideological undermining with internal power divisions. However, the practices of access based on ability create interactions between the resources and the stakeholders leading to biosocial relations and furthering the process of commonisation. The study suggests that informal systems of conservation (in situ) and sharing can provide mechanisms by which practices of access based on stakeholders' abilities could be more attainable. These practices further the possibility of commonisation of resources based on the ability of the stakeholder.

6.6 Discussion on findings contributing to the debates on PGRs and commons

The study analysed the commonisation of resources by taking four distinct issues relevant to the analysis of PGRs, especially seeds as commons. Applied through specific research questions it approached the four issues in reference to a specific conservation context such as;

- The disconnection of seeds from their biosocial environment.
- Resistance of the community to the state policies and caste discrimination.
- Repossession of seeds through resistance at local level.
- Abilities were discussed in terms of access to PGRs conserved in seed/gene banks.

Below, I summarise the different chapters in respect of their contributions to the larger debate on PGRs and commons.

- The debate on disconnection of PGRs from different stakeholders has been reflected in the commons literature in terms of appropriation and enclosure of resources leading to their commodification (Aoki and Luvai, 2007; Kloppenburg, 2010, 2014). These studies analysed disconnection through IPRs. Here, the ex situ genebank study reflected on the disconnection of PGRs from their biosocial environment through the scientific practices (involved in conserving and transforming seeds into intellectual resources). The findings of the study suggested that, contrary to the earlier debates, the disconnection of PGRs from the biosocial environment need not lead to commodification or enclosure. On the contrary, in this case it created a pool of intellectual commons. However, the intellectual commons created through the disconnection was exclusive in nature.
- Different scholars have studied the intangible aspect of PGRs as commons (Dedeurwaerdere, 2012; Halewood et al., 2013; Roa-Rodríguez and van Dooren, 2008) but failed to show the process of disconnection and commonisation. This is an addition to the existing literature in which most scholars like Hayden (2003, 2005) and Dedeurwaerdere (2012) limit themselves to reflections on the intangible nature of PGRs conserved at genebanks. They highlighted the disconnection of the conserved resources but not to the process through which the disconnection occurs. This process is elaborated through the ex situ genebank study.
- The study of the disconnection of PGRs from their biosocial environment through the genebank opens a new trajectory for reflecting on the possibilities of reconnecting PGRs with their biosocial environments. Through this, the

study contributes to the debates on disconnection, particluarly to the study by Dedeurwaerdere (2012), where possibilities for the reconnection of PGRs stored in genebanks were neglected.

- The third chapter focussing on resistance through the collective activities of a marginalised community contributed to the studies of seed networks through debates on commons. Scholars like Aistara (2011), Da Via (2012) and Bezner Kerr (2013) have analysed seed networks as source of resistance. Other scholars like Shrestha et al. (2005), Shrestha et al. (2006), Bezabih (2008), Shrestha et al. (2013), and Vernooy et al. (2015), have analysed the community management of seeds through CSBs. The study on CSBs adds to these studies. It presents an empirical analysis of the seed networks describing collective activities facilitated through socio-cultural identity (gender and caste) in which women of a marginalised community resisted to the state policies.
- The study on CSBs showed a correlation between disconnection of the marginalised community from their food, culture and religion through social and political factors that led to resistance and a commonisation of seeds. This adds to the studies on the commonisation of PGRs where resistance is established only in relation to IPRs, such as by Srinivas (2006) and Kloppenburg (2010, 2014).
- Through the empirical analysis of the CSBs, I elaborated on a space of commons concept referring to Bourdieu's (1985, 1989) notion of social space and Aistara's (2011:494) concept of a 'new culture of relatedness'. The focus on resistance and the creation of subjectivity served as key aspects for the formation of this space. The space of commons concept refers to a socio-economic or, more broadly, cultural space in which the marginalised but empowered community encounters and negotiates a common lived experience. I followed Bourdieu (1985,1989) in understanding commonality as defined in relation to that which is external. In practice, this means that the space of commons defines what and who is external to the community and/or network. Thus becomes a platform for defending the common goal and negotiating subjectivity with others who are placed outside this space. Here, the *sangham* members challenged the caste hierarchy by conserving seeds through CSBs, which acted as a space of commons. In this sense, the chapter also elaborates Aistara's (2011:494) '*new culture of relatedness'*, which refers to individuals sharing a space of commons insofar as they are related through participation into an informal social network (and not formalised relations, such as those based on kinship or biology). This is reflected in the

study through informal social relations that are developed among farmers relating to one another '*through the common management of other biological species – the plants and their seeds*' (Aistara, 2011: 494).

- Through the reflection on the activities of the Millet Network of India (MINI)[101] and Café Ethnic,[102] the third chapter further suggested that the collective practices of conserving seeds through the CSBs can also lead to scaling-up possibilities for local commons. Thereby, the study also provides instances showing that collective practices of conserving seeds at local level can be broadened through informal networks (MINI) and restaurants (Café Ethnic) transcending local boundaries. This engages with wider debates about food culture, further broadening the scope of commonisation of seeds.
- In the fourth chapter, I analysed repossession through the activities of two NGOs in Odisha and comparison of these with the activities of two initiatives propagating repossession through open source developments were made. This analysis adds to the commons literature on repossession through its reflections on the various strategies aimed at repossessing PGRs as commons. Scholars like Kloppenburg (2010, 2014) have analysed the repossession of PGRs enclosed through IPRs using the open source mechanisms. In this study, I point to other activities those of grassroots organisations (the two NGOs) that can also contribute to PGRs (seeds) repossession and commonisation. This study differs from the way Kloppenburg (2010, 2014) analysed repossession using the commons literature as for the study practices of repossession were described using the theories of metabolic rift as developed by scholars like Wittman (2009) and Salleh (2010). This perspective provides possibilities to study initiatives that repossess seeds other than through open source mechanisms. Specifically, the initiatives resisting the commodification of seeds by challenging the industrial mode of production through organic farming and informal seed networks.
- In the fifth chapter, I analysed access to PGRs through an ability perspective rather than the rights perspective, thereby contributing to the literature on management and access to conserved resources by different stakeholders. Scholars like Herdt (1999), Dedeurwaerdere (2012), Schmietow (2012) and Halewood (2013) have considered access to PGRs through a rights perspective, where politico-legal institutions determine the access of different stakeholders. In this study, I looked at access to conserved PGRs through

101 MINI is a nationwide network of communities and organisations producing and sharing millets.

102 The Café Ethnic restaurant serves only local foods prepared from millets to encourage farmers to cultivate millets.

the access framework of Ribot and Peluso (2003). Using this framework adds to the access literature focusing on criteria other than rights, such as access via negotiation, through social identity, through knowledge and through ideology. Further, I add two additional ways with which access was determined in the cases studied namely through informal seed networks and social relations, further extending the mechanisms proposed by the theory of Ribot and Peluso (2003).

6.7 Possibilities for the commonisation of seeds as biosocial commons

The study analysed PGRs, especially seeds investigating whether and how opportunities for commonisation of these resources as biosocial commons emerge in the Indian context. The four issues of disconnection, collective resistance, strategies of repossession and ability of stakeholders which guided the study are distinct but related to the process of commonisation and to the broader issue of seeds functioning as biosocial commons. Focussing on the interrelations between the four distinct issues and commonisation I will describe the ways that collective arrangements enable PGRs, especially seeds to function as biosocial commons.

Following van Dooren (2009:375), biosocial is defined in an agricultural context as '*the way in which humans are inextricably entangled with various non-humans in both the cultivation of crops and the making of agricultural socialities, knowledges and practices*'. It is using this idea that the concept of biosocial commons is developed in this study. In brief, the working definition of biosocial commons in this study referred to those common resources where communities interact with the resources continuously (re) creating various kinds of social relations which not only help the community to derive biological benefits from the resource but also the social benefits built upon the collective practices of the community. To explore this commonisation process of PGRs, especially seeds as biosocial commons I now reflect on the overall findings of the study.

- It was found that disconnection of seeds from their biosocial environment makes them exclusive (the case of CRRI), underused (the case of DDS) and creates metabolic rift (the cases of LSP and Sambhav), whereas reconnecting the resources to their biosocial environment provides a means to develop biosocial commons. Therefore, picking out the various points of disconnection can provide a means for researchers to study specific factors that lead to the disconnection of resources from their biosocial environment. From this point

analysis towards the possibilities for a commonisation of these resources can be made. Here, the disconnection of resources from their biosocial environment was found to create an exclusive commons (at the ex situ genebank), but mapping out this disconnection also brought out the possibilities for reconnecting the stored resources to their biosocial environment. The study concludes that in order to develop the commonisation of seeds as biosocial commons, researchers need to examine areas of disconnection and then identify possibilities for (re)connection. The possibilities for (re)connection can be realised by identifying concrete possibilities for (re)linking the resources with the stakeholders and with their biosocial environment. For example, this was proposed in case of the ex situ genebank, where relinking was suggested by disseminating seeds through the village seed programmes and seed automated telly machines. Developed according to the local needs, this can lead to a commonisation of seeds as biosocial commons within an institutionalised framework, such as that of the CRRI genebank.

- Chapter 3 looked at the relationship between collective resistance and commonisation of PGRs. The study found that the identity of the members of the community in this case acted as one important variable in resisting dominant practices related to food, caste and gender systems. These identities further created normative subjectivities through collective activities and contributed to the commonisation of the resources. A continuous interaction was observed between the community and the resources through the seed management, governance and sharing. This practice of the CSBs provides an instance of actively working biosocial relation and community deriving both biological and social benefits from the conserved resources. Seeds in this case can be seen functioning as a biosocial commons.
- The study of CSBs also provided insights into the space of commons concept as a useful tool for studying the commonisation of seeds. There are different categories of space used to analyse the participation of individuals, described as closed, invited, claimed/created spaces[103], but these categories '*are not the only possible spaces – the critical kinds of spaces for engagement will vary across context and historical setting*' (Gaventa, 2006: 27). Similar space was reflected through the analysis of the CSBs, where a normative subjectivity among the community members enabled solidarity and provided opportunities to resist inequalities creating a space of commons for the community. This space of commons involves a culture of relatedness on the basis of which members negotiate and defend their common lived experience through a collective

103 For details on different types of spaces see Gaventa J. (2006) Finding the spaces for change: a power analysis. *IDS bulletin* 37: 23.

arrangement. These negotiations and contestations again provide instances of continuous interaction between the resources and the community. The study therefore suggests that analysis of seeds as biosocial commons remains incomplete if they do not refer to the space of commons.

- The organisational dynamics of the CSBs studied in the third chapter were based on unequal distribution of power among the collective group (*sangham*) heads and other members, but this organisational dynamics did not create an unequal distribution of benefits among the members. This can be regarded as an important aspect for further studies on seeds as commons. The study indicates that seeds in case of the CSBs can function as biosocial commons (as assumed earlier) even within a hierarchical organisation structure if they are managed through collective practices with an equal distribution of benefits among the community.
- In the fourth chapter various practices of repossessing seeds were analysed to provide insights into the commonisation of seeds. The three NGOs studied showed a positive correlation between the abilities of farmers, biosocial relations and biosocial commons through their repossession practices. The study established that accessibility to resources increases stakeholders' independence and self-sufficiency in matters related to these resources creating possibilities for repossession and commonisation. The commonisation of seeds in such cases is based on the notion of reclaiming lost rights, regaining access to and control over resources and re-commoning of that which had been enclosed (through restrictive IPRs). Thus, I suggest that the study of PGRs as biosocial commons should focus on first, critically analysing the metabolic rift. Then search for an entry point to study repossession and through these highlight the possibilities for commonisation engaging with the abilities of farmers, biosocial relations and biosocial commons. Researchers should especially focus on cross-sectional studies of repossession with multiple cases analysing the power relations among different members and the effects of these on the interactions between the resources and the stakeholders. They can further draw from these relations to analyse commonisation of PGRs, especially seeds as biosocial commons.
- The findings of the study suggest that repossessing resources through informal means as was visible with the three NGOs helps in re-establishing the biosocial relations. This further provides opportunities for seeds to function as biosocial commons. Thus, the study suggests that informal means of access, informal seed networks and informal social relations can facilitate the commonisation of seeds as biosocial commons.

- In the fifth chapter, the institutional structures (places) where seeds are conserved were also found to be important for the commonisation of seeds as biosocial commons. For example, seeds stored at the ex situ genebank disconnect seeds from their biosocial environment, whereas the three NGOs manage these resources maintaining the biosocial relations. Further, the resources conserved at the NGOs provide both biological and social benefits. It can be derived from these instances that the institutional structure (place) where seeds are conserved also creates or inhibits possibilities for the commonisation of seeds as biosocial commons.

The above mentioned processes and practices are the core aspects for commonisation of PGRs, especially seeds as biosocial commons. Summarising, the findings of the study imply that scholars interested in studying the commonisation of PGRs, especially seeds as biosocial commons should consider the following:

- The areas of disconnection (to identify possibilities for reconnection)
- The different aspects of contestation and negotiation that take place among the community for the use of the common resources (for a complete analysis of the operation of, inhibitions on and potentials for commonisation)
- The various practices for repossession of PGRs into the domains of commons (for usage of the resources, especially by small and marginal farmers).

6.8 Recommendations for further study in this area

The study has highlighted processes of commonisation of PGRs (especially seeds) through different cases by analysing both their biological and social benefits. However, there were certain areas that remained outside the scope of the study and can be taken up by other scholars. Below are some recommendations for further study in the area of commonisation of PGRs.

- The study recommends analysis of PGRs commonisation considering the biosocial relations and context specific to ex situ genebanks (Chapter 2). This can provide new possibilities to recognise and reconstruct the biosocial context of the ex situ genebanks and create opportunities for a commonisation of PGRs that go beyond the exclusive use of the PGRs conserved there.
- Scholars should focus on analysing multiple case studies of power relations between the stakeholders who control conserved resources and those who maintain their access through different mechanisms. I reflected on the different organisational dynamics but did not engage in a deeper analysis

of power relations which was beyond the scope of this study. For example, through the CSB study (Chapter 3), I indicated that the collective activities are organised in a hierarchical power structure in which *sangham* heads enjoy a greater degree of power than the other members but benefits are shared equally.[104] Therefore, additional research is need into these power relations which will further add to the commons literature on power relations and access distribution which has received relatively little attention. As Agrawal (2003) also points out, even successful commons institutions can exhibit internally coercive power relations.

- Multiple case studies of collective activities involving marginalised communities can help to introduce new dimensions to the concept of the space of commons and commonisation of seeds. This will add to the literature on commons and marginalised community which remains neglected in the commons literature. I presented the Dalit/DDS case as an example of collective activity where a marginalised community is creating a space of commons. Reflecting further on similar cases through the concept of a space of commons may introduce further case-specific dimensions.

6.9 Implications of the study

Overall the findings of the study add to the scant literature on the processes of commonisation of PGRs, especially seeds. Seeds have been studied as commons (Aistara, 2011; Demeulenaere, 2014; Kloppenburg, 2010, 2014), but the process through which they become and develop as commons has been missing in the literature. This study has contributed to fill that gap. The findings of the study further suggested certain implications for different PGRs' stakeholders, such as the ex situ genebanks/institutionalised conservation systems, NGOs and formal seed networks.

Ex situ genebanks/institutionalised conservation systems: The second chapter suggested reconnecting seeds from the ex situ genebanks with the biosocial environment referring to concrete examples by establishing seed vending machines (SVMs or seed Automated Teller Machines) and through the Seed Village Programme (SVP). These suggestions are possible in the Indian context where the SVMs or seed Automated Teller Machines and SVP are already functional, albeit in a limited way. This study suggests that these or similar mechanisms even including CSBs and other seed networks can be used to dispense seeds extended or established by (in relation

104 For a detail understanding please refer to Chapter-3 of this thesis.

to) ex situ genebanks generally (worldwide) as a means of relinking the stored varieties in the genebanks at different regions for local farmer's needs.

NGOs: The study found that the practice of organising mobile seed festivals[105] helps in the better dissemination of resources leading to better resource access for farmers. Moreover, these festivals are mobile which enables the extension of the informal seed networks among different villages and through them possibilities of disseminating resources throughout the country.

Formal seed networks: The study found that formal seed networks, such as OSSI, adhere to no restriction on derivative uses of the resource under the protected commons and its application in agriculture which also includes genetic modification (Kloppenburg, 2014). This might be seen as contradictory to the goals of grassroots organisations that are based on organic farming and take an anti-GM crop stance. This problematizes its application in the Indian context. Indeed, the study found the Open Source Seed System (OSSS) initiative developing in India aligned with open source principles, however indicates a different perspective on the repossession of seeds. This initiative is a reaction to the introduction of IPRs, particularly addressing to the drawbacks of the Indian Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act and Biological Diversity Act (BDA). This initiative can be seen as tailored to the Indian context and may be taken as a model to develop further open source seed initiatives in India.

6.10 Overall Discussion

In this study on the commonisation of PGRs, especially seeds in the Indian context the interaction between (small and marginal) farmers or the stakeholders and the resources were regarded as essential. These interactions helped in the creation of biosocial relations to further the functioning of seeds as biosocial commons. Overall, the study found that the biosocial character of the PGRs, especially seeds is not fully revealed when they are analysed only as intellectual commons, limited commons or global commons. On the contrary, the commonisation of PGRs as biosocial commons is revealed when the interaction and inter-relations between the PGRs and socio-political context is analysed considering the biological, social and cultural relations between the resources and the different stakeholders.

The process of commonisation of PGRs as biosocial commons was expressed in

105 It was found through the study of CSBs of DDS that the community celebrated seed festivals every year where farmers brought their seeds in small earthen pots and carried them through the villages using decorated bullock carts. This festival extended and established new seed networks among different villages, as well as contributed to the local network of social relations.

the case studies researched and presented here where informal social relations and seed networks formed the core platform through which different stakeholders interacted with the resources. The repossession of resources through informal means and informal basis of access to conserved resources was found to be crucial to commonisation of PGRs as biosocial commons. In addition, the role of common ideology, the identity of the community members and the place where the seeds are conserved (conservation bank location) acted as major facilitators for creating possibilities for the commonisation of resources and formation of biosocial commons. These factors can be taken as important variables in determining the commonisation of PGRs, especially seeds and their functioning as biosocial commons.

This study further suggests that extending and strengthening the informal networks can increase the resource flow creating biosocial relations in local areas and regions, within a nation and beyond. This will also expand the commonisation of PGRs where they function as biosocial commons. For example, the informal seed networks in this study helped in the flow of resources in and among different communities in India leading to commonisation of PGRs that can be further taken up, at a global scale even. From this, it follows that similar networks should be forged through extensive alliances creating international seed networks and thus facilitating a further flow of these resources. This greater flow of resources is essential to the provision of biological and social benefits for farming communities through the collective social relations built upon the use of these resources ultimately, that is, for the development of biosocial commons.

Apart from the theoretical implications, further studies of the commonisation of PGRs, especially seeds as biosocial commons will also help scholars in reconstructing the various mechanisms through which PGRs can be utilised to protect and promote agrobiodiversity and commons. Thus, I also suggest the study of social and cultural relations through an analysis of the potentialities of these resources to become biosocial commons, contributing to further debates on the commonisation of PGRs, especially seeds as biosocial commons.

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Summary

Plant Genetic Resources (PGRs), especially seeds form an important element for sustaining human life (through food production) and social relations (by maintaining agricultural socialities). Therefore, conservation and management of PGRs in form of seeds is essential for plant breeding, agricultural production and to meet the growing food demand of the increasing population. However, the changed use of PGRs through enclosures and appropriation by the Intellectual Property Rights creates underutilisation of these resources, risking their important societal role. The study delivers insights into the processes of commonisation of PGRs, especially seeds as biosocial commons. It provides understanding into the ways PGRs can be managed and governed as commons that can undermine the risk to their societal role and facilitate these resources for providing both biological and social benefits to the communities.

The thesis describes and analyses how the informational (traits) and biological aspects of PGRs (seeds) are conserved, managed, governed and utilised under different conservation systems (in situ and ex situ). Describing these processes it also establishes whether and how opportunities for commonisation of PGRs as biosocial commons emerge within these contexts. Deriving from the existing literatures and theories this study focuses on four distinct issues of disconnection, collective resistance, strategies of repossession and ability of stakeholders to provide insights broadly into the processes of commonisation of PGRs. These issues were established to be the core features in discussing commonisation of PGRs and were reflected in the thesis in different chapters through an in-depth, qualitative research approach.

The research analysed three cases of bottom-up perspective of commons produced through Non-Governmental Organisations (NGOs) and one case of intellectual commons produced through institutionalisation of PGRs. The first case of a public ex situ genebank, the Central Rice Research Institute (CRRI) looks at the disconnection of PGRs, while the second case reflects on the collective activity of resistance through management of community seed banks (CSBs) by the Deccan Development Society (DDS). The third and fourth cases involve small, local initiatives; Loka Samabaya Pratisthan (LSP) and Sambhav with a relatively wide outreach that foster collective action for repossession through in situ seed banks. Together, the four cases reflect different aspects of the commoning of PGRs and also contribute to an understanding of commonisation of PGRs. Analysing the four cases on the issues of disconnection, collective resistance, strategies of repossession and ability of stakeholders further provide implications for commonisation of seeds, particularly in countries like India.

The empirical studies

The thesis in its second chapter connects the process of commonisation of PGRs to the issues of disconnection of the resources from their biosocial environment. It was found that storing seeds at genebanks disconnects the resources from their biosocial environment. Further, the evaluation of genetic traits within the stored seeds through the scientific intervention at the genebank creates the divide between the resources (seeds) and their informational content. However, this division has dual function, first it provides opportunities for creation of intellectual commons and second it creates exclusivity in terms of its users. This transformation taken together inhibits the creation of biosocial commons by hampering the interaction between the resources and the farmers. By analysing the disconnection the chapter provides possibilities of re-connecting the PGRs through different socio-scientific procedures. Thus, the chapter concludes that disconnection of seeds from their biosocial environment leads to the creation exclusive but positive intellectual commons.

The third chapter provides insights into the collective resistance of a marginalised community, the Dalit (lowest caste) women in Telangana, South India in defending local millet varieties by creating common pool of seeds through Community Seed Banks (CSBs). This chapter establishes that disconnection of the community from their local food system can generate resistance and collective activity among the community. The resistance and collective activity further brought in the interaction between the resource and the stakeholders through informal social relations and seed networks. In addition to this, the collective activity also generated empowering normative subjectivity where caste system and gender inequalities were questioned creating a social space of commons. This chapter thus brings in the socio-cultural aspects of commonisation of PGRs by reflecting on the collective resistance of the marginalised community.

The fourth chapter demonstrates the relation between repossession and the commonisation of seeds analysing the diversity of singular initiatives and discussing their commonalities as well as their differences. The analysis reflected on two NGOs of Loka Samabaya Prathisthan and Sambhav as well as activities of Open Source Seeds Initiative (OSSI) in the USA and Open Source Seed System (OSSS) in India to provide understanding of different strategies for repossession. This chapter establishes how socio-political and ecological context play an important role in determining the strategy for repossession and commonisation of PGRs which further inhibits or facilitates the production of seeds as biosocial commons drawing from these various initiatives.

The fifth chapter reflects on the ability of the stakeholders and commonisation of PGRs analysing access through the ability perspective. The study examines four comparative cases of common resource (PGRs) management in India to analyse how individual abilities and relations to a resource along with institutional rights influence his/her access and the chances of deriving benefits from that resource. This chapter finds that apart from institutional rights other factors like the social relations, ideology, negotiations and social identity of a stakeholder determines their ability in accessing the conserved resources. This subsequently affects the commonisation of seeds and further the creation of biosocial commons. Thus, the chapter established that the ability of the stakeholders also determines the process of commonisation of PGRs as biosocial commons.

Comprehending the findings this thesis reflected broadly on processes of commonisation of PGRs, especially seeds through four distinct issues of disconnection, collective resistance, repossession and ability of the stakeholders. However, it was also established that the informal seed networks in the cases analysed stimulated in establishing the biosocial relations between the stakeholders and the biosocial environment. The biosocial relation further led seeds to function as biosocial commons. The thesis thus proposes that strengthening of these biosocial relations through informal seed networks can lead to the commonisation of the PGRs, especially seeds as biosocial commons in the Indian context.

About the author

Archana Patnaik was born in Rourkela, India, on 24th August 1983. She grew up in Bhubaneswar, Odisha doing her schooling from D.A.V. Public School, Unit-VIII. She studied Social Sciences from B.J.B Junior College. During her intermediate studies she secured the seventh position in merit list in the state of Odisha and was awarded The Kalinga Medha Samman and Rajiv Gandhi Chhatra Prativa Puraskar. She graduated from B.J.B. (A) College, Utkal University with Sociology Honours, in 2005 and stood third in the Merit list of Sociology (Hons.). She moved to Hyderabad Central University to complete her Masters in Sociology and was awarded the Post-Graduate Scholarship by the Hyderabad Central University. In 2008, she qualified the University Grants Commission Junior Research Fellowship (JRF) in Sociology. She pursued her Masters of Philosophy (M.Phil) in Sociology from Hyderabad Central University during which she worked as a Research Assistant under the research scheme entitled 'Science, Ethics and Technological Responsibility in Developing and Emerging Countries' supported by the European Commission (EC) under Prof. E. Haribabu (Project Investigator), Dept. of Sociology, University of Hyderabad. She was awarded The Netherlands Organisation for Scientific Research (NWO)-WOTRO (Science for Global Development) PhD fellowship and pursued her PhD from Wageningen University, The Netherlands. During her PhD research, Archana participated in various workshops and presented papers in various International Conferences related to seeds and commons which was her area of study. She was also a resource person for Utkal University in 2013 and taught courses on Women and Technology. Apart from her academic training, Archana is also a trained Classical Odissi dancer. She has recently moved to The USA with her husband and intends to peruse her academic career there.

List of publications

Articles submitted, revised and worked on based on different chapters of the thesis entitled; Seeds as Biosocial Commons: An Analysis of various practices in India.

Chapter 2

Patnaik, A., G.T.P. Ruivenkamp & J. Jongerden (forthcoming). Institutionalisation of seeds, intellectual commons and biosocial relations: The Central Rice Research Institute (CRRI), India. To be submitted in revised form to *Science as Culture.*

Chapter 3

Patnaik, A., G.T.P. Ruivenkamp & J. Jongerden. A Marginalised Community, Space of Commons and Autonomy: The Deccan Development Society. Submitted *to Journal of Rural Studies*.

Chapter 4

Patnaik, A., G.T.P. Ruivenkamp & J. Jongerden (forthcoming). Repossession through sharing of and access to seeds: Different cases and practices. To be submitted in revised form to *International Review of Sociology*.

Chapter 5

Patnaik, A., G.T.P. Ruivenkamp & J. Jongerden. Farmers' access to plant genetic resources: Various Indian cases. Is developed to be submitted to *Development and Change.*

Completed Training and Supervision Plan

Archana Patnaik
Wageningen School of Social Sciences (WASS)

Name of the learning activity	Department/Institute	Year	ECTS*
A) Project related competences			
Investigating Technology: Politics, Power and the Social Shaping of Technology	CTC, WASS	2011	4
Writing PhD research proposal	CTC, WUR	2010-2011	6
CTC PhD discussion seminar	CTC, WUR	2010-2012	4
B) General research related competences			
Research Methodology I: From topic to proposal	WASS	2010	4
Writing ethnography and other qualitative interpretative research: An inductive learning approach	WASS	2012	3
Atlas.ti, a hands on practical	WASS	2011	0.5
Working with Endnote X4	WUR Library	2010	
'Genetic Resource Commons: A Case study of Central Rice Research Institute (India)'	1st Thematic Conference on the Knowledge Commons, Louvain	2013	1
'Conservation of Plant Genetic Resources for Food and Agriculture (PGRFA): Emphasizing on differences and conflict over seeds'	WASS PhD day	2014	1
'Efforts to conserve the commons: A comparative case study of an Indian public research institute and a NGO'	2e International conference knowledge shared and agricultural innovation	2014	1
'Institutionalisation of Plant Genetic Resources and intellectual commons: A case study of Central Rice Research Institute, India'	International Association for the Study of the Commons 15th Biennial Global Conference, Canada	2015	1
'Marginalised community, New Commons and Autonomy: A case study of Deccan Development Society in India'	International Association for the Study of the Commons 15th Biennial Global Conference, Canada	2015	1
C) Career related competences/personal development			
Techniques for writing and presenting scientific paper	WGS	2013	1.2
Mobilising your scientific network	WGS	2014	1
Scientific Writing	WGS	2014	1.8
Scientific Publishing	WGS	2014	0.3
Workshop Presentation Skills	WGS	2014	1
Total			**31.8**

*One credit according to ECTS is on average equivalent to 28 hours of study load

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