Shaping Seed Regulation in Nepal

The Role of Networks, Community and Informality

Kamalesh Adhikari

A thesis submitted for the degree of Doctor of Philosophy

School of Regulation and Global Governance (RegNet)
College of Asia and the Pacific
The Australian National University

June 2016

Declaration

This thesis is an account of research undertaken at the School of Regulation and Global Governance (RegNet), the Australian National University, under the supervision of Professor Peter Drahos between February 2012 and January 2016.

The material in this submission is my own, except where acknowledged within the text and references. To the best of my knowledge, this research work has not been submitted for a degree at this or any other university.

Kamalesh Adhikari
6 June 2016

Acknowledgements

I acknowledge the support, encouragement and advice of many people and institutions in carrying out and sustaining my work on this thesis. First of all, I sincerely express my special appreciation and thanks to my supervisor Professor Peter Drahos. With his inexhaustible reservoir of knowledge, he supervised and guided me, providing comments on drafts and helping me develop theoretical and empirical insights. Thanks Peter, your advice on my research (and not to forget my future academic career) has been invaluable.

I also thank Miranda Forsyth for her comments on drafts as a panel member. She enlightened me with her knowledge and helped me, among others, in the analysis of different aspects of the rights of local, indigenous and farming communities. I also thank Hazel V J Moir for her inputs to this thesis as another panel member. She helped me refine my research proposal and generate insights for my fieldwork in Nepal.

The School of Regulation and Global Governance (RegNet) has provided me an inspirational environment for academic insights, professional networks and friendship. I am grateful to Professor John Braithwaite for giving me an opportunity to work with him in a research project that focussed on Nepal and gain from his profound knowledge. I am also thankful to Kathryn Henne and Jeroen van der Heijden for providing time and thoughts on regulatory theories. My special thanks to Seung-Hun Hong, Shane Chambers, Nara Ganbat, Jacqueline Parry and Suzanne Akila for organising formal and informal meetings among the PhD students of RegNet and helping me refine my analysis in many ways. I also thank Robert Cunningham for providing his time to let me know about seed savers in Australia, and Mamoun Alazab for continuous encouragement and advice on the research methodology.

Many thanks to the Department of Foreign Affairs and Trade of Australia for the Australian Leadership Award. It made possible my PhD studies at the ANU. I am grateful to Gina Abarquez, Elaine Ee, Rozana Muir and other people of the Australia Awards Liaison Office for all the academic and administrative support I got throughout my research in Australia and

fieldwork in Nepal. I am also thankful to Lyndal-Joy Thompson and Thilak Mallawaarachchi of the Department of Agriculture in Canberra for providing me an opportunity to make a presentation on my research plan for feedback from government officials and experts.

Many people from different countries helped me by providing relevant publications, reports, documents and/or information on global trends and dynamics of seed regulation and community seed banks. Some of them are Ronnie Vernooy and Michael Halewood of Bioversity International, Italy; Svanhild-Isabelle Batta Torheim and Teshome Hunduma of the Development Fund, Norway; Abhiskar Subedi of Wageningen University, the Netherlands; Guri Kristin Rosendal, Leif Christian Jensen and Tone Winge of the Fridtjof Nansen Institute, Norway; Anitha Ramanna-Pathak of SP Jain School of Global Management, India; and Yogesh Pai of National Law University, India.

I also benefitted from my participation in different international and South Asian events held in Nepal, Norway, Pakistan, Sri Lanka and the US. The feedback of professors, lecturers and students on my guest lecture at the University of Sydney and presentation in an Asia-Pacific Conference at the ANU was also helpful.

In Nepal, a large number of people and institutions helped me collect data from different geographical settings. Let me start by thanking my previous office, SAWTEE. In particular, Prakash Ghimire made it easy for me to arrange site visits and obtain data from community seed banks. Ratnakar Adhikari and Posh Raj Pandey provided me critical information on policy and legal matters. I am also thankful to LIBIRD, USC Canada, the Nepal office of Bioversity International, Oxfam Nepal and Seed Entrepreneurs' Association of Nepal for their cooperation. In particular, I am grateful to Pratap Shrestha, Bhuwon Sthapit, Devendra Gauchan, Balram Thapa, Pitambar Shrestha and Bharat Bhandari. Government officials of the Ministry of Agriculture, Ministry of Forests, Seed Quality Control Centre, and Nepal Agriculture Research Council also helped me a lot during my fieldwork.

I am also grateful to all mobilisers, managers and members of community seed banks, including local farmers of Bara, Kathmandu, Sindhupalchok and Lalitpur districts. Some of them even welcomed me into their homes to undertake interviews and treated me like an important family member. I am also thankful to other interviewees and all other individuals and institutions who helped me from Nepal.

I am especially thankful to Puspa Sharma of the ANU and Paras Kharel of the University of Melbourne for critical feedback with editorial inputs. I am also grateful to Keshab Raj Gautam of the Ministry of Forest and Thaneswor Bhusal of the National Planning Commission of the government of Nepal. Though they were themselves busy in their academic research in Australia, they offered me their precious time to improve my analysis in the thesis, mainly from the viewpoint of government agencies. I am also thankful to Shrutidhar Tripathi, Binod Chapagain, Jyotsana Tamang, Savitri Gurung, Ramesh Sunam, Mandip Rai and Ram Ghimire for feedback on my presentation of fieldwork data and findings at the meeting of the ANU-based Nepali Student Association. Thanks to Uttam Sharma and Bishal Chalise for helping me gather statistical data and also for useful comments on the analysis of national data.

Finally, I cannot express how much I am indebted to my family. My wife Nikunja and daughter Rishita (Urfu) have remained a major source of energy, inspiration, dedication, care, love, support and what not. Without them, I would not even think of commencing this research. Family kids, especially Aarohan, Sejal, Sakshi and Medhavi, also inspired me to continue to work to make them feel proud. My father, mother, younger brother (Bimlesh) and sister (Pranita) were kind and caring during my fieldwork in Nepal. My mother, brother, sister and parents-in-law even came to Australia to celebrate with us the greatest festivals of Nepal, providing further energy and support during the research period. My elder brother “Ramu”, who left this world at the age of 39, was my greatest source of energy and support, and I dedicate this work to him.

Abstract

Scholars often discuss the ramifications of seed regulations for customary dynamics of conservation, use and exchange of local plant varieties in three streams of scholarly writing. These are formality and informality of the seed system, commons and property notions of plant genetic resources for food and agriculture, and community seed banks. This thesis makes an important contribution to these literature, exploring how seed regulation is being shaped and what has been the role of networks, community and informality in the governance of the seed system in Nepal.

The thesis shows that Nepal's formal model of state-led, private-sector supportive seed regulation has failed to address customary dynamics of seed use and exchange and promote farmer-to-farmer seed exchange networks. A key argument is that the role of informality needs to be duly recognised in view of its significant contribution to protect local plant genetic diversity and the rights of farming communities to save, use and exchange seeds. The role of informality is also important in view of Nepal's legislative initiatives to implement the global agreements such as the Agreement on Trade-Related Aspects of Intellectual Property Rights, the Convention on Biological Diversity and the International Treaty on Plant Genetic Resources for Food and Agriculture. Nepal offers an important site of network confrontation as various actors and networks from government, non-government and private sectors have been engaged in promoting their own visions of property and commons. A key finding of the thesis is that Nepal needs to consider these different visions of commons and property and adopt a networked model of regulation to create a seed system that addresses local needs.

The thesis shows that Nepal is also an important site of community seed banks. What makes Nepal's case interesting is the emerging typologies of community seed banks that interact with both formal and informal seed systems. The thesis argues that if community seed banks continue to tilt towards becoming a formal actor like a local seed trading enterprise, there would be implications for local initiatives to conserve native plant genetic diversity and promote customary practices of seed use and exchange.

Table of contents

List of figures

List of tables

Abbreviations

ASA/PB	Semi-Arid Paraíba Network
CATIE	Tropical Agricultural Research and Higher Education Centre
CEAPRED	Centre for Environmental and Agricultural Policy Research, Extension and Development
CET	Centro de Educatión y Techlogia
CGIAR	Consortium of International Agriculture Research Centres
CIMMYT	International Maize and Wheat Improvement Center
COGENT	Coconut Genetic Resources Network
DNA	Deoxyribonucleic Acid Molecule
EOSA	Ethio-Organic Seed Action
FAO	Food and Agriculture Organisation of the United Nations
FNI	Fridtjof Nansen Institute
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GREEN	Genetic Resource Ecology Energy Nutrition
GRPI	Genetic Resources Policy Initiative
GTZ	German Technical Cooperation
IBC	Institute of Biodiversity Conservation
IBPGR	International Board for Plant Genetic Resources
ICIMOD	International Centre for Integrated Mountain Development
ILO	International Labour Organisation
IRRI	International Rice Research Institute
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
IUCN	World Conservation Union
IUPGR	International Undertaking on Plant Genetic Resources
LDC	Least-developed Country
LIBIRD	Local Initiatives for Biodiversity, Research and Development
NAFOS	National Alliance for Food Security in Nepal
NEAT	Nepal Economic, Agriculture and Trade Activity
PGRFA	Plant Genetic Resources for Food and Agriculture
SAARC	South Asian Association for Regional Cooperation
SAWTEE	South Asia Watch on Trade, Economics and Environment

SEARICE	South-East Asia Regional Initiative for Community Empowerment
SEDA	Sustainable and Equitable Development Academy
SMTA	Standard Material Transfer Agreement (SMTA)
TIFA	Trade and Investment Framework Agreement
TOT	Training of Trainers
TRIPS	Agreement on Trade-Related Aspects of Intellectual Property Rights
UBINIG	*Unnayan Bikalper Nitinirdharoni Gobeshona*
UK	United Kingdom
UPOV	Convention of the International Union for the Protection of New Varieties of Plants
US	United States
USAID	United States Agency for International Development
USC Canada	Unitarian Service Committee of Canada
WTO	World Trade Organisation

Chapter 1
Introduction

1.1 Key arguments of the thesis

This thesis shows that a formal model of state-led, private sector-supportive seed regulation has failed to address the local, customary dynamics of use and exchange of native and local plant varieties[1] in Nepal. The thesis argues that the notion of informality does not capture the essence of customary practices of using and exchanging farm-saved seeds as commonly shared resources and undermines the role of farmer-to-farmer seed exchange networks in Nepal.

A key argument is that there exists a variety of notions of commons and property that the regulation of plant genetic resources for food and agriculture (PGRFA) needs to consider in view of the local, customary dynamics of seed use and exchange, and the rights of local, indigenous and farming communities. By developing and using an analytical framework of the "PGRFA knowledge commons", the thesis shows that Nepal's state-led regulation of PGRFA is gearing towards the implementation of restrictive types of commons of exclusive nature even though local, customary practices continue to represent an example of self-regulation of PGRFA as a common heritage or a *positive inclusive commons*.

A finding of the thesis is that a complex typology of community seed banks is emerging in Nepal. There is a possibility of some community seed banks to function more like a local seed trading enterprise of the formal seed system than to serve to protect and promote the use and exchange of native and local varieties within farmers' seed system.

[1] The thesis uses the term "native and local varieties" with a note that not all varieties in farmers' seed system may be native to their lands. Some or many varieties may have come from outside sources. However, these varieties are referred to as local because farmers keep their seeds within their seed system for generations through regular saving and exchange, and over time, these varieties adapt well to local environment and/or appear with additional traits developed and preferred by local farmers. The thesis, however, acknowledges that to many scholars, these terms may have different meanings and values for scientific and other reasons (For example, see Andersen, 2007; Zeven, 1998).

1.2 Regulatory discourse on local, customary dynamics

Since the start of agriculture, farmers across the world have been domesticating, producing, saving and using seeds of native and local varieties. For centuries, farmers have also been exchanging farm-saved seeds through farmer-to-farmer seed exchange networks as commonly shared resources and not as privately-owned or -controlled resources (Halewood, 2014; Halewood et al., 2013; Jackson et al., 2007; Lewis & Mulvany, 1997; Posey & Dutfield, 1996).

The conservation, use and exchange of such varieties are considered important for generating locally reliable options to ensure seed and food security. These practices are also considered important for building trust, reciprocity and communication forming – as Ostrom (1990) says – important building blocks of collective action across farming populations (Gladis & Hammer, 2000; Jarvis et al., 2000; Poudel et al., 2015; Sthapit, 2012; Sthapit et al., 2008). Due to their socio-cultural values and ties with customary practices and knowledge of local and indigenous farmers, native and local varieties are also known as indigenous varieties, traditional varieties, local varieties, folk varieties, heirloom varieties, farmers' varieties and landraces of local, traditional, indigenous or farmers' seed system[2].

Over time, the global and national regulatory trends and dynamics of who would grow, own and market seeds have been changing. The emergence of a new plant breeding and development sector – initially in North America and Europe in the early 20th century – has separated the profession of farming from seed production. Initially with the involvement of the public sector and gradually the private sector, a formal seed system has emerged to regulate the use of seeds through seed and intellectual property laws. Scholars claim that such regulatory developments have already led the world to witness "the seed wars" with technologies like genetic engineering and laws like intellectual property (Borowiak, 2004; Dutfield, 2014, p. 4; Mooney, 1979).

[2] This thesis uses the terms "local", "traditional" and "indigenous" interchangeably, though their meaning and understanding could be a matter of further discussion and insights (For example, see for some insights, Drahos & Frankel, 2012; Sperling et al., 2013).

A review of existing literature suggests that there are three streams of scholarly writing that are important to the discourse on customary practices of use and exchange of local plant varieties and the rights of local, indigenous and farming communities over seeds and traditional knowledge. The first of such stream of scholarly writing can be located within the discourse on formal and informal seed systems (Almekinders, 2001; Almekinders et al., 1994; Cromwell et al., 1993; Douglas, 1980; McGuire & Sperling, 2013; Sperling & Cooper, 2003; Sthapit & Shah, 2001). In this scholarship, it is often argued that due to the Green Revolution initiated since the 1960s and the neo-liberal agricultural policies pursued since the 1980s, seed policies and laws have been paying little attention to the protection of local agricultural biodiversity and traditional practices of saving, using and exchanging seeds under the farmers' seed system.

According to this scholarship, initially through the public and gradually through the private sector, seed policies and laws with a unilaterally focussed linear model of seed sector development strategies have been largely focussing on breeding, multiplication and marketing of new, improved seeds of the formal seed system. Such seed policies and laws have, however, failed to recognise the significance of farmers' seed system that mostly relies on the use, exchange and conservation of the diversity of local varieties. Some scholars have, therefore, called for an integrated seed sector development strategy for addressing the crucial needs of both formal and informal seed systems and merging indigenous and modern knowledge for agriculture development (Husnah et al., 2015; Louwaars et al., 2013; Sperling et al., 2013).

The second stream of scholarship, which emphasises the significance of traditional varieties, mostly draws on the regulation of PGRFA focussing on commons and property dynamics (Correa, 2014; Dutfield, 2014; Halewood, 2014; Posey & Dutfield, 1996; Roa-Rodríguez & Van Dooren, 2008). This scholarship argues that such regulation is being highly dominated by the two global regimes of intellectual property rights – the Convention of the International Union for the Protection of New Varieties of Plants (UPOV) and the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) of the World Trade Organisation (WTO). According to this stream

of scholarly writing, patents and plant breeders' rights are the two forms of intellectual property rights that establish exclusive, monopolistic rights over the production, reproduction and marketing of new plant varieties, and restrict the rights of local, indigenous and farming communities over seeds and traditional knowledge (Drahos, 1996; Matthews, 2011).

Some scholars in this group perceive the enclosure of commons through intellectual property rights – that is, the enclosure of PGRFA which initially prevailed as a "common heritage of humankind" or a "global commons" – as mostly serving the interests of technology-rich countries of the North and multinational seed companies (Andersen, 2008; Halewood et al., 2013; Roa-Rodríguez & Van Dooren, 2008). They argue that such an enclosure – often discussed as the "second enclosure movement" to privatise knowledge commons – does not benefit technology-poor and biodiversity-rich countries of the South. It rather negatively affects the rights of local, indigenous farmers who largely rely on regular saving, use and exchange of seeds of local needs and preferences (Adhikari, 2005; Aoki, 1998; Boyle, 2003; Evans, 2005; Prasad et al., 2012).

Some scholars within this group have also analysed how the global and national intellectual property regimes have undermined the objectives of the two other international instruments – the Convention on Biological Diversity (CBD) and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) – mainly by undermining the rights of local and indigenous farmers (Andersen, 2006; Matthews, 2011; Nair, 2011; Roa-Rodríguez & Van Dooren, 2008; Tansey & Rajotte, 2008).

The CBD requires the contracting parties to implement measures to protect the rights of local and indigenous communities, including their traditional knowledge. Recognising states' sovereignty over generic resources within their territories, the CBD also requires the parties to conclude access agreements based on mutually agreed terms of, among others, access to genetic resources, prior informed consent, benefit sharing and commercial use (Le Prestre, 2002; Oberthür & Rosendal, 2013; Ruiz & Vernooy, 2012).

The ITPGRFA is the first international instrument to provide for the protection of farmers' rights to PGRFA and traditional knowledge,

including the rights to save, exchange, reuse and sell seeds. In addition, the ITPGRFA establishes a multilateral system of access and benefit sharing that includes samples of PGRFA of 64 crops enlisted in Annex 1 of the Treaty. The multilateral system aims to facilitate access to such a global pool of plant germplasms as a "protected global commons" and share the benefits arising from their utilisation in a fair and equitable way (Esquinas-Alcázar, 2005; Halewood et al., 2013).

Mainly since the 1990s, another group of scholars, our third category of scholarship, has come forward with some empirical cases of seed savers' networks in the developed world and community seed banks in the developing world to highlight the importance of the conservation, use and exchange of native and local varieties. Initiated as a grassroots-level initiative since the 1970s, such seed savers' networks and community seed banks have been emerging as important actors and networks for the conservation and use of local PGRFA and traditional knowledge, and are already in operation in more than 40 countries (FAO, 2014; Feyissa, 2000; Lewis & Mulvany, 1997; LIBIRD, 2010; Phillips, 2008; Van Dooren, 2009; Vernooy, 2012; Vernooy et al., 2015).

This group of scholars highlights the role of seed savers' networks and community seed banks in promoting the use and exchange of non-hybrid, open-pollinated seeds of heirloom varieties as a common cultural heritage. Some scholars of this group have even conceptualised the community seed bank to represent a model of an "open source seed network". Their idea is to promote such banks as a means for building and expanding national and international movements that promote an effective open source approach for managing PGRFA as a global commons (Ramanjaneyulu & Rajashekar, 2013; Ramanjaneyulu et al., 2015; Sthapit, 2012).

1.3 Enquiries and aims of the thesis

The above-mentioned three areas of scholarships are at the centre of the international and national debates on how to effectively regulate the duality of the formal and informal within the seed system, and the commons and property notions of PGRFA. All such regulatory debates and outcomes are inter-related and have implications for each other, more so in the case of

countries that have the features of formality, informality, commons, property and community seed banks.

This thesis examines the following three regulatory trends that relate with and/or impact the local, customary dynamics of seed use and exchange and the rights of local, indigenous and farming communities. The first such trend relates to how the formality of the seed system affects local, customary dynamics and establishes the notion of informality in the seed system. The second trend deals with how commons and property notions of PGRFA shape property rights for the state, community and private actors and affect local, customary dynamics of seed use and exchange. Finally, the third trend relates to how community seed banks in the developing world and seed savers' groups in the developed world have emerged to promote the use and exchange of seeds among and between farmers.

With these three lines of scholarship as a background, this thesis conducts a case study of Nepal. The thesis seeks to achieve the following analytical and normative aims. The analytical aim is to contribute to the understanding and analysis of the regulatory trends and dynamics of formality, informality, commons, property and community seed banks. The normative aim is to make a case for the desirability of a seed regulation that promotes the use and exchange of local varieties and protects farmers' customary practices and rights over seeds and traditional knowledge.

1.4 Empirical insights from Nepal

The thesis develops its arguments using Nepal as a case study. Nepal has been chosen for a variety of reasons discussed in the next chapter on methodology. In order to analyse vague and complex global, national and local regulatory landscapes of formality and informality of the seed system, commons and property notions of PGRFA and community seed banks, the thesis relies on a flexible, qualitative research design drawing on the techniques of in-depth, interpretive socio-legal investigation.

A variety of research methods have been used to gather data from a diverse group of actors and networks, involving a total of 118 participants from Nepal's different geographical locations. For primary data, it uses three methods: preliminary observation; semi-structured interviews with key

informants; and focus group discussions with farmers, managers and mobilisers of community seed banks. For secondary data, the thesis relies on socio-legal methods to undertake a review and analysis of documented information and knowledge on international, national and local regulatory trends and dynamics.

1.5 Theoretical underpinnings, concepts and analytical frameworks

The thesis draws on the theoretical underpinnings, concepts and analytical frameworks of formality, informality, commons and property as they form the basis of analysis throughout all substantive chapters. The thesis also draws on the concepts of networked governance, meta-regulation, self-regulation, globalisation of regulation and regulatory capture for developing a case for a networked regulation of the seed system in the conclusion chapter. Below I discuss these concepts briefly in two sub-sections.

1.5.1 Formality, informality, commons and property

Formality is about the formal reach of the law through codified and written rules, directives and contracts. In contrast, informality stands for cultural norms, taboos and values, conventions, customs and practices that are reproduced by all members of the society (Etzold et al., 2009; North, 1992).

This thesis uses the dichotomy between formality and informality, but subject to the observation that the concept of informality needs to be understood in a positive way, rather than a plethora of negative appellations such as hidden, grey, underground, illegal and black market (Feige, 1990; Sindzingre, 2006). In the thesis, formality of the seed system refers to state-led regulations of seeds and intellectual property. Informality of the seed system refers to customary norms, values and dynamics of use and exchange of native and local varieties within farmers' seed system.

Commons and property are important concepts in the regulation of PGRFA at global and national levels. Commons has been understood and defined differently by scholars, for example, as a shared resource, as a common-pool resource and as a common property (Ostrom and Hess, 2007). For the purpose of this thesis, an analytical framework of PGRFA knowledge

commons has been developed based on a typology of intellectual commons discussed by Drahos (1996). The four types of PGRFA knowledge commons – *positive inclusive, positive exclusive, negative inclusive and negative exclusive* – are the four key concepts used to analyse the shifts in common spaces available within the global and national regulations of PGRFA.

For economists, the economic rationale of property rights is that they economise on the use of resources, reduce the transaction costs involved in such use, and assist in a better allocation of resources (Demsetz, 1967). For legal scholars, property is a legally enforceable bundle of rights over resources which property rights holders are free to exercise without interference, neither by the state nor by an individual (Cooter & Ulen, 1988).

This thesis understands property as a social institution; property is embedded within society, people and resources (Bromley, 1989). Chapter 5 explores further the meaning of property rights beyond their economic rationale and explains the distinction between commons as a resource and as a form of property regime.

1.5.2 Networked governance, meta-regulation, self-regulation, globalisation of regulation and regulatory capture

The thesis adopts a broad understanding of governance[3] as "a wider set of control activities than government" (Braithwaite, 2008, p. 1), or broader than government, also covering non-state actors and self-governing and inter-governmental networks (Rhodes, 1996, p. 660). Governing by network is at the heart of the networked governance (Castells, 2000). For example, in networked governance, actors from state, private and civil society sectors not only form but also operate and interact within governance networks to

[3] The traditional concept of governance relies on hierarchical command and control modes of regulation, in which state-promulgated laws are the dominant regulatory tools; the state is a dominant regulator; and depending on the nature of the law, non-state actors, including natural and legal persons, are merely regulatees. However, such classical modes of regulation have been increasingly termed as being inefficient, ineffective and inappropriate under new conditions of governance that are emerging in this information age (Crawford, 2006).

govern the social systems they inhabit (Burris et al., 2005). According to Castells (2000, p. 14):

> "…overall the new state is not any longer a nation-state. The state in the information age is a network state, a state made out of a complex web of power-sharing, and negotiated decision-making between international, multinational, national, regional, local, and non-governmental, political institutions."

Under conditions of networked governance, the commands of the state are not the only source of regulatory power. Instead both state and non-state actors and networks develop and enforce (or influence these processes) regulatory models to govern complex socio-economic processes. Thus, for effective governance outcomes, the networked model of governance "requires the state to steer society in new ways through the development of complex networks and the rise of more bottom-up approaches to decision making" (Stoker, 2006, p. 41).

In a larger context of networked governance, while governments and governance can be understood as providing, distributing and regulating, regulation can be conceived as that large subset of governance which steers the flow of events and behaviours to regulate social and economic life, as opposed to providing and distributing (Braithwaite et al., 2007; Parker et al., 2004). In networked governance, as third parties, non-state actors monitor and influence behaviours, steer the flow of events and enforce rules and practices, for example, to achieve social and environmental objectives. This is in a way similar to what scholars discuss in the case of meta-regulation. Meta-regulation is a claim that third parties are involved in regulation and the state is both the object and subject of regulation, that is, regulated by others (Coglianese & Mendelson, 2010; Gunningham et al., 1999; Parker, 2007). In this thesis, meta-regulation refers to the importance of third parties in regulation.

In regulatory discourse, self-regulation too has been defined differently, but is often used to mean a rule imposed to regulate one's own behaviour (Coglianese & Mendelson, 2010; Gunningham & Rees, 1997). This thesis conceptualises self-regulation to mean the tools and mechanisms developed and implemented by actors and networks of society which they *own* and

find *beneficial* for meeting their needs and preferences of social and economic life.

The thesis undertakes the concept of the globalisation of regulation to mean "the spread of some set of regulatory reforms" through actors and networks at global, national and local levels and "the extent to which principles, standards, rules, guidelines and models of regulation have converged" between or among local, national and global regulations (Drahos & Braithwaite, 2001, pp. 103, 104).

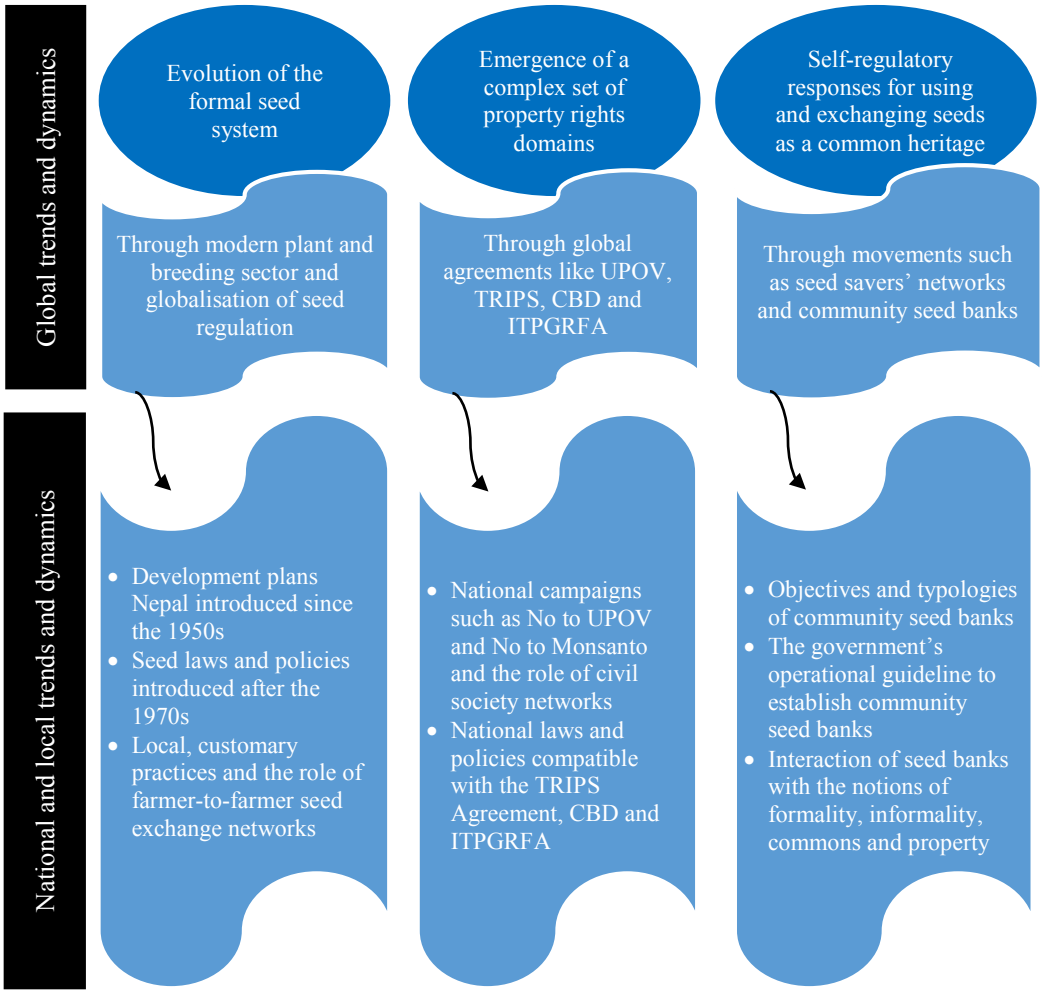
Regulatory capture is another important concept of the thesis. Regulatory capture means an incident or a trend in which regulations are designed or influenced to serve the vested interests of a particular group rather than to work towards achieving broader social and environmental objectives. Here the role of the actors and networks of public interest groups such as civil society organisations become important to play the role of watch dogs or even the preventers of any incident or trend of regulatory capture (Ayres & Braithwaite, 1991).

1.6 Research framework

Nepal has a history of development planning of more than half a century. Since the beginning of the 1950s, its development plans have been following the global trends of developing a formal model of seed sector development, initially as state-led formal regulatory system and later with the involvement of the private sector as a key formal actor. Since the 1990s, Nepal has also been involved in international negotiations and agreements that regulate the use and exchange of PGRFA through a complex set of property rights domains. The global movements of seed savers' networks and community seed banks too have some relevance to the creation, growth and typologies of community seed banks in the country.

Given these regulatory contexts and dynamics at global, national and local levels, the following research framework has been designed to capture and analyse the issues needed for a comprehensive study of how seed regulation is shaping in Nepal and what has been the role of networks, local communities and informality.

Figure 1.1: Research framework for the case study of Nepal



1.7 Overview of chapters

The following 10 chapters present the theoretical and empirical analysis based on the above-mentioned research framework. Chapter 2 discusses the genesis of the idea of this research and the rationale behind the selection of Nepal as a case study. It also presents an analysis of the research methods used for gathering fieldwork data from Nepal's different geographical and context-specific settings.

Focussing on global contexts and a case study of Nepal, Chapters 3 to 10 are the major substantive chapters of the thesis. These substantive chapters are divided into three parts: Part I (Chapters 3 and 4), Part II (Chapters 5 to 8) and Part III (Chapters 9 and 10).

Part I analyses the concepts, trends and impacts of formality and informality of the seed system. Chapter 3 explores a broader context of the discourse on formality and informality; the formality and informality dynamics that have evolved to regulate the seed system across the world; and the emergence and growth of the formal seed system in Nepal. By evaluating the periodic development plans, policies and programmes Nepal implemented since the 1950s, this chapter shows how the government initially developed a public sector-led formal seed system and then gradually started to adopt a model to provide more of a role for the private sector to market high-yielding and improved seeds.

Such regulatory trends also indicate that Nepal has been part of the regulatory processes of globalisation. Right from the 1960s, global actors were key to support the government in introducing improved seeds. They also played a major role in supporting the introduction of a state-led seed law, which is gradually moving towards a private sector-supportive linear model of seed sector development under the neo-liberal development paradigm, a phenomenon common in many other developing countries.

For example, as part of a global trend of improved technology transfer to developing countries, the Consortium of International Agriculture Research Centres (CGIAR) – the International Rice Research Institute (IRRI) and the International Maize and Wheat Improvement Center (CIMMYT) – collaborated with the government to release improved varieties and disseminate the seeds of the same varieties to farmers. Similarly, donors such as the United States Agency for International Development (USAID), the Food and Agriculture Organisation of the United Nations (FAO) and German Technical Cooperation (GTZ) supported the government to develop infrastructure for seed sector development and introduce policies and laws in support of the formal seed system.

Chapter 4 presents an analysis of the regulatory features and impacts of the formal seed system in Nepal, discussing major regulatory institutions and formal actors in various stages such as variety registration and release, and quality control, multiplication and marketing of improved seeds including hybrids. The chapter shows Nepal's increased inclination towards the

import of varieties from outside for release and dissemination of improved varieties and growing reliance on the import of formal seeds, including hybrids, for production and use within the country.

The chapter then discusses the informal seed system, identifying the traditionality of agriculture; local, customary dynamics of seed use and exchange; and the interaction between formal and informal seed systems as three key features of farmers' seed system in Nepal. The chapter shows that a majority of farmers do not rely on formal seed markets but on farm-saved seeds and farmer-to-farmer exchange of seeds. The chapter also shows that within the context of social customs and practices, most farmers in Nepal do not possess any exclusive rights over seeds but believe in worshipping and sharing of seeds as commonly shared resources.

Such dynamics of formality and informality of the seed system then lead to a discussion of the commons and property notions of PGRFA in Chapters 5 to 8 of Part II of the thesis. Chapters 5 and 6 are focussed on academic discussions and global issues. Chapter 5 first explains the meaning and rationale of property rights and commons. It then discusses how commons scholarship has expanded to cover not only traditional commons (physical resources) but also "new" commons (intangible, knowledge-based resources). Chapter 5 also analyses how scholars have conceived the "enclosures" of commons in the first and second enclosure movements – the first dealing with the enclosure of lands and forests where plant genetic diversity lies, and the latter dealing with the enclosure of intangible knowledge-based resources through intellectual property rights. The chapter shows that PGRFA are a complex type of commons with two types of objects of regulation: tangible, physical objects as well as intangible, informational objects.

Given the complex nature of PGRFA as both a commons and a property, Chapter 6 draws on a typology of intellectual commons of Drahos (1996, 2006) to develop an analytical framework of four types of "PGRFA knowledge commons": *positive inclusive, positive exclusive, negative inclusive* and *negative exclusive*. This framework explains how globalisation of intellectual property regulation – through the TRIPS

Agreement and the UPOV Convention – and the global standards on access and benefit sharing and farmers' rights of the CBD and the ITPGRFA have led to a situation where multiple layers of positive and negative commons exist to regulate the use and exchange of PGRFA. In other words, the framework helps to show how such global regulations have moved away from open access-based *positive inclusive commons* to the different categories of restrictive *positive exclusive, negative inclusive* and *negative exclusive commons*.

Following the discussion on global regulations, Chapters 7 and 8 focus on national and local regulatory trends and dynamics of commons, property and PGRFA in Nepal. Chapter 7 first sets a broader national context of the first enclosure movement, particularly highlighting the historical trends of enclosures of natural resources such as land and forest in Nepal. It then discusses the second enclosure movement focusing on the historical and emerging trends and contexts in relation to the regulation of PGRFA. The chapter shows that due to the influence from the regulatory process of globalisation as well as actors and networks at national and international levels, Nepal has been gearing towards the design and implementation of new regulatory principles that largely change the commons and property dynamics of the national regulation of PGRFA, as well as the dynamics of the local seed system. The chapter also discusses the regulatory trends and contexts in relation to regulatory capture, meta-regulation and networked governance, for example, when Nepal was pressured to join the UPOV Convention and partner with multinational seed companies like Monsanto to promote the use and sale of hybrid seeds.

Chapter 8 – using the same framework of PGRFA knowledge commons – analyses how farmers' local, traditional seed system is characterised by the elements of *positive inclusive commons,* that is, all human beings, regardless of geography, race or culture, own and use PGRFA, though only with the consent of the commoners. Then, the chapter analyses the contents of the national regulations by examining the existing legislation, including draft laws that govern the seed system, plant breeders' rights, access and benefit sharing and farmers' rights. This analysis shows Nepal's regulatory initiatives are making a departure from the elements of *positive inclusive*

commons to a complicated system of multiple layers of positive and negative commons.

Part III analyses the concepts, goals, objectives and impacts of community seed banks, together with an analysis of similar networks that operate in developed countries through seed savers' groups. Chapters 9 to 10 of this part investigate how the regulatory dynamics, actors and networks of community seed banks relate with or are impacted by the regulations of formality and informality of seed systems and the commons and property notions of PGRFA. Chapter 9 explores the trends of organised initiatives for conservation, use and exchange of local, native seeds of crop varieties that are well-reflected in seed savers' networks of the developed world and community seed banks of the developing world.

In the developed world, with their sole focus on extending farmers' networks for exchange of heirloom and open-pollinated varieties that are non-hybrid, non-patented and free from genetic modification, seed savers' networks have emerged as important actors to counterbalance the impacts of the formal seed system, intellectual property rights and technologies like genetic engineering. In the developing world, community seed banks have come into existence for a variety of reasons, for example, as a post war recovery instrument, as a field bank of local varieties, and as an enterprise to produce, exchange and sell seeds of local and modern varieties of both informal and formal seed systems.

Drawing on the origin, objectives and functions of community seed banks in Nepal, Chapter 10 builds a case of an emerging typology of community seed banks that interact in different ways with formal and informal seed systems. Within such a typology, there are self-regulatory *de facto* community seed banks that have been active for generations with customary practices to promote the use of farm-saved seeds and their exchange within local, traditional seed system. Likewise, there also exist organised community seed banks that came into existence first in the 1990s and then started to expand thereafter in several regions of the country. As organised community seed banks work within informal or formal or both seed systems, farmers not only have opportunities to protect and promote the use

and exchange of native and local seeds, but also face challenges from the emerging regulatory trends and dynamics of formality and property rights.

Chapter 11 presents the conclusion of the thesis in relation to the formality and informality of the seed system, commons and property notions of PGRFA and community seed banks. It then discusses the desirability of a regulatory system that builds on the concepts of the networked model of regulation. The chapter argues that Nepal's seed regulation needs to move beyond the idea of supporting only the formal seed system through a deliberately constructed linear model of seed sector development. It shows that it is desirable for Nepal's seed regulation to draw upon a model of networked governance to address the interests of the state, private sector, and importantly, local, indigenous and farming communities.

Finally, the chapter highlights the contribution the thesis has made in the regulatory discourse of formality, informality, commons, property, and community seed banks.

Chapter 2
Methodology

2.1 Genesis of the research idea

The idea of conducting this research has its genesis in the outcomes of an international event I participated in 2011. It was the Fourth Session of the Governing Body of the ITPGRFA, held from 14 to 18 March in 2011 in Indonesia. At this session, a major issue of negotiation was the progress made in reviewing, and if necessary, adjusting "national measures" affecting farmers' rights, including the rights to save, exchange, reuse and sell seeds. Contracting parties were to make such progress in accordance with the Resolution on Farmers' Rights (Resolution 6/2009), adopted by the Third Session held in June 2006 in Tunisia.

Before I mention what exactly motivated me to undertake this research, let me first briefly explain why the adoption of this Resolution was not an easy process. Developing countries had been calling for a resolution that would require the parties to review and adjust "seed regulations" as these affect farmers' rights in many ways. These countries were of the view that more focus is often placed on the impacts of patent and plant breeders' rights laws. There is much less focus on formal seed regulations that undermine farmers' rights through strict provisions on variety development, quality control, certification and sale of seeds.

However, as a result of lobbying by some developed countries such as Australia and Canada, the final Resolution on Farmers' Rights was adopted by replacing "seed regulations" with "national measures"[4]. These countries put forward the argument that the Treaty only requires the parties to implement farmers' rights at the national level and it is essentially a national concern. The negotiation on the implementation of the Resolution on Farmers' Rights was an agenda item of the Fourth Session as well. It was pointed out that only six contracting parties had submitted their views on the implementation of farmers' rights and there was rarely any progress in

[4] http://www.planttreaty.org/sites/default/files/R6_2009_en.pdf (last accessed 21 December 2015).

addressing the issue of reviewing and adjusting national measures, including seed regulations.

As a non-government observer of the Fourth Session and a Rapporteur of the Asia and near East region, I had an opportunity to make a presentation in a sideline event organised by Fridtjof Nansen Institute (FNI) of Norway. The presentation was part of the findings of the Report of the Global Consultation on Farmers' Rights organised by FNI in Ethiopia from 23 to 25 November 2011. An excerpt from the report that I made part of my presentation is as follows:

> "In most countries there are national measures in place regulating seed, most have seed legislation and some also have plant breeders' rights, although most of the countries represented have not joined UPOV. National policies on biodiversity are also being developed in some of the countries. The participants agreed on the need for a review of national measures…" Andersen et al. (2011, p. 74).

At the Fourth Session, I also had an opportunity to work closely with government delegates from Nepal, mainly in preparing Nepal's official statements for formal negotiations among the contracting parties. During my informal interaction with a Nepali delegate, I inquired about Nepal's preparation in relation to reviewing and adjusting seed regulations and intellectual property laws. He expressed the concern that no such study had been done by the government. He was also uncertain as to whether any country had in fact undertaken such a study.

I also discussed this issue with the other Nepali participants in the Fourth Session who represented the non-government sector and the national gene bank of Nepal. I received similar feedback. My further interaction with some researchers of a community-based organisation in Nepal – Local Initiatives for Biodiversity, Research and Development (LIBIRD) – added to my motivation to systematically research seed regulations, intellectual property and biodiversity laws. In particular, their inputs helped me to link the research idea to ground-level practices. This led me to think about the experiences of community seed banks in Nepal.

2.2 Research design

A number of factors influenced the research design process. First, I had to deal with the complexity of global and national trends in seed systems largely influenced by the notions of formality and informality (Chapters 3-4). Second, vague and complex global and national regulatory landscapes of commons and property in relation to the use and exchange of PGRFA had to be considered (Chapters 5-8). Third, I also had to address the diversity of global and local dynamics of community seed banks (Chapters 9-10). Additionally, there was the problem of how best to gather data from Nepal's different geographic settings and diversity of actors and networks of state, private, non-government and community sectors working under different contexts of formality, informality, commons, property and community seed systems.

I decided to approach this complexity through a flexible, qualitative research design using a case study approach that drew on the techniques of in-depth, interpretive socio-legal investigation. In particular, the case study approach enabled me to go beyond the study of the dynamics present in a single setting and analyse multiple situations and phenomena faced by actors and networks in different geographical and context-specific settings (Eisenhardt, 1989; Guba & Lincoln, 1994; Yin, 2013).

Between 2012 and 2013, I visited Nepal two times to gather data from different geographical locations and a diverse group of actors and networks, using a variety of research methods. For primary data, I used three methods: preliminary observation; semi-structured interviews with key informants from government, private and non-government sectors; and focus group discussions (as well as semi-structured interviews) with farmers, managers and mobilisers of community seed banks. For secondary data, I used socio-legal methods to undertake a review and analysis of documented information and knowledge on international, national and local regulatory trends and dynamics.

The gathered data were analysed in the context of the concepts and/or analytical frameworks of the regulation of formality, informality, commons and property. The analysis of the data also benefitted from the feedback I

received on the presentations I made concerning the initial findings of this research in different international, South Asian and national meetings held between 2012 and 2015 in Nepal, Pakistan, Sri Lanka, Norway and the USA. During my fieldwork in 2013, I was also invited by the Ministry of Agriculture to moderate a policy meeting on ITPGRFA and Nepal's agenda. The discussion at this meeting helped me to refine my analysis and findings.

2.3 Selection of Nepal as a case study

While Nepal's selection as a case study is rooted in the outcomes of the Fourth Session of the ITPGRFA, there are various reasons why the country fits well in this research. First, though Nepal comprises less than 0.1 percent of the Earth's land mass, it ranks 31st in the world in terms of biodiversity. It is also rich in agricultural biodiversity owing to significant agro-ecological variations and diverse social-cultural settings and farming systems in the mountain, hill and the Terai (plain land) regions (CGRFA, 2008). However, the government's policy has always been to focus more on the commercialisation of agriculture for which it relies on the import of plant varieties and improved seeds. There has been less policy emphasis on the promotion of conservation and use of native and local plant varieties. Importantly, the Nepal Biodiversity Strategy also identifies "commercialisation of agriculture" as a major reason for the loss of agriculture biodiversity in the country (MOFSC, 2002, p. 77).

Second, with 83 percent of a total population of more than 28 million residing in rural areas, agriculture in Nepal – aside from forests and other natural resources – plays a significant role in supporting farmers' livelihoods. These farmers comprise the so-called upper castes such as *Brahmins* and *Chhetris*, as well as 59 indigenous ethnic groups who altogether speak 22 languages and 96 dialects. A majority of Nepali farmers are poor, hold less than 0.5 hectares of land and depend on subsistence farming for livelihoods (CBS, 2011; CGRFA, 2008). The regulatory trends in terms of formal and informal seed systems hold significant implications as a majority of farmers rely on indigenous, customary practices of using their own farm inputs including seeds. There is, however, little academic research on the history, nature, actors and networks of these custom-based

seed systems, and in particular, the interaction between the formal and informal seed systems.

Third, Nepal is a contracting party to the CBD and the ITPGRFA, and is obliged to implement the TRIPS Agreement as a least-developed member of the WTO. As Nepal is in the process of developing relevant national laws, these global regulatory instruments have far reaching impacts on its national regulation of commons and property notions of PGRFA, formality and informality of the seed system and community seed banks.

Fourth, Nepal is a site of intense networked action by civil society organisations and farmers. It has a history of campaigns such as "No to UPOV" and "No to Monsanto" providing data on cases of confrontation and contests amongst networks made up of global, national and local actors. The country is also rich in examples of how networks of state and non-state actors can collaborate to explore and design *sui generis* options to protect the rights of local, indigenous and farming communities over seeds and traditional knowledge. There has been little analysis of these networked contests and collaborations in Nepal, especially how they have shaped Nepal's seed regulation, including the PGRFA regime.

Fifth, Nepal is an important source of data on community seed banks. The idea of establishing a community seed bank was first operationalised in the 1990s in Nepal. Since then, more than one hundred community seed banks have been established covering the country's three ecological regions – mountains, hills and Terai (plain land). While some of the earlier community seed banks were established with support from non-government organisations for the purpose of ensuring the security of local seeds, some others were created as part of the government's programme to ensure food security through the use of quality (often modern, improved) seeds. The effectiveness of community seed banks in Nepal has so far been considered positive, for example, in terms of facilitating the use and exchange of seeds among farmers. However, the typology, nature and impacts of the community seed banks have not been studied using the lens of formality and informality of the seed system and commons and property notions of PGRFA.

2.4 Research methods

The thesis relies on a review and analysis of both academic and 'grey' literature. Reviewing the 'grey' literature was important in relation to gaining insights into the experiences of seed savers' networks, community seed banks, as well as the regulatory issues facing Nepal. Together with the 'grey' literature, the review of the academic literature helped in developing ideas about the concepts, theories and analytical frameworks relevant to the regulation of formality, informality, commons and property.

For fieldwork data, a variety of research methods were applied during the two visits to Nepal, involving a total of 118 participants (Table 2.1). The first visit took place in 2012 between 16 and 30 December for the purpose of identifying the issues that various networks saw as being the important ones to address. Focus group discussion, and then one-to-one interaction with key informants from government, non-government and private sectors, were employed to gain insights into the concerns of these networks. I also got insights into the issues of community seed banks by interacting with farmers involved in the management of such banks in different districts of Nepal. During this visit, I also got important feedback on the presentation I made on community seed banks in a South Asian context at a Regional Consultation on Trade, Climate Change and Food Security[5].

The second visit took place in 2013 between 24 July and 8 October. In this extended fieldwork trip, data were gathered from different actors and networks in different geographic locations. I undertook semi-structured interviews with key informants from government, private and non-government sectors of Lalitpur, Kathmandu and Bhaktapur districts. I also organised a focus group discussion with six mobilisers of community seed banks in the Pokhara district as these mobilisers were directly linked with the 16 community seed banks operating in the different districts of the country. Finally, I conducted semi-structured interviews with the managers of three community seed banks in Lalitpur, Bara and Sindhupalchok districts and later arranged for three focus group discussions with farmers from each of these banks.

[5] http://www.sawtee.org/presentations/SessionTwo20Dec2012.pdf (last accessed November 2015).

Table 2.1: Two phases of fieldwork		
Preliminary observation and mapping of the extent of fieldwork in 2012		
Research methods	***Key dates and districts***	***No. of participants***
Focus group discussion	18 December in Kathmandu	18
One-to-one personal interaction with key informants	Between 20 and 39 December in Lalitpur, Kathmandu and Bhaktapur	11
Main fieldwork in 2013		
Focus group discussion with mobilisers of community seed banks	23 August 2013, Pokhara	6
Interviews with key informants from government, non-government and private sectors	Between 25 July and 8 October in Lalitpur, Kathmandu and Bhaktapur	20
Interviews with three managers of the community seed banks in Dalchoki, Kachorwa and Thumpakhar	Between 4 September and 5 October in Lalitpur, Bara and Sindhupalchok	3
Focus group discussion with farmers of the Thumpakhar Community Seed Bank		17
Focus group discussion with farmers of the Kachorwa Community Seed Bank		15
Focus group discussion with farmers of the Dalchoki Community Seed Bank		11
Interviews with local people[6] of Thumpakhar, Kachorwa and Dalchoki villages		17
Total no. of participants		**118**

2.4.1 Document review and analysis

An important part of my socio-legal method was to review the international laws that were the subject of policy contestation and implementation in Nepal. The TRIPS Agreement, the UPOV Convention, the CBD and the ITPGRFA were reviewed as per the scholarly discussion of their scope, nature and impacts on a country like Nepal. Thus far Nepal has not enacted any national law for the implementation of these international laws. While Nepal is opposed to joining the UPOV Convention, it has introduced draft

[6] These local people included a local school teacher, officers of community projects, farmers and their family members who provided accommodation during the stay in villages, and people available to talk in local tea and food shops.

bills[7] (yet to be enacted as laws) as part of its obligations under the TRIPS Agreement, CBD and ITPGRFA (Chapter 8).

These bills have been the subject of networked scrutiny and contestation and so have gone through a number of revisions. Obtaining the latest (and authentic) bills was key to understanding Nepal's current regulatory framework. I had to contact a number of people in government and non-government organisations to obtain access to the bills. Since these bills have not been discussed in detail and only a few studies exist in the 'grey' literature, I had to rely mostly on the interviews and meetings I participated in Nepal in order to gain an understanding of how people understood their likely operation and consequences. The overall analysis on these (and other) matters of the thesis also benefitted from my previous engagement in policy research in Nepal. I worked at a Nepal-based regional network, South Asia Watch on Trade, Economics and Environment (SAWTEE) between 2001 and 2011, focussing mostly on policy and legal aspects of biodiversity management, intellectual property and farmers' rights.

On formality and informality dynamics, there was very little information, mainly with regard to the growth of the formal seed system in Nepal. I then decided to explore the historical context and development of the formal seed system, by thoroughly reviewing Nepal's periodic development plans and programmes the country had undertaken since the 1950s. Chapter 3 provides the reader with some of the important historical contexts for Nepal's seed system.

I drew on the large literature surrounding informality to help analyse the fieldwork data that I had gathered on the local, customary dynamics of seed use and exchange in Nepal (Chapter 4). I also collected digital copies of all National Agriculture Census Reports and Nepal Living Standard Surveys of various periods to help with the analysis of the formal and informal dynamics in Nepal. For some of the Census Reports, I had to personally visit the Central Bureau of Statistics in Kathmandu and request copies.

[7] Throughout the thesis, these have been referred to as bills and draft bills, interchangeably.

On finding ways to understand the dynamics of community seed banks, I again had to mostly rely on the academic as well as 'grey' literature. Since 2014, there has, however, been some growth in the academic writing on community seed banks. I use some of this writing in Chapters 9 and 10 to develop my arguments. To collect documented data on seed banks, I also used my professional networks. In 2012, when I had just started my research, I contacted an official of the Norway-based Development Fund in order to obtain the case studies of community seed banks that the Fund had conducted in eight countries, including Nepal. After receiving these case studies, I also contacted the officials of LIBIRD and Bioversity International for the case studies and publications they had on community seed banks. They sent me some of their case studies, including a book[8] that provides insights into the global and national experiences of community seed banks.

I have also created a facebook page of Community Seed Banks, in which 454 people are members from different countries, though mostly from Nepal[9]. This has helped me to track important news and developments in the academic and 'grey' literature on community seed banks. In addition, my interaction with the others through this page has also helped me look for data for this research. I have also been a member of the facebook pages of different seed savers' networks[10]. This has helped me observe how farmers in developed and developing countries share views to promote the idea of saving, using and exchanging native and local (heirloom) varieties.

2.4.2 Preliminary observation and mapping of the extent of the main fieldwork

I went to Nepal for a preliminary observation and mapping of the extent of fieldwork on 16-30 December 2012. I organised a focus group discussion in Kathmandu inviting the key actors from the government, non-government and private sectors. Some farmers from the community seed banks of

---

8 Shrestha, P., Vernooy, R., & Chaudhary, P. (2013).

9 https://www.facebook.com/groups/291333294360492/ (last accessed 12 January 2016).

10 https://www.facebook.com/groups/waseedexchange/; https://www.facebook.com/groups/chilliseedsavers/; https://www.facebook.com/groups/PakistanSeedSaversAndExchange/ (last accessed 24 December 2016).

different districts were also the participants in this discussion. My previous office, SAWTEE, helped me organise this meeting on its premises.

I moderated the discussion and also made a presentation on the typology of community seed banks I had developed out of the review of case studies of community seed banks. While I received important feedback on the typology, the discussion provided me with important inputs for the main fieldwork I was intending to do in mid-2013. An important insight I gained from this discussion was the diversity in the structure and objectives of community seed banks in Nepal. I realised that I needed to choose my set of community seed banks for further investigation based on their linkages with formal and informal seed systems. While the ones created by the government seemed more aligned with the formal seed system, the ones created initially by some non-government organisations were working towards strengthening the informal seed system.

This focus group discussion, followed by one-to-one personal interaction with key actors, helped to confirm that interviews and focus group discussions would be appropriate tools for this case study. Overall, this visit provided me with a fair idea about the methods to apply during the main fieldwork, and who to contact for interviews and focus group discussions. It also helped me to estimate a possible timeframe that would be required for the semi-structured interviews and focus group discussions in different locations of Nepal.

2.4.3 Interviews and focus group discussions during the main fieldwork

In the second visit between July and October 2013, I conducted the main fieldwork through interviews and focus group discussions in different geographic locations. Initially, I conducted 20 semi-structured interviews – 8 officials from the Ministry of Agriculture, the Ministry of Forest and Seed Quality Control Centre; 3 from the Nepal Agriculture Research Council (includes the national gene bank); 6 from non-government organisations; and 3 from the private seed business sector. The number of private seed traders is small compared to others, but I was at least able to interview a trader who was a key person in the largest network of private seed entities – Association of Seed Entrepreneurs' Association of Nepal.

The interview sampling was purposive. Interviewees were identified based on their expertise on issues of formality, informality, commons, property and community seed banks. Appointments for interviews were made by myself and in some cases through the help of a local researcher. He also helped me in conducting interviews with key informants, including the managers of the community seed banks in different geographical locations. Interviews were conducted generally over 50-100 minutes.

In the case of gathering data on community seed banks I used semi-structured interviews and focus group discussions with mobilisers, managers and farmers of community seed banks, following the steps shown in Figure 2.1.

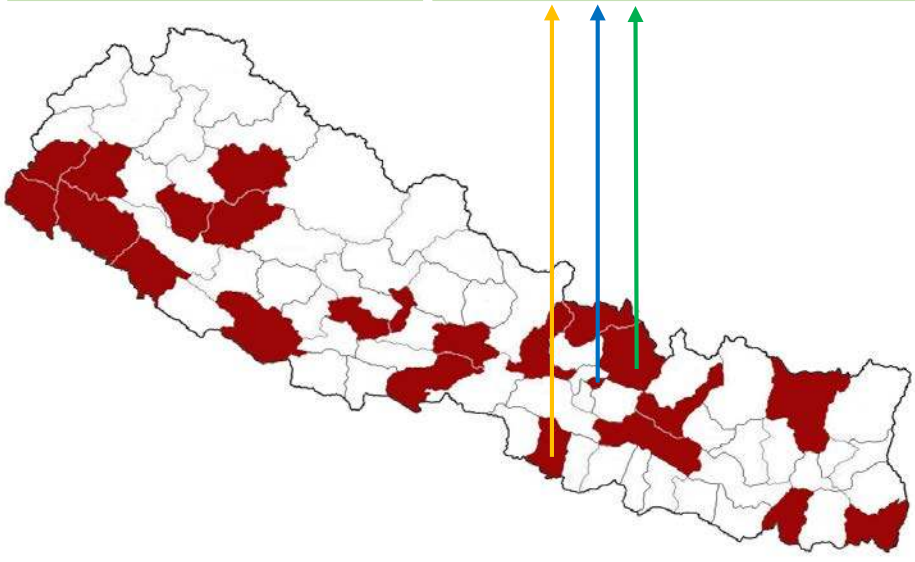
Figure 2.1: Map of Nepal showing the presence of community seed banks in several districts and steps followed to gather data

Step 1: A focus group discussion with mobilisers of 16 seed banks

Step 2: Interviews with officials of the Ministry of Agriculture which created five seed banks with a plan to establish more

Step 3: Interview with an official of Oxfam Nepal which created 90 seed banks in just two districts

Step 4: Site visits to three seed banks for interviews and focus group discussions with farmers, covering low land to high land



Map description: Red locations are the districts where community seed banks have been created in Nepal. Yellow arrow shows the Bara district where LIBIRD and the Nepal Agriculture Research Council have established the Kachorwa Community Seed Bank; Blue arrow shows the Lalitpur district where USC Canada Nepal has established the Dalchoki Community Seed Bank; and Red arrow shows the Sindhupalchok district where the government has supported the establishment of the Thumpakhar Community Seed Bank.
Source of the map: Shrestha et al. (2013).

These interviews led to insights into the experiences of the different banks operating in different locations. In the case of interviews with the mobilisers, managers and farmers, interviews were generally conducted over two hours, as they needed more time to open up and then discuss issues. As shown in the figure, first, I conducted a focus group discussion with six mobilisers of the banks. 'Mobilisers' means the actors involved in the creation and operation of the banks. These mobilisers represented the non-government sector and were directly linked with the creation and management of 16 community seed banks that mostly focus on the conservation, use and exchange of native and local varieties among local farmers. This focus group discussion was conducted in the Pokhara district, where six researchers of USC Canada and LIBIRD – major mobilisers of community seed banks in Nepal – participated for a whole day discussion on the different dynamics of community seed banks, including their origin, objectives and impacts. This discussion was critical to providing important information about seed bank movements across South Asia and in other countries, including seed savers' networks in Australia and Canada.

Second, I interviewed officials from the Ministry of Agriculture. The Ministry has created a different model of community seed banks in different districts. Third, I interviewed an official from Oxfam Nepal which has, in line with the objectives of the government, created 90 community seed banks in Nepal. Finally, I interviewed the managers of three different community seed banks. 'Managers' mean the chief farmers who manage the operation of the bank in coordination with member farmers. These managers then supported me in visiting their sites of work and organising three focus group discussions with 11, 15 and 17 local farmers from the Lalitpur, Bara and Sindhupalchok districts, respectively. These focus group discussions helped in triangulating the information and data gathered from the initial interviews with the mobilisers and managers of the community seed banks. These focus group discussions were conducted for about four hours on the premises of the banks.

For site visits, the Lalitpur district, which is a hill region, was chosen because the Dalchoki Community Seed Bank of the district was the first-ever example of an organised community seed bank in Nepal. It was

established by USC Canada, which supports the creation of community seed banks across many countries through its Seeds of Survival Programme. The Bara district, which is a fertile region of the Terai (plain land), was chosen because the Kachorwa Community Seed Bank of the district is considered an organised model bank for its contribution to the conservation, use and exchange of native and local varieties. This bank was established with support from LIBIRD, the Nepal Agriculture Research Council and Bioversity International. The Sindhupalchok district, which is mountainous and rich in biodiversity, was chosen because of the focus of the Thumpakhar Community Seed Bank on modern, improved varieties of the formal seed system. Its operation is supported by the Ministry of Agriculture.

Having described the methodology of the research, let us now turn to the examination of the regulatory trends and dynamics of formality and informality of the seed system, commons and property notions of PGRFA and community seed banks in the substantive Chapters 3-10. The next chapter discusses the trends and dynamics of formality and informality, and the evolution of the formal seed system Nepal.

Chapter 3

Trends and dynamics of formality and informality: The emergence of formal seed system in Nepal

3.1 Introduction

The development discourse on formality and informality is not new. Scholars have been debating the concepts and features of formality and informality for a long time and in different disciplines. This chapter briefly provides a broader context of the development discourse on formality and informality, highlighting that informality, though often treated as a neglected (or illegal) sector, remains important for development discourse, process and planning. This background will help to provide a better understanding of the role of the informal seed sector in Nepal.

The chapter then presents an analysis of the global trends and dynamics of formality and informality in the seed system including in developing countries. It briefly explores how the regulation of the seed system through formal means and laws got its space and role in separating the profession of farming from seed production, gradually re-conceptualising the oldest farmers' seed system as an *informal* system in the present world of globalisation.

The chapter then provides a historical analysis of how global trends of the formality of the seed system affected Nepal's seed sector from the 1950s. As Braithwaite and Drahos (2000, p. 13) argue, "globalization of regulation never occurs on the basis of a single mechanism, no matter how powerful." This chapter shows that dense webs of internal and external influences have played a pivotal role in creating and expanding the formal seed system in Nepal. As we will see, not only the government, but also the donor agencies, international agriculture research centres and the private sector have been part of such a regulatory process of globalisation.

3.2 Broader context of formality and informality

The development discourse on formality and informality has a history of more than half a century (Guha-Khasnobis et al., 2007). In the 1940s, Julius Herman Boeke, a Dutch anthropologist, identified a developing economy as a "dual economy", which, as he views, comprises an urban market economy with a capitalist nature and a rural subsistence economy with static agriculture system of production (Boeke, 1943, 1953).

As the rebirth of the development economics in the early post-World War II period coincided with the revival of development theories focusing on the workings of the market and the role of the state (Ranis, 2004), a number of economists too have explored the formal and informal nature and characteristics of the dual economy. For example, in the 1950s, the Nobel laureate Arthur W. Lewis – in his theory of unlimited supply of labour from agriculture to industry jobs – discussed labour market dualism, in which one sector is capitalist, modern, industrial or urban (formal) and the other is subsistence, traditional, agricultural or rural (informal) (Lewis, 1954).

Similarly, in the 1970s, two development economists – John R. Harris and Michael P. Todaro – conceptualised the dual economy into a simple equilibrium model that consists of an urban and a rural sector (Harris & Todaro, 1970). Then, Keith Hart, professor of economic anthropology, made an important contribution to the discourse of formality and informality (Hart, 1973, 1985). In fact, Hart is also considered the first person to bring the term "informal sector" into research and policy focus from a Third World context (Guha-Khasnobis et al., 2006). He described the informal sector as an urban labour force that works outside the formal labour market (Hart, 1973).

In addition to Hart, the initiatives of the International Labour Organisation (ILO) are also considered to have played a pivotal role in understanding the dichotomy between formal and informal sectors (Bangasser, 2000; Gerxhani, 2004; Guha-Khasnobis et al., 2007). The ILO has, in particular, contributed to build further the concept of informality, initially based on the

report of the ILO mission to Kenya[11] and later through negotiations for and resolutions on the need to recognise the role and contribution of the informal sector.

Since the concept of informality has come into the research and policy focus, there is a growing interest to explain the informal sector as well as analyse the dichotomy between formality and informality. Over time, analyses of the nature of and trends in formality and informality have not remained confined to an examination of economic dualism or employment and unemployment trends in labour markets. The study of the presence, nature, size and type of the informal sector is also visible in other fields such as criminology, finance, law, political science, public policy, sociology, statistics and trade. Studies on informality are not, however, uniform and have used a variety of contexts and criteria of informality. This is also a reason behind divergent views about how to define, measure, classify, and respond to the informal sector (Hussmanns, 2004).

In addition, the literature on informality is not consistent in using the term itself and has explained it with a plethora of appellations including hidden, grey, shadow, clandestine, underground, illegal, irregular, unorganised, unofficial, unobserved, unreported, unrecorded, unmeasured, untaxed, non-structured, petty production, subterranean, cash economy, second, parallel, and black market (Feige, 1990; Sindzingre, 2006). While such appellations may give a negative meaning to what the informal economy or sector is, there are two main reasons for informality to remain important in development discourse, process and planning.

First, though there were assumptions that it would disappear in the course of economic development (Porta & Shleifer, 2014), the informal sector is increasingly becoming normal. It has emerged in new contexts and guises, and is prevalent in many unexpected places, not only in developing but also in developed countries. Second, support for the informal sector has been

[11] The report was on employment, incomes and equality in Kenya. In the report, “the 'informal sector' consists of things 'done in a certain way'-a way characterized by ease of entry into the activity concerned, reliance on indigenous resources, family ownership, smallness of scale, labour intensiveness and 'adapted technology', skills acquired outside the formal school system and unregulated and competitive markets” (Leys, 1973, p. 425).

growing with the recognition that it contributes to promote growth and reduce poverty (Chen, 2005).

For example, the ILO has argued, recognising the informal economy is a critical aspect of growth and development processes though it remains outside the social protection and tax system. According to a 2002 ILO resolution concerning decent work and the informal economy, the term informal economy refers to:

> "all economic activities by workers and economic units that are – in law or in practice – not covered or insufficiently covered by formal arrangements. Their activities are not included in the law, which means that they are operating outside the formal reach of the law; or they are not covered in practice, which means that – although they are operating within the formal reach of the law, the law is not applied or not enforced; or the law discourages compliance because it is inappropriate, burdensome, or imposes excessive costs"[12].

Since formality is about the formal reach of the law, according to North (1992), it is ensured through codified and written rules, directives and contracts that are outlined, for example, in constitutions, articles of the law, company directives, working contracts, etc. In contrast, as North (1992) mentions, informal institutions operate through (often unexpressed) cultural norms, taboos and values, conventions, customs and practices that are reproduced by all members of the society (Cited from, Etzold et al., 2009).

3.3 Formality and informality dynamics in seed system

According to Bourdieu (1998), informal rules have emerged in accordance with routines, customs or traditions over many years and such rules manifest themselves in a specific habitus (Cited from, Etzold et al., 2009). In the case of agriculture too, traditional practices to secure and store seeds are not a new phenomenon, but have evolved out of local, customary rules that farmers all over the world followed over the past several millennia.

Roughly 10,000 years ago, together with the emergence of agriculture, farmers not only started to domesticate wild plants and animals that today

[12] http://www.ilo.org/wcmsp5/groups/public/---ed_norm/--relconf/documents/meetingdocument/wcms_218128.pdf (last accessed 7 November 2015).

feed the world, but also to use, retain and exchange seeds among themselves for future cultivation and for specific genetic features such as faster growth, taste and adaptive traits. The global plant genetic diversity that exists today is, therefore, an outcome of continuous efforts of domestication, conservation and use by farmers (Harlan, 1975). As farmers developed thousands of crop varieties in hundreds of species (Cleveland et al., 2000), and continue to do so under on-farm conditions, they are considered the conservers, guardians, custodians and innovators of a vast number of crop varieties (Andersen, 2005, 2008; Bala Ravi, 2004; Posey & Dutfield, 1996).

However, since the late 19th century and mainly after the early 20th century, farmers' traditional practices of domestication, conservation and use of crop varieties started to face significant impacts from a number of technological and policy developments in international agriculture (Kloppenburg, 2005). Such developments can be better explained by an analysis of the shift in the regulation of the seed sector, that is, from a formally unregulated traditional, indigenous system of production, saving, use, exchange and sale of seeds under the informal seed system to a modern, regulated system of production, use, sale and marketing of seeds under the formal seed system.

Mainly after the early 20th century, based on Darwin's theory of evolution through selection and the genetic mechanisms of evolution developed by Mendel and others, a new breeding and development sector emerged to apply genetics to develop varieties of crops for commercial seed production (Allard, 1999; Cleveland et al., 2000). Initially with the entry in North America and Europe, this new breeding and development sector – consisting of a highly sophisticated workforce of modern, scientific and professional breeders – made the profession of farming separate from seed production. Gradually in the decades after World War II, this sector started to come up with modern varieties of crops (such as high-yielding varieties, hybrids and genetically modified seeds) and inputs (such as chemical fertilisers and pesticides) (Borowiak, 2004; Kloppenburg, 1988; Tansey & Rajotte, 2008).

These developments had a strong influence on the focus of most agriculture research and development programmes in many countries, including in

Africa and Asia, as they were convinced and assured of the benefits of new technologies in increasing food production and productivity (Louwaars et al., 2013). One may recall here an often-cited statement made by President Harry Truman of the US in his inaugural address on 20 January 1949:

> "…we must embark on a bold new program for making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas…More than half the people of the world are living in conditions approaching misery. Their food is inadequate. They are victims of disease. Their economic life is primitive and stagnant. Their poverty is a handicap and a threat both to them and to more prosperous areas." (Truman, 1999, p. 4).

While Banerjee (2003, p. 149) criticises this statement for setting "the stage for the new imperialism", there are grounds to believe that in the decades after the 1940s, the transfer of technologies from the developed world and international agriculture research centres to the developing world became a major thrust to advance agriculture development and ensure food security. For example, supported by advanced techniques of plant breeding, a technology for dramatic increase in yields came to the forefront of agriculture research in the form of the Green Revolution. Though the research for this technology started in Mexico in the 1940s, the Green Revolution was promoted, for example in South and East Asia, since the 1960s (Pinstrup-Andersen & Watson II, 2011).

At the start, the Green Revolution, with accompanying technology such as chemical fertilisers and pesticides, focussed on the establishment and development of the public sector so that high-yielding varieties were transferred to farmers for cultivation. The same notion also motivated the countries adopting this technology to establish and strengthen centralised seed production units as public institutions or state enterprises (Cromwell et al., 1992; Louwaars et al., 2013).

However, since the mid-1980s and 1990s, due to the economic trends of structural adjustment and liberalisation – which were also influenced by the commercialisation of agriculture, the gene revolution, stronger intellectual property rights protections, and more open international markets – the seed

production units were transformed into private seed enterprises (Cooper et al., 2006; Louwaars & de Boef, 2012; Raney & Pingali, 2005).

Gradually, the neo-liberal structural adjustment, growth and development policies of the 1990s not only strengthened the role of the private sector in agriculture research and dissemination, but also led to such private sector-supportive seed policies and laws that focus more on market-oriented formal seed systems (Louwaars et al., 2013). As modern plant breeding – supported by modern chemistry, biology, genetics and also information technology – advanced (Suslow et al., 2002), the private sector expanded to use the global collections of PGRFA and started to encroach upon the biodiversity commons, for instance, by two means.

As Shiva (1993) explains, the first such means were technologies like terminator genes and hybridisation. Both of these do not allow the plants to reproduce seeds[13], thereby preventing farmers from using the traditional technique of saving seeds for future production. The second means were intellectual property rights such as patents and plant breeders' rights. Both of these rights establish or support legal monopolies (exclusive rights for the owners) over production, reproduction, marketing and use of seeds (Also see, Hubicki & Sherman, 2005). These genetic and legal technologies have helped to shape a global seed market in which the share of a few multinational seed companies increased from 21.1 percent in 1994 to 53.9 percent in 2009, creating the situation of a growing corporate control over seeds of the formal seed system (Adhikari, 2009b; Fuglie & Toole, 2014).

Due to these developments, today's seed system – mainly in developing and least-developed countries – is composed of not just farmers who operate through farmer-to-farmer seed networks for exchange and use of seeds. There are also other organisations and institutions involved in different stages of selection, production, multiplication, processing, storage,

[13] Terminator genes are the products of terminator technology, also called Genetic Use Restriction Technologies. With this technology, genetic modification of plants is done to make them produce sterile seeds (Ohlgart, 2002). Likewise, hybrid seeds, also known as F1 seeds, are the products of a plant variety developed through a specific, controlled cross of two parent plants. Since F1 plants do not usually produce uniform offspring, the formal seed actors benefit from regular seed sales by restricting farmers to save seeds for the next season (Also see, Borowiak, 2004).

distribution and marketing of seeds. To put it in terms identified by many scholars, there exist formal and informal seed systems (Almekinders et al., 1994; Aw-Hassan et al., 2008; Etwire et al., 2013; Lomnitz, 1988; Louwaars & de Boef, 2012; Louwaars et al., 2013; Pandey et al., 2011; Sthapit, 2012; Thijssen et al., 2008).

While formal actors and agencies are typically focussed on sophisticated breeding, development and diffusion of high-yielding varieties under formal conditions of certification, standardisation and sale, rural farmers in many developing countries still largely depend on local varieties as these have abilities to live and reproduce in their *in situ* and informal conditions of conservation, selection, saving and exchange (Cleveland et al., 2000).

3.3.1 Formal seed system

The formal seed system is a deliberately constructed regulatory system for delivering certified seeds of verified varieties to farmers (Almekinders et al., 1994). The formal seed system is also referred to as: a) organised seed system; b) conventional seed system; c) commercial seed system; and d) regulated seed system[14]. This type of seed system is guided by seed policies and laws, and characterised by a deliberately constructed and bounded system involving breeding, production, multiplication and marketing of certified seeds of verified varieties, which are tested through a standard quality control mechanism to usually ensure that seeds are uniform, stable and distinct (Almekinders et al., 1994; Sperling et al., 2013; Tripp, 2002). In the case of seeds that are protected by intellectual property rights such as patent and plant breeders' rights, the patent or the plant variety protection laws apply, requiring the seeds to also be new, that is, fulfilling the criteria of "novelty"[15].

Generally, there are certain steps followed in a formal seed system to deliver final products, that is, high-yielding varieties or improved seeds to farmers, and a major emphasis is given on increasing the seed replacement rate. This rate is calculated based on the percentage of area sown out of total

[14] http://www.fao.org/docrep/meeting/ 022/am646e.pdf (last accessed 18 December 2015).

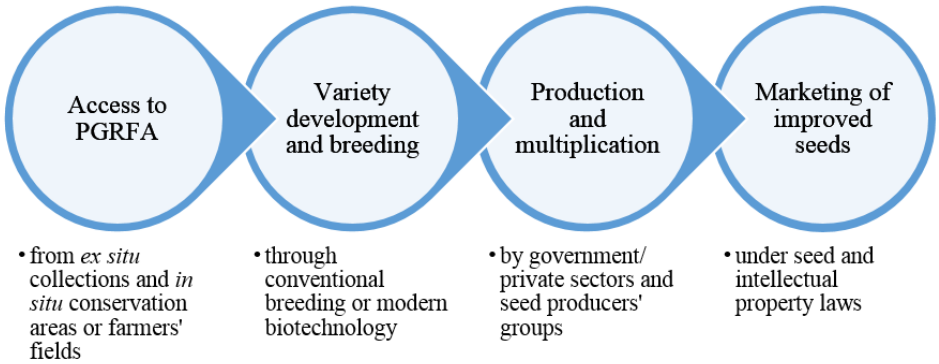
[15] Patents require the seed to fulfill the three criteria of novelty, inventiveness and industrial use; and plant breeders' rights the four criteria of novelty, distinctness, uniformity and stability.

area of crop planted in the season by using the seeds of the formal seed system, and not the farm-saved seeds of the informal seed system.

Access to a plant genetic resource – for example either from the gene banks or breeders' working collections and farmers' fields – is the first step for variety research and development in the formal seed system. The next step is then the development of improved or new varieties through conventional or modern breeding by plant breeders of public or private institutions.

Seeds are then produced and multiplied at different stages of the production of seeds of different class, from nucleus to breeder to foundation to certified to improved seeds, for maintaining genetic purity and meeting other technical requirements, including distinctness, uniformity and stability (discussed further in the next chapter – see Figure 4.3). In the entire process of production and multiplication of different class of seeds, not only government and private actors, but seed producing groups of farmers also engage, mainly to produce and multiply improved seeds. Finally, seeds of improved or new varieties are marketed to farmers, who are the consumers and buyers in the formal seed system, generally under the regulation of seed and plant variety protection laws. Based on the concept of Louwaars et al. (2013), Figure 3.1 shows a general trend of the steps taken in a formal seed system to deliver improved seeds to farmers.

Figure 3.1: General steps for delivering varieties of the formal seed system



The seeds of crop varieties developed in the formal seed system are disseminated or sold often by non-local institutions such as government entities, national research and extension programmes, seed companies,

international organisations and non-government organisations (Jarvis et al., 2000; Maredia & Howard, 1997). One important aspect of the formal seed system is that formal seed markets operate based upon seed policies and laws, which involve formal approval of seeds promoted and approved through official channels and marketing of such seeds through retailers (Lipper et al., 2010; Tripp, 2002).

According to Lipper et al. (2010), in formal seed markets, property rights are explicit, quality is assured, and farmers are guaranteed the identity of the seeds they are purchasing. However, there are two important considerations in this regard. First, the formal seed system, as a market-oriented approach, often focuses on the varieties of economically viable crops that have good recurrent seed demands. For example, it builds on a system of promoting the use of varieties of vegetables, hybrids and some cross-pollinated crops such as maize. To a lesser extent, this seed system concentrates on some self-pollinated crops such as wheat and barley or some vegetative propagated crops, mainly potato[16].

Second, the growth of the formal seed system tends to influence the informal seed system by requiring farmers to purchase the seeds of high-yielding, or improved and new varieties. This way, the formal seed system either leads to the introduction of high-yielding varieties causing the replacement and gradually the loss of local landraces and traditional knowledge; or creates such an environment under which farmers find it difficult to exercise their rights to use, save and exchange seeds, for example, due to strict provisions of private sector-supportive seed laws and the introduction of seeds through technologies like hybridisation (Shiva, 1997, 2015).

3.3.2 Informal seed system

Indigenous varieties – also known as traditional varieties, local varieties, landraces, heirloom varieties, folk varieties and farmers' varieties – have evolved through both natural and human selection. In this process, since the start of agriculture, farmers have not only conserved and developed thousands of varieties but have also developed, inherited and invested a rich

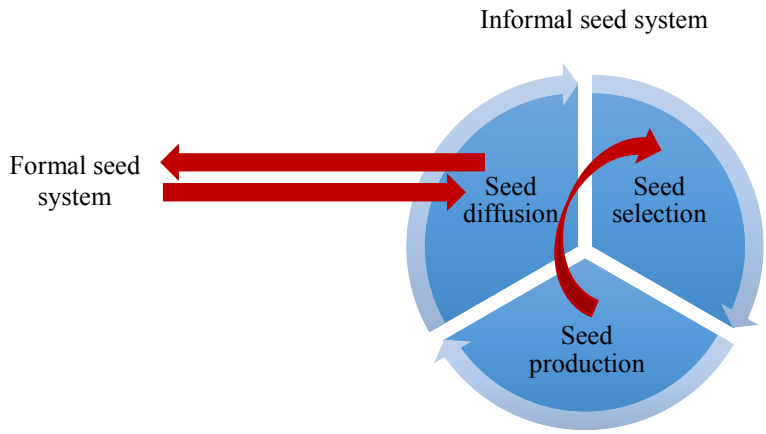
[16] http://www.fao.org/docrep/meeting/ 022/am646e.pdf (last accessed 18 December 2015).

array of traditional knowledge important for food security, climate adaptation and conservation of local genetic diversity (Posey & Dutfield, 1996).

For instance, farmers have been maintaining the seeds of native as well as locally adapted crop varieties gathered from different places and sources through traditional arrangements of use, conservation, exchange, collection and selection. These traditional arrangements also form the basis of the traditional rights of local, indigenous and farming communities over seeds and traditional knowledge and are even recognised in international agreements and national laws of a number of countries (Andersen, 2005).

However, such arrangements and rights – though having originated within local, customary norms long before the emergence of the formal seed system – are often seen as being part of the so-called informal seed system. Under the local seed system, farmers routinely save seeds from one harvest to the next or obtain seeds through social networks based on exchange with, or gifts from, relatives and neighbours, or through bartering with other farmers or purchasing from local markets (Lewis & Mulvany, 1997; Louwaars et al., 2013). Based on the framework of farmers' seed system discussed by Louwaars et al. (2013), Figure 3.2 shows the general steps of seed use and exchange within the informal seed system.

Figure 3.2: General steps of the informal seed system



As the figure shows, under the so-called informal seed system – as opposed to the sophisticated scientific processes of variety development, breeding, multiplication, and marketing of seeds under the formal seed system –

farmers do not follow a linear sequence. They generally follow the traditional mechanisms of seed selection, production and diffusion. Farmers of the informal seed system do not, however, necessarily follow all the three steps mentioned in the figure. In some cases, local farmers may only opt to go for seed selection to production to again seed selection, typically through the use of farm-saved seeds at the household level. Note that around 70 percent to 90 percent of staple crop seed demands of farmers, in particular in developing and least-developed countries, are met through farm-saved seeds and their exchange within the informal seed system (Almekinders et al., 1994; Lewis & Mulvany, 1997; Louwaars & de Boef, 2012).

As the figure shows, another important aspect of the informal seed system is its linkage with the formal seed system. For instance, in the informal seed system, seed diffusion not only results in the creation and expansion of farmer-to-farmer seed exchange networks, but also establishes linkages with the formal seed system in two ways – either providing germplasms to the formal seed system, or bringing in the seeds of the formal seed system for food production, and gradually as in a general case of the informal seed system, for saving and exchange of seeds among farmers (Jones et al., 2001; Louwaars et al., 2013).

This way, the informal seed system is complex and dynamic, and seed selection, production and diffusion processes of this system are influenced by a range of socio-cultural, religious, economic and environmental factors (Almekinders et al., 1994). Though there is not necessarily a distinction between seed and grain, the informal seed system has a very strong linkage with the maintenance of local genetic diversity, and importantly, with food security and livelihood enhancement of farmers. Mostly, this seed system is considered important for those farmers who depend on subsistence farming and live in remote, marginal, unirrigated areas with limited landholding (Almekinders, 2000; Cromwell et al., 1993; Etwire et al., 2013). However, seed policies and laws often focus on pushing local farmers to participate in a profit-oriented formal seed system through a unilaterally focussed linear model of seed sector development. Such a model has, however, largely failed in market terms in the developing world where a majority of farmers, for example in Asia and Africa, still rely significantly on local, customary

practices of seed use and exchange than on formal seed markets (Douglas, 1980; Louwaars et al., 2013; Sperling et al., 2004).

3.4 The emergence of the formal seed system in Nepal

As in many other countries of Africa, Asia and other regions, Nepal's seed sector is also divided into formal and informal seed systems. The government's "National Seed Vision 2013-2025: Seed Sector Development Strategy" (hereafter Seed Vision) recognises the presence of formal and informal seed systems in the country as it states:

> "The informal seed system is characterized by farmers producing and preserving their own seeds for subsequent planting. Often, they exchange this small amount of seeds with other farmers as gift, and for both monetary and non monetary value. Most traditional and local landraces are product of such selection and maintenance process. In addition, these landraces are important genetic resources for modern plant breeding. The formal seed systems are characterised by a vertically organised production and distribution of tested and released/registered varieties by public and private organisations using agreed quality control mechanism. It comprises different phases of seed cycle: Breeder, Foundation, Certified and Improved Seeds" (SQCC, 2013, p. 5).

The long-term Seed Vision is, however, only focussed on creating a supportive policy environment for the formal seed system. There is no section dealing exclusively with the informal seed system or farmers' seed system. Notwithstanding the recognition by the Seed Vision that "there are limited number of farmer preferred improved varieties developed, released and maintained" through the formal seed system (SQCC, 2013, p. 28), the whole focus of this national policy document is on expanding the outreach of the formal seed system.

According to the Seed Vision, the formal seed system contributes less than 10 percent of farmers' requirements of cereal seeds. The same figure is, however, around 66 percent in the case of vegetable seeds, mostly due to the widespread availability and use of hybrid seeds of vegetables as these do not regenerate and need to be replaced for the next plantation. In order to expand the outreach of the formal seed system, the Seed Vision thus aims to significantly increase the seed replacement rate of formally certified and

registered improved seeds of cereal and vegetable crops to 25 percent and 100 percent, respectively (Table 3.1).

Table 3.1: Seed replacement rates of cereal and vegetable crops

	Status in 2009	**Projection by 2025**
Cereal crops (rice, wheat and maize)	> 9%	25%
Vegetable crops	66%	100%
Source: SQCC (2013)		

Such a formal seed system-supportive vision of the government is not, however, a recently conceptualised vision, but is grounded in support and webs of influences made by different external agencies and initiatives taken by the government over the period of several decades. Such support and influences from external agencies and initiatives taken by the government can be explained by a historical overview of the regulatory interventions made under development planning.

3.5 Historical overview of regulatory initiatives under development planning

Nepal's initiative towards creating a formal seed system can be traced back to the 1920s, though formal seed production and distribution by the public sector started only after Nepal pursued development planning in the 1950s. As a major institutional step of the government in promoting agriculture development, *Krishi Adda* (Agriculture Office) was formed in 1921. Then in 1925, this office was converted into Agriculture Department, and an agriculture demonstration farm was established by the Department in Kathmandu, the capital city. In 1947, in order to promote agriculture research and experimentation on exotic crop varieties, an agriculture farm was established in Parwanipur of the Terai region, and another one in Kakani of the hill region[17].

The country was not open to the outside world until the end of 1940s and was being ruled by the Shahs (kings), though the political power was effectively in the hands of the Rana family. After the collapse of the 104-

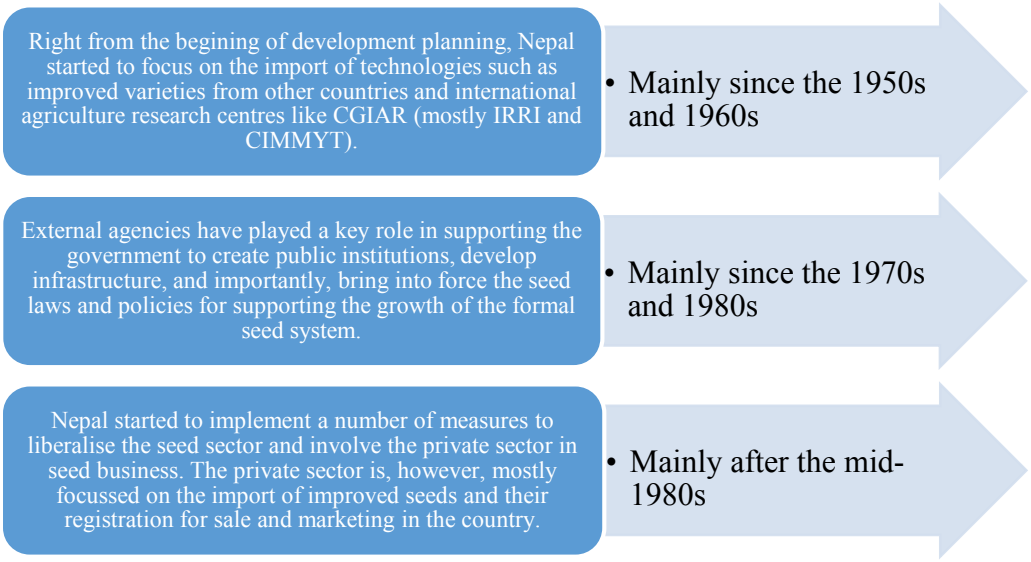
[17] ftp://ftp.fao.org/OSD/CPF/Country%20NMTPF/Nepal/AgExtServDelSysNepal.pdf (last accessed 20 December 2015).

year long Rana oligarchy in 1951, the country witnessed the first parliamentary democracy with an alliance with monarchy of the then Shah king (Srivastava, 2008). This led to some initiatives to open up the country and obtain bilateral aid for development activities from several developed countries and the United Nations agencies (Metz, 1995).

With the support from the US, more experimental farms were established, and different plants of fruits were imported for experimentation in government farms. Also, a US-designed community development approach was imported from India, and the first development assistance received from the US in 1952 was used for agricultural development, including for the creation of the Agriculture Extension Service in 1953 (Pyakuryal & Suvedi, 2000).

In the following sub-sections, I explore how Nepal has been making a number of regulatory interventions in its development plan periods to strengthen the formal seed system. As we will see, irrespective of the changes in the political regimes since the 1950s, there are three key trends which reveal that the growth of the formal seed system in Nepal is not distinct from the general global trends of the rise and expansion of the formal seed system in other countries (Figure 3.3).

Figure 3.3: Key trends of Nepal's formal seed system



3.5.1 From the First to the Seventh Plan (1956 to 1984): The emergence of the public sector-led formal seed system

A few years after the demise of the Rana regime, Nepal's First Five-Year Development Plan (1956-61) was introduced and implemented with much enthusiasm by the first democratic government. After the implementation of this Plan, the government seemed committed to promote formal seed production and distribution by making available more efficient agricultural crops through selection, cross breeding and introduction from other countries; disseminating information about new crops; and educating farmers about the advantages of growing improved crops[18].

A School of Agriculture was created in 1957 to train agriculture extension workers such as junior technical assistants. Through this Plan, the government also supported the establishment of demonstration farms, and importantly, a central breeding station linked with research stations in other zones for trial plantings, plant selection, and breeding of varieties. It also established five agriculture extension centres, which expanded to nine in the Second Three-Year Development Plan (1962-65).

Since the early 1960s, new varieties of cereal crops, mainly rice, wheat and maize, were gradually introduced in different government farms and stations, and made available to farmers through extension services. For instance, the first high-yielding variety of wheat called Larma 52*,* brought from Columbia, was introduced in 1960 for mid hills. As a trickle-down approach, the government initially mobilised village development workers to distribute improved agricultural inputs to the farmers, and junior technical assistants to disseminate information on improved agricultural practices. It was assumed that after a few innovative farmers benefitted from the adoption of improved agricultural innovations, their fellow farmers would be motivated for the same (Pyakuryal & Suvedi, 2000).

In 1960, political parties were banned and power was centralised by the royal palace of the Shahs under the *Panchayat* Regime, which lasted until the end of 1989. Notwithstanding this shift in the political regime, the government's seed sector development strategy did not change, but

[18] http://www.npc.gov.np/images/download/FirrstPlan_Eng1.pdf (last accessed 12 March 2015).

expanded to focus more on the promotion of the formal seed system through the public sector. In the Second Three-Year Development Plan (1962-65), which was also the first monarchy-led Plan, major emphasis was given on the provisioning of agriculture extension, and 11 agronomy farms were established to produce seeds for distribution to farmers[19]. Also, a central seed testing laboratory under the Agronomy Division of the Department of Agriculture[20] was established in 1962 for providing seed testing services to agriculture farms for ensuring quality seed production and distribution. The laboratory obtained a designated membership of the International Seed Testing Laboratory in 1964 and continued to carry out field inspection and seed certification activities.

The Third Five-Year Development Plan (1965-70) aimed at "introducing modern techniques to replace the existing primitive practices" by focussing on expanding agricultural output through "the adoption of new and improved agricultural techniques"[21]. An Agricultural Supply Corporation was also established in 1965 to promote the use of fertilisers, insecticides, agricultural implements, and importantly, improved seeds. The strategy was to mobilise the Corporation for producing, collecting, procuring and distributing improved seeds; testing for purity of seeds; protecting seeds from insects; and grading the seeds.

By the end of this Plan, out of 1,845,000 hectares of the country's cultivated land, improved seeds were being used in 102,630 hectares of land. For the distribution of improved seeds, the Third Plan aimed to establish additional agronomy farms, and emphasised the production of nucleus seeds in government farms and their distribution among the registered seed producers, who would grow seeds under the guidance of technical advisors provided by the government.

The Third Plan led to another major development linked to the then global trends of technology transfer and Green Revolution for agriculture development and food security. Together with other countries, CGIAR

---

19 http://www.npc.gov.np/images/download/Second_Nep.pdf (last accessed 12 March 2015).

20 After the demise of the Rana regime in 1951, the new government had terminated the Agriculture Council and Agriculture Development Committee, and formed the Department of Agriculture.

21 http://www.npc.gov.np/images/download/Thirs_ENG.pdf (last accessed 12 March 2015).

centres like the IRRI and the CIMMYT – as important global actors in the transfer of technologies – started to collaborate with the government through different projects that introduced high-yielding, improved varieties from outside. As a result, a number of improved varieties of rice were released. The parental lines of these varieties were brought from IRRI, Taiwan and India. Under this Plan, not only was a "Grow More Wheat" campaign designed, but in 1965, three improved varieties of maize, the parental lines of which were brought from India, were released. This was followed by the release of an improved variety of wheat called Lerma Rojo 64 in 1966. The parental lines of this variety were brought from CIMMYT.

In the Fourth Five-Year Development Plan (1970-75), an intensive Agriculture Development Programme, which focussed on the use of chemical fertilisers and improved seeds, was designed for implementation in select 28 districts of the Terai and the hill regions. The Plan also emphasised the production of foundation seeds and multiplication of such seeds at government farms to make them available to registered seed growers[22]. The Agriculture Supply Corporation would then purchase the multiplied seeds from such growers and sell the certified seeds to farmers.

In 1974, the establishment of the Agriculture Inputs Corporation[23] further strengthened the formal seed system by enabling it to procure and market seeds at a subsidized rate through its own distribution networks across the country. While Nepal was already receiving fertilisers as aid from countries like Germany, Canada, Japan and Finland, the government enabled the Agriculture Inputs Corporation to also import and distribute fertilisers under a government subsidy scheme for the hills and the Terai. The corporation was largely supported by external agencies such as USAID and the FAO, and organised seed production and distribution continued to increase after

[22] http://www.npc.gov.np/images/download/fourth_eng.pdf (last accessed 12 March 2015).

[23] In 1972, the Agriculture Supply Corporation was merged with the Food Management Committee for a new institutional set up called Agriculture Marketing Corporation. This Corporation dealt with both agricultural inputs and food grains. In 1974, the government, however, decided to split the Agriculture Marketing Corporation into two corporations. As a result, the Nepal Food Corporation came into being for the marketing of agricultural produce, and the Agriculture Inputs Corporation for agricultural inputs, including seeds and fertilisers.

the FAO supported the establishment of a high capacity seed drying, processing and bagging plant for the corporation in the Hetauda district[24].

During the Fourth Plan, four improved rice varieties, the parental lines of which were brought from IRRI, were released. Three improved varieties of wheat, introduced from CIMMYT and India, were also released. In the case of maize, Rampur Composite and Sarlahi Seto were released by bringing the parental lines from Thailand and the Philippines, respectively.

In the Fifth Five-Year Development Plan (1975-80), the government introduced programmes that aimed at establishing seed laboratories in different regions and certifying 10,000 metric tons of seeds by 1980[25]. A number of programmes were also implemented to mobilise government farms for producing breeder seeds and expand extension services to promote further production of foundation seeds by innovative farmers. In 1975, production of vegetable seeds, and in 1977, production of cereal seeds started on a contract basis at the farmers' level. In 1977, the *Tuki*[26] (kerosene lamp) programme was also introduced with a highly subsidised scheme for the use of improved inputs (Pyakuryal & Suvedi, 2000).

During the Fifth Plan, three rice varieties, brought from IRRI, India and Sri Lanka, were released. Similarly, Janaki Makei, an improved maize variety from CIMMYT, and UP 261, an improved variety of wheat from India, were released for the Terai region in 1978.

The Sixth Five-Year Development Plan (1980-85) focussed on the fulfilment of people's basic needs, and continued to place an important emphasis on increasing agriculture production through improved seeds and chemical fertilisers. It set the target of making available 25,725 metric tonnes of improved seeds and 152,852 metric tonnes of chemical fertilisers for increased production of rice, wheat and maize[27]. The Plan focussed on

---

[24] http://www.moad.gov.np/downloadfile/combibed_1374486353_1423039234.pdf (last accessed 12 March 2015).

[25] http://www.npc.gov.np/images/download/fifth_eng.pdf (last accessed 12 March 2015).

[26] A *Tuki* referred to an enlightened farmer who was supplied with improved inputs in order to practice in his/her own farmland so that he/she would also motivate other fellow farmers to follow the same.

[27] http://www.npc.gov.np/images/download/sixth_eng.pdf (last accessed 12 March 2015).

the delivery of "guaranteed and certified" seeds through agricultural farms and centers, and their marketing by the Agriculture Inputs Corporation.

With support from USAID, a Seed Production and Input Storage Project was initiated in 1980, which was implemented for production and improvement of cereal seeds in the hills. Then, with the assistance of the same project, the first National Seed Seminar was organised in 1983. This seminar recommended the involvement of the private sector in seed business, and policy and legislative reforms for the same (MOA, 1983). USAID, together with FAO and GTZ, also supported the establishment of seed processing and storage facilities at five regional centres of the Agriculture Inputs Corporation in the Terai region and 20 mini seed houses in the mid hills (MOAD, 2013a).

In 1981, a rice variety from India, and in 1982, three rice varieties from IRRI and Bangladesh were released. In the case of maize, in 1982, Arun 2 of CIMMYT, and in 1984, Makalu 2, a locally originated variety, were released. For wheat, three improved varieties were released, of which one was introduced from Mexico and two others from India.

So far, we saw that since the 1950s, Nepal remained highly committed to introduce improved varieties for increased food production by bringing policies and programmes that support the public sector-led formal seed system. As we saw, with the involvement of the external agencies in the early years of the 1980s, there have, however, been some developments that convinced the government to open the door for the private sector to come into the seed business. In the following sub-section, I explore how the Seventh to Twelfth Development Plans, under the influence of the global wave of globalisation, support the process of liberalisation and then the involvement of the private sector in the formal seed system.

3.5.2 From the Seventh to the Twelfth Plan (1985 to 2013): The rise of the private sector as a major formal seed actor

The decade of the 1980s witnessed the initiation of the processes of globalisation, liberalisation and privatisation throughout the world. For developing countries, structural adjustment programmes were prescribed as a major set of regulatory reforms in the overall development sector,

including agriculture. Nepal was not an exception. Since the mid-1980s, Nepal gradually embarked on the path of liberalisation and globalisation. Its open and liberal economic measures were designed under the Structural Adjustment Programme and the Enhanced Structural Adjustment Facility due to pressures for economic reforms from the Bretton Woods Institutions (Khanal et al., 2005).

One important feature of the Seventh Five-Year Development Plan (1985-1990) was that the government gradually shifted from the state-led development strategy and started to call for private sector participation for the economic good of the country[28]. Hence, while the public sector was a major actor in supporting the growth of the formal seed sector until the 1980s, a number of significant changes took place thereafter. Economic and development policies were revised or introduced to strengthen the role of the private sector. In 1988, with technical support from external agencies such as GTZ and USAID, the Seed Act came into being to regulate seed production and marketing in the country, and promote private sector participation in the seed business. In 1989, Seed Entrepreneurs Association of Nepal came to the forefront as the first national association of seed entrepreneurs engaged in the sale as well as import of improved (including hybrid) seeds.

Then, following the people's movement of 1990, multi-party democracy was restored with a minimal power to monarchy, that is, constitutional monarchy. Such a major political shift and some institutional reforms made thereafter did not make any change to the government's approach towards the seed sector. The formal seed system continued to receive policy and institutional support for promoting the use of improved seeds and fertilisers through the public as well as the private sector.

In 1990, the second National Seed Seminar was organised to discuss strategies to promote the formal seed system. Since the private sector in Nepal was only operating as seed traders and not as agents of variety development and breeding, the Nepal Agricultural Research Council was established in 1991 as an autonomous public sector organisation to conduct

[28] http://www.npc.gov.np/images/download/seventh_eng.pdf (last accessed 12 March 2015).

agricultural research in the country and as the main agency to supply breeder and foundation seeds[29] (to be discussed in the next chapter).

During this Plan's period, 12 rice varieties were released, most of which were introduced from IRRI, Sri Lanka, Indonesia and India. In the case of wheat, reliance on external agencies and other countries continued as four maize varieties were released by bringing the parental lines from CIMMYT and India. One important development in variety release and registration was the start of registration of improved seeds of a range of imported vegetable crops since 1990.

In the Eighth Five-Year Development Plan (1992-97), which was the first plan formulated after the restoration of democracy, the newly formed government pursued the approach of leading "development through the market-oriented, open and liberalised economy"[30]. Following the implementation of Nepal's Structural Adjustment Programme and consequent liberalisation initiatives undertaken during this Plan's period, privatisation of public enterprises and the involvement of the private sector in economic and agriculture activities featured in the government's policies.

Such policies led to reforms in agriculture research and extension services. The Plan undertook the strategy of gradually involving the private sector in the production, import and sale of improved seeds, emphasising that efforts would be made to enable the private sector to fully undertake these functions by the end of the Eighth Plan. Specifically, the Plan aimed at increasing the area of paddy fields covered by improved seeds from 55 percent to 75 percent, the area of wheat fields from 80 percent to 100 percent, and the area of maize fields from 40 percent to 60 percent. In the case of millet and barley too, it set the target of using 60 and 56 metric tons of improved seeds, respectively, by the end of the Plan period, which was 20 metric tons and 10 metric tons, respectively, in the first year of the Plan.

In the Ninth Plan (1997-2002), the government aimed to develop the agriculture sector through the implementation of the Agriculture Perspective Plan, which was an ambitious 20-year plan implemented since 1997 to

[29] http://narc.gov.np/narc/index.php (last accessed 15 March 2015).

[30] http://www.npc.gov.np/images/download/eighth_eng.pdf (last accessed 15 March 2015).

direct Nepal's agriculture into a commercial track of production and productivity[31]. Both of these plans had the strategy of making Green Revolution-based improved technology the basis of speedy economic development.

These plans thus focussed more on the availability of chemical fertilisers and agriculture loans, by committing to support private, public and non-government sectors for the supply of such inputs under a market-oriented mechanism, for example, by removing subsidies on the supply of chemical fertilisers. The Plan encouraged imports of hybrids, but called for the tracking of imports, as it stated:

> "Some private traders sometimes import hybrid crop seeds from the neighbouring country. Such information should be recorded by the Nepal Agriculture Research Council and be ready to solve the problems of hybrid seed availability. It should also collect information related to hybrid seeds from the international agency and disseminate such information to extension workers and farmers."

In 1999, a National Seed Policy was introduced to create an enabling policy environment for public and private sectors to develop crop varieties, multiply different classes of seeds, and market and trade improved seeds. Also, in the same year, subsidies on chemical fertilisers were completely abolished[32], except for transportation to make fertilisers available in 26 remote districts. In 2001, Nepal also introduced the National Fertiliser Policy to encourage the private sector for making chemical fertilisers available for increased agriculture production and productivity.

The Tenth Plan (2002-2007) emphasised the role of the government as being "that of catalytic, facilitator, and regulator to strengthen the liberal and open market-oriented economic activities", and aimed to activate the private sector more in agriculture[33]. Some important reforms were undertaken during this Plan's period to strengthen the formal seed system. In 2002, a National Seed Quality Control Centre came into being for quality

---

31 http://www.npc.gov.np/images/download/ninth_eng_2.pdf (last accessed 15 March 2015).

32 In 1997, a decision was made to allow the private sector to import and market chemical fertilisers, and to gradually reduce government subsidies on them.

33 http://www.npc.gov.np/images/download/10th_eng.pdf (last accessed 15 March 2015).

control of improved seeds. In the same year, under the Company Act of 1997, the Agriculture Inputs Corporation was split into two different entities, namely Agriculture Inputs Company Limited and National Seed Company Limited, to handle fertilisers and seeds separately.

In 2005, the then king took over the political power, which frustrated the political parties, including the Maoists[34]. Yet, the government's thrust to strengthen the formal seed system continued as in the past and a number of rice varieties were released by importing the parental lines from other countries. There was another important development in the case of maize varieties. The first hybrid maize variety called Gaurav was introduced from CIMMYT and released for dissemination among farmers. Then, in 2006, Shitala from Mexico and Deuti from Zimbabwe were released as improved maize varieties. In the case of wheat, in 2004, a locally originated variety called Gautam, and in 2007, WK 1204, introduced from Mexico, were released.

The people's movement of 2006 led to the complete collapse of monarchy from Nepal. A Comprehensive Peace Agreement between the Maoists and the new democratic government was signed and negotiations under a new Constituent Assembly started for a new Constitution aiming to introduce federalism in Nepal. Following this, not only the Interim Constitution of Nepal, 2007 was introduced[35], which recognised food sovereignty as a basic human right, but in the same year, Nepal also ratified the ILO 169, recognising the need to protect the rights of indigenous and tribal peoples. These developments had a direct impact on development planning too.

For the first-time ever in the history of development planning, the Eleventh Plan (2007/08-2009/10) included a separate section on "food security" aiming to establish the right to food in Nepal. The Plan had an objective to increase national self-reliance in basic food products and a mission to bring into force a Food Sovereignty Act[36]. Such a vision could be a reason for the

[34] The Maoists had started an armed conflict in the country in 1996, with severe implications for rural livelihoods and agriculture across all development regions.

[35] http://www.dor.gov.np/documents/Interim.Constitution.Bilingual.UNDP.pdf (last accessed 15 March 2015).

[36] http://www.npc.gov.np/images/download/11tyip_eng.pdf (last accessed 15 March 2015).

Plan's introduction of a Targeted District Priority Production Programme so that each district of the country becomes self-sufficient in one or more than one type of crop seeds.

Yet, the government did not seem to have put a different vision as far as the formal seed system was concerned. For example, in another separate section on agriculture, as in the previous plans, the Eleventh Plan also set the priority to produce breeders and foundation seeds and finally supply improved seeds to farmers, and to facilitate the accreditation of the Central Seed Testing Laboratory with the International Seed Testing Organisation.

By also mobilising local government bodies, it aimed at making the monitoring and regulatory activities more effective to ensure "the sale and distribution of seeds of known quality". For the purpose of facilitating the supply of quality seeds and chemical inputs, the Plan called for the establishment of community and private agriculture resource centres by emphasising the participation of cooperatives, and their strengthening with technical support from government farms.

Notably, during this Plan's period, the registration of crop varieties by the Seed Quality Control Centre witnessed a significant growth through the approval of imported hybrid varieties of cereals as well as vegetables. In 2010 alone, 3 hybrid rice varieties, 4 hybrid maize varieties, and more than 150 hybrid varieties of vegetables were registered. In the case of vegetables too, 39 hybrids of cauliflower, 32 hybrids of cucumber, 27 hybrids of cabbage, 23 hybrids of tomato, 16 hybrids of bitter gourd, 12 hybrids of chilli, and 11 hybrids of brocauli were registered for sale approval in various locations of the country, mostly in high and mid hills and the Terai region.

As in the period of other plans, a number of varieties of cereals were also released during the Eleventh Plan. Five rice varieties were released by bringing the parental lines from IRRI and Indonesia. Similarly, four varieties of maize and two varieties of wheat were released, mostly relying on imported parental lines from other countries.

The Twelfth Plan (2010/11-2012/13) integrated agriculture and food security into one section, and focussed on the strengthening of public and private farms and centres for the production of source and certified seeds, as well as improved seeds[37]. The Plan also focussed on developing the standards of seeds for export. In order to increase agriculture production and productivity, the government also planned for the establishment of community seed banks; promotion of District Seed Self-sufficiency Programme and Maize Mission Programme; and the supply of chemical fertilisers at a reasonable price (I will discuss the case of such community seed banks in Chapter 10).

The plan to establish and support such community-based institutions suggests that the government has a clear target to make available and expand the use of formal seeds at the community level. Under this Plan's period, while the registration of hybrid varieties of some vegetable crops continued, as a major development between 2011 and 2012, the government approved the registration of 14 hybrid varieties of rice and 31 hybrid varieties of maize.

3.6 Conclusion

Due to formal rules, there is often a neglect of the significance and contribution of informality to development. Despite this neglect, informality, however, remains visible and a major sector for development including seed sector development. Globally, regulation of the formality of the seed system is largely rooted in the emergence of the public sector-led breeding sector that separated the profession of farming from seed production, mainly after the early 20th century.

Over the past few decades, formality of the seed system is being regulated and promoted largely by private sector-supportive seed and intellectual property laws that focus on a linear model of seed sector development. Such a linear model involves a deliberately constructed regulatory system that promotes the release, registration and marketing of certified seeds of verified varieties.

[37] http://www.npc.gov.np/images/download/TYP_2012.pdf (last accessed 15 March 2015).

In developing countries, the transfer of technologies through CGIAR centres and movements such as the Green Revolution in the 1960s played a major role in creating public institutions to promote the formal seed system. Later on, under the influence of neoliberal policies of the 1980s and 1990s, these countries have witnessed a greater involvement of the private sector to expand the use of high-yielding varieties of the formal seed system.

On the other hand, the so-called informality of the seed system has its roots in the origin of agriculture, that is, long before the formality of the seed system appeared on the global agriculture scene. The rules that have emerged in accordance with social customs, values and norms of many generations of practices of domestication, selection, use and exchange of seeds are important dynamics of the traditional seed system.

Thus, the traditional seed system, though termed in modern times as being informal, holds significance for a majority of farmers in developing countries. Through the saving and exchange of seeds of local varieties, a majority of farmers have not only been contributing to conservation of local genetic diversity but also building a seed system that is supportive of local needs and preferences, and resilient to dynamic climatic and local conditions.

Nepal's case of the emergence and growth of the formal seed system is not distinct from the global trends of the formality of the seed system. Irrespective of the change in governments, since the start of development planning in the 1950s, Nepal has focussed more on the import and use of technologies from other countries or international agriculture research centres. As we have seen from our presentation of the various plans, successive governments of all the political regimes, be they under monarchy or a democratic system, have strengthened the formal seed system, initially through the public sector, and later on together with the participation of the private sector.

In our historical analysis of development plans, we found that CGIAR centres like IRRI and CIMMYT partnered with the government to introduce a number of improved varieties of rice, wheat and maize since the 1960s. Nepal also introduced several other improved varieties from other countries,

but hardly paid any attention towards promoting the use of native varieties of farmers' seed system. We also saw that mainly since the 1980s, external organisations like USAID and GTZ, as major global actors, were key to support seed production programmes and develop related infrastructure for formal seed sector. In 1983, the USAID also supported the organisation of the first National Seed Seminar, which recommended the enactment of a Seed Act and the expansion of the use of improved seeds of the formal seed system through private sector participation. The Seed Act finally came into being in 1988 with major technical support from the GTZ.

Moreover, as I highlighted, as part of the externally-guided structural reforms of the agriculture sector, the introduction of the National Fertiliser Policy, National Seed Policy and Seed Regulation in the 1990s further enabled the formal seed actors to emerge as major players in Nepal's seed system. These trends do not merely coincide with the global trends of the formality of seed system, but also relate to the outcomes of the regulatory process of globalisation where international trends and influences have played a major role in shaping the national seed sector development strategies across many developing countries.

Against the backdrop of such a historical context and the growth of the formal seed system in Nepal, the next chapter provides an analysis of the regulatory features and impacts of the formal seed system. The chapter also provides an analysis of Nepal's local, customary dynamics of farmers' seed system.

Chapter 4

Regulatory features and impacts of formal and informal seed systems

4.1 Introduction

The previous chapter showed that Nepal has been following the general global trend to promote the formality of the seed system for seed sector development. While external agencies have supported Nepal to move towards a linear regulatory system for seed sector development, a number of domestic actors from public and private sectors too have contributed to the growth of the formal seed system in the country.

This chapter presents an analysis of how public and private actors, together with non-government organisations and farmers' groups, operate within the formal seed system in Nepal. As farmers in Nepal mostly rely on local exchanges and outlets for the use of native and local varieties, the focus of the formal seed system has often been on making farmers consumers (buyers) of the new, improved varieties.

The chapter discusses the features and impacts of the formal seed system in relation to regulatory institutions and formal actors; variety release and registration trends; and measures of quality control, multiplication and marketing of improved seeds. After an analysis of the features and impacts of the formal seed system, the chapter presents an analysis of the dynamics of the local seed system in Nepal, also discussing how formal and informal seed systems interact.

4.2 Major regulatory institutions and formal actors

The introduction of the Seed Act in 1988 and the National Seed Policy and Seed Regulation in the 1990s shapes Nepal's regulatory framework on variety development, quality control, and multiplication and marketing of seeds under the formal seed system. Within such a regulatory framework, different formal actors operate in Nepal to promote the use of improved seeds and chemical fertilisers.

At the top level of the regulatory agency is the Ministry of Agricultural Development. The Ministry holds the authority to coordinate and supervise the plans and programmes in the seed sector. The Ministry also oversees the plans and programmes of the Department of Agriculture, which implements developmental and extension programmes in the seed sector through District Agriculture Development Offices in all the 75 districts of the country.

The National Seed Board, formed under the Seed Act 1988, also works under the Ministry. The Board has three sub-committees: the Variety Approval, Release and Registration Sub-committee; the Quality Standards Determination and Management Sub-committee; and the Planning Formulation and Monitoring Sub-committee. Seed Quality Control Centre acts as the secretariat of the National Seed Board with three units: the Central Seed Testing Laboratory, the Seed Certification Unit and the Seed/Variety Registration Unit.

The Seed Act contains provisions for quality control, registration and certification of a variety of crop seeds, including those of cereals and vegetables. It requires mandatory permits for the sale and distribution of seeds, prohibiting any sale and distribution if seeds are not registered, released, certified, notified or listed as per the Act (Sections 11 and 13).

There are various actors engaged in variety development, seed multiplication and marketing of seeds. The major ones from the government sector are Nepal Agriculture Research Council, Department of Agriculture, National Seed Company Limited and Agriculture Inputs Company Limited. While the Nepal Agriculture Research Council promotes variety development through research and breeding, the other government actors promote the use of improved seeds through production and sale in the country.

Until July 2011, 1,476 private seed traders had obtained licences to market seeds, and 829 seed traders had completed training to produce and maintain seeds. Similarly, more than 2,000 agrovets and local seed traders operate in Nepal, mostly to market improved seeds and chemical fertilisers. These actors, some of whom are also the members of the Seed Entrepreneurs'

Association, promote the marketing of seeds of open-pollinated as well as hybrid varieties. A representative of the Association represents the private sector in all the sub-committees of the Seed Board, while there is no representation of any farmer. A representative of a relevant non-government organisation, however, remains a member of the Variety Approval, Release and Registration Sub-committee. This is because non-government organisations have also started to play a vital role in variety development through participatory plant breeding programmes.

Besides public and private actors, a number of agriculture (seed) cooperatives and community seed banks also produce and promote the use of improved seeds of the formal seed system. Different developmental programmes of the government such as District Seed Self-sufficiency Programme and Community-based Seed Production Programme too are being implemented for the dissemination of improved seeds of the formal seed system, mainly through the mobilisation of seed producers and growers at the community level.

4.3 Variety release and registration trends

The Variety Approval, Release and Registration Sub-committee facilitates the release and registration of plant varieties by making recommendations to the National Seed Board for variety approval. For any variety to be released through breeding, it has to be distinct, uniform and stable. As a public sector organisation, variety development and maintenance is managed by the Nepal Agriculture Research Council as the main agency to develop and release varieties through different commodity research programmes.

So far, the private sector has a minimal role and contribution in variety research, breeding and development. Realising this, the National Seed Policy of 1999 calls for making arrangements to encourage and involve the private sector, including non-government organisations, in variety development and release, but so far only a few varieties have been released from actors other than the government.

Interestingly, as we will discuss a bit later, this has been possible because of the collaborative role played by the Nepal Agriculture Research Council,

non-government organisations and farmers' groups to develop and breed varieties through participatory variety selection and breeding programmes. However, there is a greater role of the private sector in the registration of the varieties for production, sale and marketing of imported improved seeds. In variety registration, there are three important aspects.

First, improved seeds of imported varieties can be registered for sale and production in the domestic seed market. As long as the formal seeds are open-pollinated and not hybrids, farmers can also save and exchange such seeds, though there is no provision for such allowance in the law. It is because Nepal's Seed Act and Regulations provide for "ownership rights" of breeders, but do not specify the nature and scope of such rights. These are left vague. In effect it means there is no intellectual property protection through breeders' rights in the existing seed laws, and breeders can only obtain ownership certificate of the released varieties without being able to exercise monopoly-type rights over released plant varieties.

Second, the Seed Regulation of 2013 bans the registration of seeds with terminator genes, but allows for genetically modified seeds on the basis of a biosafety report. Notably, there is no official record of the use or production or sale of such seeds within the country.

Third, traditional and local varieties can also be registered under the seed law, which is a new provision incorporated in the Seed Act in 2008 and the Seed Regulation in 2013. This amendment is intended to establish the rights of farmers over traditional and local varieties, but the seed law does not specify the nature and scope of such rights. While implementing this provision, until 2013, the Seed Quality Control Centre had only registered two local varieties of broad-leafed mustard called Dunde Rayo and Gujmuje. However, there was no clarity on the nature and scope of ownership rights that the locals of the Dalchoki village of the Lalitpur district had obtained out of such registration.

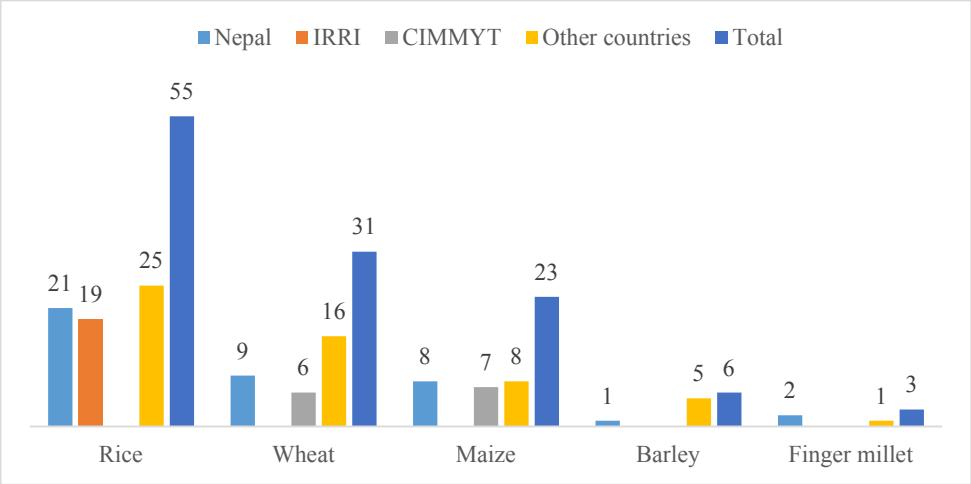
From 1960, when the first improved variety was released, to 2010, Nepal introduced 55 varieties of rice, 31 varieties of wheat, 23 varieties of maize, 6 varieties of barley and 3 varieties of finger millet as improved varieties of cereals. In the case of crops other than cereal and commercial, it introduced

49 varieties of vegetables, 34 varieties of grain legumes, and 17 varieties of oilseed. While none of these varieties are genetically modified seeds, an analysis of the data of the variety release and registration shows that Nepal's variety research and development system relied more on varieties introduced from outside for parental lines than on local landraces.

Of the total 118 varieties of cereals introduced until 2010, only 41 varieties were introduced using a local landrace as a parental line, and the rest used only the parental lines of the varieties introduced from outside. In the case of rice, out of 55 improved varieties, only 21 varieties used local variety as a parental line, whereas 19 varieties had their parental lines from IRRI and 25 others from countries such as Bangladesh, China, Indonesia, India, Malaysia, Sri Lanka, the Philippines and Taiwan.

Similarly, out of 31 varieties of wheat, while the parental lines of 6 varieties were provided by CIMMYT, the parental lines of 16 other varieties were introduced from countries such as India, Mexico and Colombia. In the case of improved varieties of maize, CIMMYT provided the parental lines of 7 varieties, and 8 other varieties had their parental lines from countries such as India, Mexico, the Philippines, Thailand and Zimbabwe (Figure 4.1).

Figure 4.1: Released/registered varieties of cereal crops by source of origin (1960 to 2010)

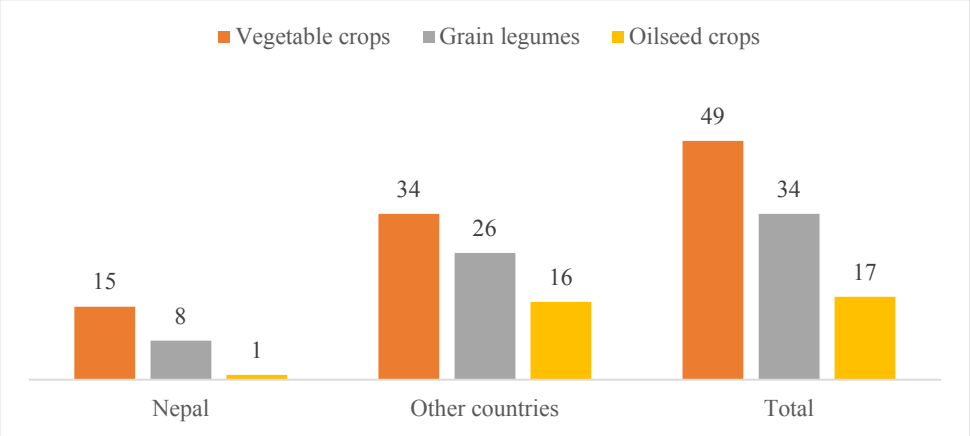


Source: Based on the data of MOAD (2013b)

The trend is similar in the case of the varieties of barley and finger millet, though only a few of their varieties were released, as compared to those of rice, wheat and maize. In the case of the varieties of vegetable, grain legume

and oilseed crops too, Nepal relied more on varieties introduced from outside than on local landraces (Figure 4.2).

Figure 4.2: Released/registered varieties of crops other than cereals by source of origin (1960 to 2010)



Source: Based on the data of MOAD (2013b)

4.4 Quality control and multiplication of seeds

Seed Quality Control Centre – as the secretariat of the National Seed Board and based on the recommendations of the Quality Standards Determination and Management Sub-committee – is empowered to require breeders and seed producers to follow seed certification standards in each stage of variety release, including multiplication of seeds. In order to maintain the quality of seeds, different classes of seeds – from nucleus to breeder to foundation to certified to improved seeds – are developed, maintained and multiplied for use and dissemination or sale.

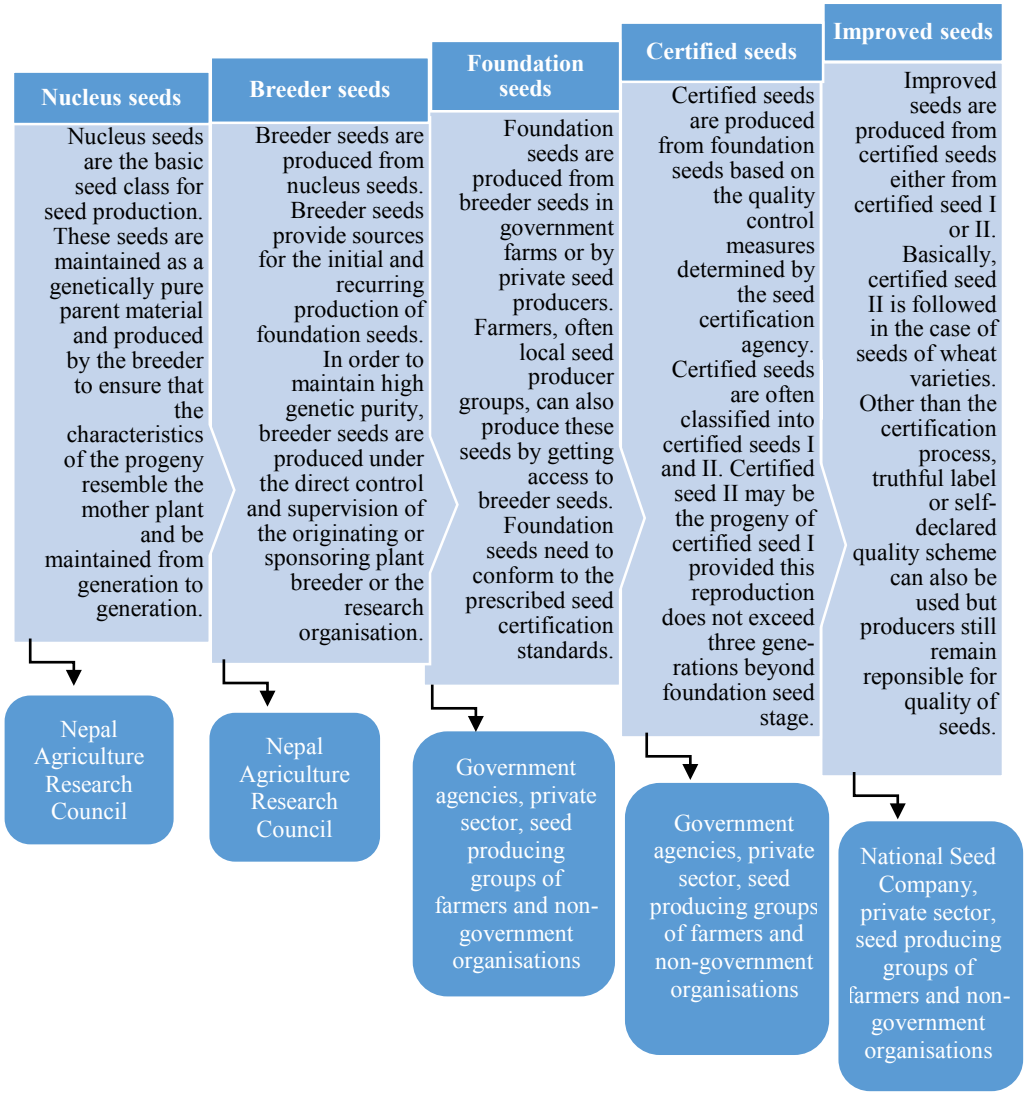
Since there is no engagement of the private sector in variety research, until the production of breeder seeds, Nepal Agriculture Research Council produces and maintains seeds through its research stations and commodity research programmes. Then the Council produces foundation seeds under the supervision of breeders and other technical experts.

At this stage, the Department of Agriculture as well as private actors are also involved in the production of foundation seeds. Then, with more actors such as government agencies, the private sector, local seed producers and non-government organisations, foundation seeds are used to produce certified seeds. The entire process of producing certified seeds is supervised

by technical experts, central and regional seed testing laboratories and the Seed Certification Unit of the Seed Quality Control Centre.

Finally, improved seeds are produced from certified seeds and sold with a label indicating yield potential and suitability for specific regions. Improved seeds are made available through the government's extension programmes or seed traders and other actors, including local seed producers and non-government organisations. Figure 4.3 shows the engagement of different public, private and non-government actors and farmers in the production and multiplication of each class of seeds.

Figure 4.3: Seed class, stages of seed multiplication and producing actors



4.5 Marketing of improved seeds, including hybrids

The Seed Act of 1988 prohibits the sale and marketing of seeds not registered or notified under the law, except for the purposes of agriculture research. If anyone is found to have been engaged in the sale and marketing of seeds that have not been certified, registered or notified, crop inspectors have the right to seize such seeds. In addition, improved seeds cannot be sold without packaging and in regions other than recommended ones, and must be labelled with information as determined by the law.

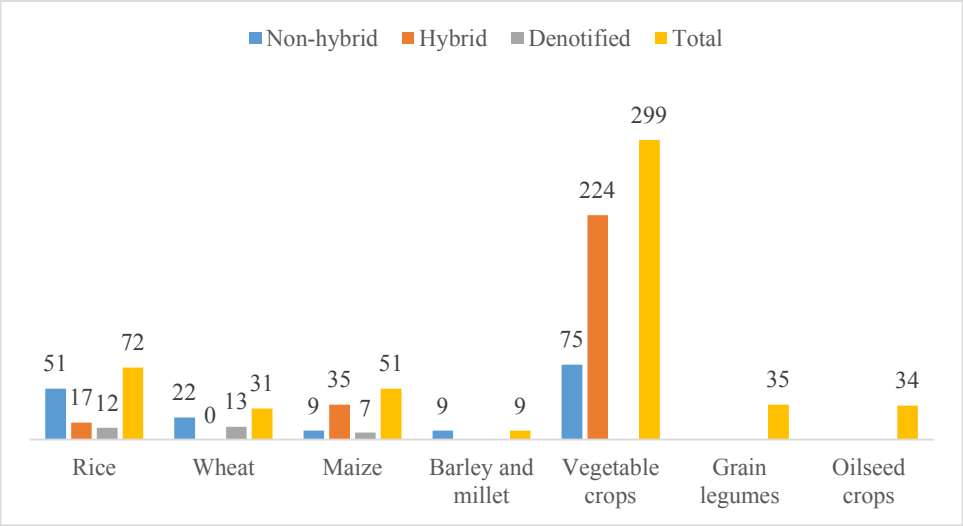
Marketing and sale of seeds could either be of seeds developed and released in Nepal, or of seeds registered or notified, for example, through the import from other countries under the seed law. The private sector or other actors such as seed producing groups can also opt to use truthful labelling or quality-declared seed system to market and sell seeds to farmers. Under these options, the suppliers of the seeds, however, remain responsible for quality as these are not certified by the authorised agency.

There are government agencies like the National Seed Company and other actors – foreign seed companies, importers, agrovets, local seed traders, non-government organisations, seed producers' groups, cooperatives, community seed banks, etc. – for promoting the supply, marketing and sale of improved seeds, including hybrids and chemical fertilisers. While some traders have already been engaged in importing and selling hybrids since the late 1980s, the national research and breeding programme, in collaboration with CIMMYT, too has started to develop hybrids of maize. For example, in 2003, the National Maize Research Programme introduced a maize variety called Gaurav as the first released hybrid variety and recommended for use in the Terai and mid hills. Since then, different other hybrid varieties have also been released.

The increasing trend of using hybrid seeds is also visible from the registration of hybrid seeds in Nepal. For example, if we assess the above-mentioned variety release and registration data from 1960 to 2010 by including the registration data of hybrids and some non-hybrid varieties between 2011 and 2012, some other interesting observations can be made. First, the data for Nepal's reliance on varieties of foreign origin would

significantly increase, as most of the varieties introduced since 2010 were coming from outside. Second, as shown in Figure 4.4, the government created a more favourable environment for the private sector to import hybrids for production and sale to farmers.

Figure 4.4: Released/registered varieties by type (1960 to 2012)



Source: Based on the data of MOAD (2013b), Variety Release and Registration Handbooks of SQCC and Nepal Agriculture Research Council[38]

For example, in just two years between 2010 and 2012, the government registered 17 hybrid varieties of rice, 35 hybrid varieties of maize, and 224 hybrid varieties of different vegetable crops. In the figure, the denotified varieties are those that were recommended between 1960 and 2012 but denotified later due to their inappropriate technical responses in production and yield owing to, for example, poor adaptive capacity or disease. Until 2012, the government had denotified 12, 13 and 7 varieties of rice, wheat and maize, respectively.

4.6 Features of informality in Nepal's seed system

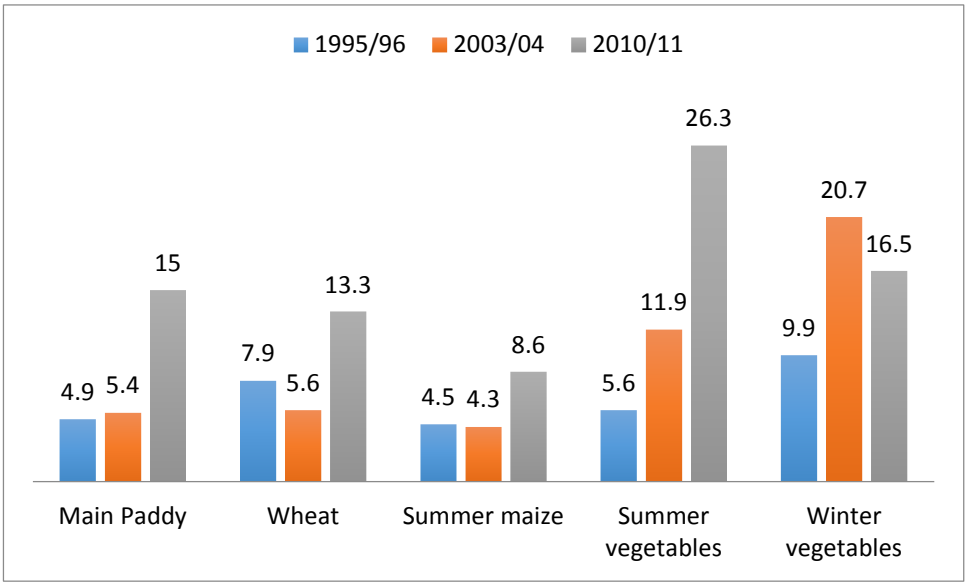
As we discussed, due to the government's continued focus on commercialising agriculture and introducing high-yielding varieties for increased agriculture production and productivity, hundreds of varieties were introduced for use by farmers, either through the release of improved varieties by the public sector, or through the registration and notification of

[38] http://www.narc.gov.np/publicaton/pdf/varieties_released/Reco-Var.Eng%20updated.pdf (last accessed 15 March 2015).

improved varieties imported by the private sector. However, as the National Seed Vision (2012-2025) reveals, the seed replacement rate of improved seeds of rice, wheat and maize is only 9 percent, 7 percent and 9 percent, respectively (MOAD, 2013a).

It means farmers in Nepal mostly use farm-saved seeds of native and local varieties rather than rely on formal markets for improved seeds. In the case of vegetables, the seed replacement rate is significantly high with 66 percent, mostly because the formal seed system has been able to popularise the use of hundreds of hybrid varieties that cannot be regenerated by farmers for the next season. In order to complement this data, we draw Figure 4.5 from three Nepal Living Standard Surveys of 1995/96, 2003/04 and 2010/11. These surveys show that even in the case of major food crops, only a limited number of farmers use improved seeds, though there is a gradual increase in such use (CBS 2011).

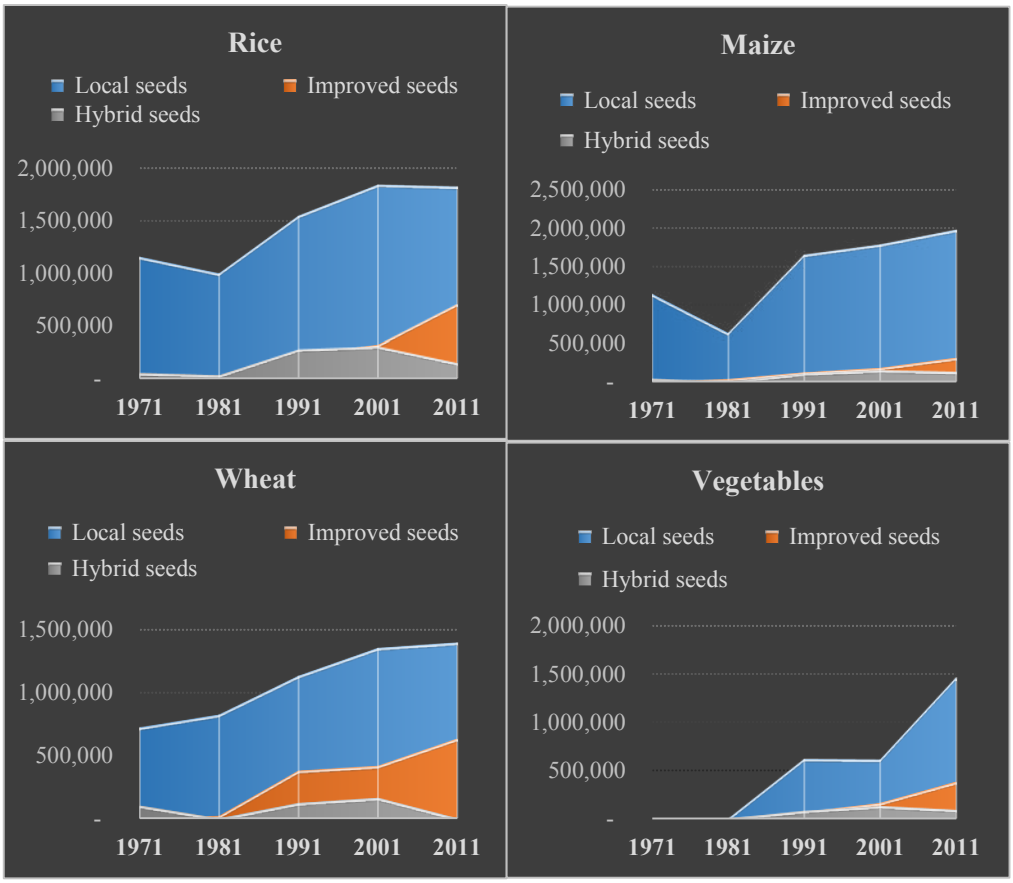
Figure 4.5: Percentage of households using improved seeds of major crops



Source: Based on the data of various Nepal Living Standard Surveys (CBS, 1996, 2004, 2011)

The data from these surveys correspond to the data of Agriculture Census reports of Nepal. As we see in Figure 4.6, the trend of using local seeds of Nepal's four major food crops is significantly high across the farming households of the country, though the use of improved and hybrid seeds of these crops is also rising along with the growth of the formal seed system.

Figure 4.6: Use of local, improved and hybrid seeds by farming households



Source: Based on the data of the Agriculture Census Reports of various decades (CBS, 1972, 1985, 1993, 2003, 2013).

Such trends require us to understand the driving elements and features of informality in Nepal's seed system. As we discuss in the following three sub-sections, the driving elements and features of informality in Nepal's seed system are constructed within or embedded in the traditionality of Nepali agriculture system; local, customary dynamics of seed use and exchange; and interaction between formal and informal seed systems.

4.6.1 Traditionality of agriculture in Nepal

Nepal is rich in agriculture biodiversity owing to significant agro-ecological variations, and diverse socio-cultural settings and farming systems in the mountain, hills and the Terai (plain land). Though it comprises less than 0.1 percent of the earth's land mass, the country ranks 31st in the world in terms of biodiversity. Of more than 6,000 vascular plant species found in its territory, about 550 species and sub-species have food value and 200 are cultivated species. Similarly, more than 400 species of agro-horticulture crops, more than 100 varieties of 15 major fruit species, 200 varieties of 50

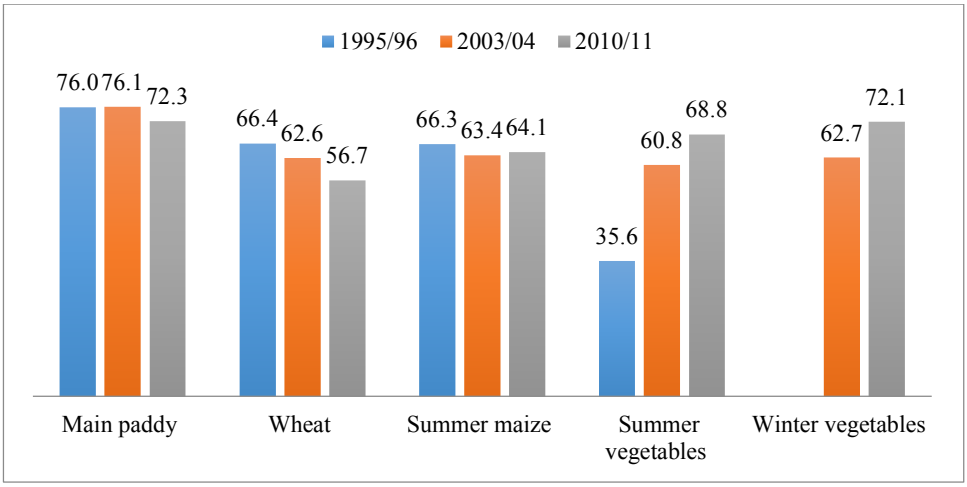
vegetable species, and about 10 varieties of potato are available in this country (MOFSC, 2002).

In addition, at least four species of wild rice, two wild relatives and several types of weedy rice contribute to genetic diversity in rice, which is largely consumed as a main source of food in Nepal. While wild relatives of wheat are also available in the hill and mountain regions, diversity in maize in these regions is attributed to the rich specific adaptation of the crops continuously maintained by farmers. In varieties grown by local farmers, variations in grain colour, husk cover, maturity and adaptive trait to intercropping are typical and important for the maintenance of local agriculture biodiversity (CGRFA, 2008).

In the case of cropping pattern, three features are important. First, cropping pattern does not merely depend on the altitudes of the Terai, hills and mountains, and temperature like sub-tropical warm, warm temperate and cool temperate, but also on land type such as rainfed, partially irrigated, irrigated, rainfed slope and irrigated lowland. For field crops, maize-based cropping system is predominant in upland areas of hills and valleys, and rice-based cropping system is prevalent in the low land areas, that is, in the Terai. Pulses, oilseeds, wheat, millets, barley and buckwheat are important crops in both cropping systems (Shrestha & Wulff, 2007).

Second, cereal crops dominate the cropping pattern. Rice, maize and wheat are the major cereals, though underutilized crops such as millet and sorghum are the major food items in the hills and buckwheat in the mountain. The share of cereal crops in agricultural gross domestic product (GDP) is 37 percent and in the national GDP 13 percent (MOAD 2013b). At the national level, according to Nepal Living Standards Survey of 2010/11, the proportion of agriculture households cultivating main paddy was 72 percent, wheat 57 percent, summer maize 64 percent, winter potato 53 percent, summer vegetables 69 percent, and winter vegetables 72 percent (Figure 4.7).

Figure 4.7: Percentage of agriculture households growing major crops



Source: Based on the data of various Nepal Living Standard Surveys (CBS, 1996, 2004, 2011). Note: Data for winter vegetables were not available for 1995/96.

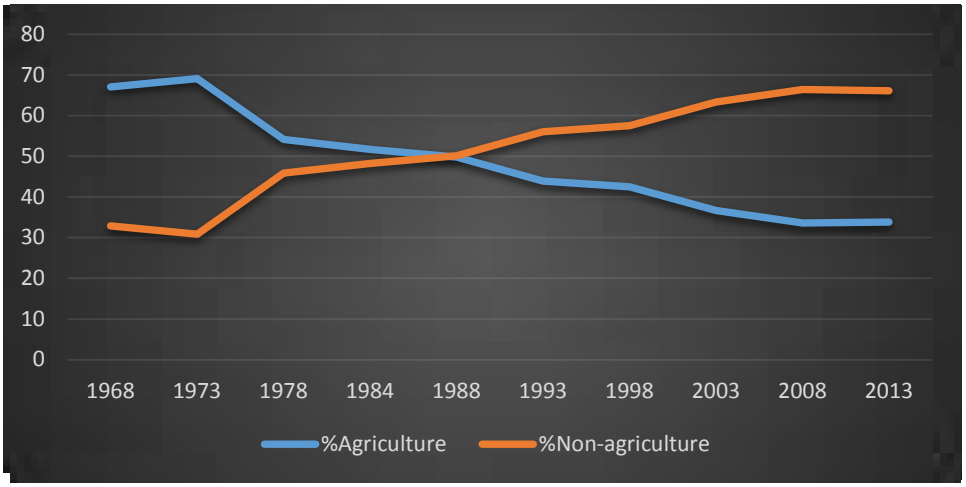
Third, despite the dominance of cereal crops in cropping patterns, mixed farming system is an important feature of Nepal's agriculture. It combines all the enterprises of the farming system, from the production of cereals, vegetables, oilseeds, fruits and flowers to beekeeping, sericulture, fishery, poultry and livestock (Shrestha, 1998). Farmers, for example in the Pokhara valley, grow four major grain crops: rice, millet, maize and wheat, as well as a wide range of vegetables, chilli, oilseed, fruit, and lentil species at over 150 different plant species in one village in a typical year (Schroeder, 1985). According to Schroeder (1985), this is not merely a major strength of indigenous agriculture but the high number of cultigens grown in a single small community also reduces farmers' vulnerability to food insecurity in case a crop fails.

Another important feature is that the agriculture sector stands as the major economic sector though it had a mere annual average growth rate of 2.9 percent in 2013, and its share in GDP has rapidly declined from 67 percent in 1968 to 34 percent in 2013 (MOF, 2015) (Figure 4.8). Agriculture is still a means of livelihood, rather than business for a large majority of farmers. Around 76 percent of households of the country depend on agriculture for livelihoods. Of these, 74 percent are agricultural households[39] with land and

[39] According to the Nepal Living Standard Surveys, an agricultural holding is an economic unit of agricultural production under single management comprising all livestock and poultry kept, and all land used, wholly or partly, for agricultural production purposes, without regard to title, legal form, or size. Agricultural holdings are grouped into two categories: land holdings and holdings

around 2 percent without land. In terms of the size of land too, there is limited scope for commercialisation as about 53 percent of agriculture households operate less than 0.5 hectare of land and only 4 percent of households operate 2 hectares and more land (CBS, 2011).

Figure 4.8: Share of agriculture and non-agriculture in GDP (1968-2013)



Source: Based on the Economic Surveys of MOF (2015)

Moreover, about 52 percent of farmers own only the most basic equipment—a plough or improved type of plough (*bikase halo*). The use of yoked oxen, simple hand-made tools of iron and wood, and human labour is a common practice for ploughing, terracing, levelling and other field preparations. A significant number of farmers also lack irrigation facilities as only 53 percent of the cultivated area is irrigated, and year-round irrigated area is significantly low, implying significant dependency on the monsoon's timing and sufficiency for agriculture production and food security (CBS, 2011).

All these factors and features of Nepali agriculture suggest that a majority of farmers largely rely on subsistence agriculture with their own farm inputs such as seeds, manure and human and animal labour. Large-scale commercial agriculture is difficult and beyond their economic capacity.

---

with no land. Holdings with land are those cultivating at least 0.013 hectare (1,458 square feet or 8 *dhur*) in the case of the Terai and at least 0.0127 hectare (1,369 square feet or 4 *ana*) in the case of the hills and the mountains during an agricultural year. Holdings with no land, on the other hand, are those with two or more cattle (or the equivalent of other livestock and poultry birds) and operating less than 0.013 hectare of land for agricultural purposes.

Such traditionality of agriculture is, therefore, largely maintained through local, customary dynamics of seed use and exchange.

4.6.2 Local, customary dynamics of seed use and exchange

Anikal ma Biu Jogaunu, Hulhal ma Jiu Jogaunu (Save seeds in famine and lives in riots) is a common Nepali proverb. However, what is interesting is, a majority of Nepali farmers do not save seeds merely in times of famine. For generations they have been relying on farm-saved seeds of plant varieties of their local needs and their regular exchange through farmer-to-farmer seed exchange networks. For many centuries, such networks have been in operation in Nepal within customary norms and self-regulatory practices of seed use and exchange. During the focus group discussions with farmers in three villages of Bara, Lalitpur and Sindhupalchowk districts, all farmers reported that they had saved and exchanged seeds under local, customary norms and at individual, household and community levels (Table 4.1).

Table 4.1: Traditional practices of seed use and exchange identified in three focus group discussions with farmers

	Fieldwork sites		
	Kachorwa, Bara (15 farmers)	*Dalchoki, Lalitpur (11 farmers)*	*Thumpakhar, Sindhupalchowk (17 farmers)*
Traditional practices			
Production through own farm-saved seeds	15	11	17
Exchange with neighbours, relatives and friends	15	11	17
Given to visitors (strangers)	7	8	13
Borrowed/purchased from local traders, cooperatives and community seed banks (including improved seeds)	15	11	17

Source: Fieldwork data

At the individual and households levels, farmers select, use and save seeds to sustain their livelihoods. In this case, their preference is to select, use and save seeds that adapt to local environments and meet their socio-economic needs. They often recognise such seeds as being native or locally adapted seeds derived from formal as well as informal channels. Most of the farmers have little (in fact hardly any) information about seed certification and

registration processes though seed cooperatives and community seed banks operate to deliver improved seeds in local areas. In the words of a farmer of a focus group discussion in Dalchoki:

> "We plant the seeds mostly relying on our traditional knowledge and communication with fellow farmers. We have no idea about seed certification and registration processes. We want to secure our food and are always looking for use and exchange of seeds that perform in our local conditions meeting our needs (FGD#5)."

Though there is a gradual increase in the trend of using improved seeds, including hybrids mostly of maize and vegetables, farmers prefer to save and use native and local seeds of cereals and vegetables for a variety of reasons. Such seeds are less likely to witness crop failure due to well-known and locally tested and adapted qualities, and generally do not require costly external inputs such as chemical fertilisers. Importantly, farmers also prefer to use native seeds as these are easily available at the local level through regular exchange among farmers and/or borrowing/purchase from the locally known provider or supplier (usually a farmer and sometimes also a local seed trader, a seed cooperative or a community seed bank).

Farmers also save and use seeds of local varieties for religious purposes, and for better taste and medicinal values, though they admit that many of their local varieties have disappeared over time. For example, with an increasing trend of using improved seeds (mostly of rice in Kachorwa, maize and vegetables in Thumpakhar and vegetables in Dalchoki), local farmers express concern over loss or shortage of seeds of their native and local varieties. Notably, in cases of the shortage or absence of local seeds, farmers not only rely on farm-saved seeds but also manage to collect seeds in required quantities by engaging in farmer-to-farmer seed exchange networks based on social relations and contacts.

Farmers first interact to share and obtain information and knowledge about their seeds, either through a contact between two individual farmers or between two or more households. These farmers are mostly from the same ward or village and could either be neighbours, or relatives and friends. The contact with farmers at the individual and household level enables them to obtain information about the use of seeds, assess the requirement of seeds

for planting, and finally, access the required amount of seeds and information provided by other farmers or households. In cases when the varieties are already known to the farmers seeking access to seeds, they simply use their networks to obtain the required quality of seeds.

At the community level, individual farmers or the households as a whole interact in a larger group, for example, in their ward or village, and cooperate to make seeds available for farmers in need through self-help or other groups, including non-government organisations. Such groups vary in form and size, and perform dynamic roles of collective action on agricultural (seed cooperatives, community seed banks); resource management (irrigation and forest user groups); religious/tribal (*Guthi*, *Perma, Chath*); conservation (seed/diversity fairs); and overall developmental (seed cooperatives, micro-credit, *Aama Samuha*- women groups) activities.

These findings from the focus group discussions suggest that farmers do not rely on one or two networks and factors, but use a variety of means and organisations to access, use and exchange seeds of their preferences and needs. At all of these levels of dynamic networks, farmers exchange farm-saved seeds in numerous ways. First, they provide farm-saved seeds to other farmers without any condition, which is generally a trend in the case of their relatives, neighbours and friends. Second, they provide seeds as gifts to farmer-visitors or when they establish family, cultural and friendly relations with farmers of other areas.

Third, farmers exchange seeds of different varieties based on each other's requirements or barter seeds with other items. Fourth, they also provide seeds based on a commitment by the recipient farmers to return the same or other agreed amount of seeds (generally, one and half of or double the amount received), for instance, in the case of borrowing of seeds from community seed banks.

Fifth, farmers also purchase seeds in order to meet their requirements. The sale of seeds is not normally a trend at individual and household levels within a small group of farmers of a particular area. The sale of seeds is usually a practice at the community level, either informally in temporary,

small local markets (such as *Haat Bazar*/*Hatiya),* or formally through the outlets of local seed traders (such as *Biu Pasal),* seed cooperatives and community seed banks.

In order to meet seed requirements, farmer-to-farmer seed exchange networks are not confined to providing or exchanging seeds within a ward or a village. Local farmers also network with farmers outside their ward or village, and exchange or purchase seeds in the wards and villages of other districts or regions. In some cases, farmers also purchase seeds in India or exchange seeds with farmers in India and other countries when they travel there on personal missions, or for attending training, workshops and seed/diversity fairs.

In such circumstances, as an example, there are cases when marriage plays a role in seed exchange, particularly in regions like the Bara district that share an open, porous border with the neighbouring country India. After marriage, women farmers from India bring their popular crop varieties either as gifts or for experimentation in the field of their husbands. The same is the trend when a Nepali woman farmer is married to an Indian farmer.

Farmers consider seeds as the gift of the creator. Worshipping of seeds before planting (and of crops after harvesting), and during religious ceremonies, is a culture common among farmers of all castes. Farmers believe that giving seeds, sharing knowledge and offering food to guests (including foreigners) bring fortunes and create goodwill – they cite a proverb common in Nepali culture *Atithi Debo Vaba* (Guests are God). For them, seeds and traditional knowledge are their cultural heritage, and their sharing for use and exchange by others is the basis of their agriculture and a critical way to promote *in situ* conservation of crop genetic diversity.

As part of their culture, they also provide seeds to visitors, including government and non-government organisations, researchers, academic institutions and international missions. To such visitors, they either provide seeds as gifts or as seed samples for research or conservation purposes. Farmers do not create demands for prior informed consent and benefit sharing when visitors, including international missions and government authorities, come up with projects in local areas to collect their germplasms.

In such cases, two issues are important to note. First, farmers are not necessarily involved in these germplasm collection projects, or consulted in the project development and implementation process. Second, when such projects are implemented by informing them and if they are asked to cooperate with their knowledge about germplasms, they kindly agree. They do not follow any formal processes or documents to provide their germplasms or share traditional knowledge.

The presence of such local, customary norms of seed use and exchange in different parts of Nepal has also been discussed in some previous studies. For example, some studies indicate or discuss the inability of the formal seed system to meet farmers' requirements of seeds and the contribution of local seed systems to expand farmers' choices of use and exchange of seeds based on local needs and preferences (Cromwell et al., 1993; Joshi et al., 2012; Sapkota et al., 2013).

Some other studies conducted in different regions find that farmers derive 60-90 percent of their seeds through saving, 10-40 percent from informal or local sources, and 2 percent from public and private companies (Shrestha & Wulff, 2007). Similarly, a study conducted in three districts covering all the ecological regions of the country (Jumla in the mountain region, Kaski in the hill region and Bara in the Terai region) also shows a similar pattern. According to this study:

> "The main sources of seed were farmer's own saved seed (67-91%), seed from neighbours and relatives. Exchange of germplasm was the main basis of fulfilment from other sources. All farmers obtained seed from their own village, while farmers introduced materials occasionally from outside village." (Baniya et al., 2005, p. 1)

Shrestha (1998) and Joshi (2000) identify the importance of farmers' seed system in utilising and managing landraces with information and traditional knowledge about production environment, as well as users' needs and preferences. Shrestha (1998) asserts that in Nepal, traditional seed systems are key to form the basis of conservation and use of agriculture biodiversity and traditional knowledge, and provide security to farmers against risks and uncertainties. According to him:

> "traditional seed supply systems are dynamic and continuous processes comprised of varietal selection, variety adaptation, seed selection, processing, storage, and exchange by farmers. Through these processes, genetic variations in crop varieties have evolved continuously, contributing to the maintenance of on-farm crop diversity." (Shrestha, 1998, p. 145)

Similarly, a study of the local seed system of rice farming communities in mid hill, low hill and Terai plains finds that as a common social practice, farmer-to-farmer seed exchange has been "a reliable and trustworthy mechanism for local farmers to access seed and information", though farmers in the Terai region are gradually becoming more inclined to purchase seeds due to exposure to seed markets (Poudel et al., 2015, p. 9). According to this study:

> "…informal seed supply system in the community plays important role to fulfill the seed requirement and also improves the conservation of the crop genetic resources on farm. Farmers acquire seed using variety of networks of social relations and different types of seed transactions. They seek seeds to replace poor quality seeds, to grow better cultivars they saw in another farmer's field, to test new cultivars, to look for suitable cultivars to replace the existing one for specific land parcel, and to fight disease or pest infestation. The majority of seed flow occurs within a community as gifts, exchange and bartering within the context of social custom." (Poudel et al., 2015, p. 9).

Since farmers have also opted to use new cultivars when they have access to the formal seed system, some other studies also identify that the same farmers engage with formal as well as informal seed systems. For example, farmers of the Kaski and Bara districts not only rely on informal networks to access seeds, but also use formal sources to replace the old seeds with the new seeds of the formal seed system (Jarvis et al., 2000; Rana et al., 2011). Hence, while making an attempt to understand the dichotomy between formal and informal seed systems, it is important to discuss how these two seed systems interact with each other.

4.6.3 Interaction between formal and informal seed systems

During the fieldwork in Kachorwa, Thumpakhar and Dalchoki villages of Bara, Lalitpur and Sindhupalchok districts, respectively, it was found that

both seed systems do not necessarily work in isolation or in conflict. In fact, both seed systems interact in a complex manner, creating choices to farmers for locally preferred varieties but making it difficult to pin down to what extent formal seed system is formal and to what extent informal seed system is informal.

For example, farmers adopt and localise improved seeds if they find them appropriate to address their local needs and preferences. In such circumstances, farmers either replace the seeds of new varieties through purchase in every season, or adopt and localise the open-pollinated, non-hybrid seeds within their local seed system for regular use, reuse and exchange within informal conditions. This way, informal or local or farmers' seed system not only conserves and uses native varieties, but also localises varieties of the formal seed system. Table 4.2 provides a list of improved seeds of different crops farmers were using in the three fieldwork villages of Sindhupalchok, Bara and Lalitpur districts.

Table 4.2: Improved seeds in use in Sindhupalchok, Bara and Lalitpur

Villages	Paddy	Maize	Wheat	Potato	Vegetables
Kacharwa	BG 1442, Sona Mansuli (Bhadaiya), Kacharwa 4, Sabitri, Ram, Katarni, Sarjug 52	V92, 900 M Kargil	Aditya, NL 292, NL 973, Lok 1, UP 262, Gautam	Rajendra 1, Shiva 40, Lal Gulab, Sinduri, Kapuri	Lauka 5, Cauli 3-4, Simi 4, Kerau 5
Thumpakhar	Makawanpure 1, Khumal 4, Khumal 8, Khumal 10, Khumal 11, Khumal 13, Tainun 242	Rampur, Makawanpure 3, Makawanpure 4, Makawanpure 5, Makawanpure 6, Deuti, Posilo, Arun 1, Arun 2	WK 1204, Pasang Lhamu, Gaurab	Rojita, Kuprijyoti, Kuprisindure, Cardinal, MS 42	Cauli 5-7, Simi 5
Dalchoki	Not any	Manakamana 3	Not any	Only local	Cauli 3, Tomato 3, Bandaa 3

Source: Fieldwork data

Note that it is not the case that only the farmers' seed system obtains and uses the locally adapted seeds of the formal seed system. The informal seed system also provides materials for breeding and crop improvement to the formal seed system. At the national level, the interaction between formal and informal seed systems can be understood from the use of the parental lines of local landraces to breed and release improved plant varieties, though the country's major focus was mostly on varieties derived from

other countries and CGIAR centres. As mentioned above, altogether 41 varieties of cereals, 34 varieties of vegetables, 26 varieties of legumes and 16 varieties of oilseed were introduced as improved seeds by using a local landrace as one of the parental lines.

Similarly, since the introduction of programmes such as participatory variety selection and participatory plant breeding in the 1990s, there has been a growing realisation that farmers and breeders can and should work together to develop local varieties. The Nepal Agriculture Research Council and some non-government organisations, together with farmer groups and community seed banks, have played a crucial role in implementing participatory variety selection and participatory plant breeding programmes, focussing on local varieties that are suitable for marginal climatic regions and possess value for conservation and food security.

In these participatory crop improvement programmes, farmers contribute their traditional knowledge for identifying traits and provide a multi-farmer, multi-locational testing system to improve the crop through selection and breeding in different climatic conditions, and technical experts and breeders contribute their formal scientific knowledge to breed and enhance varieties identified through participatory methods. Such participatory variety selection and breeding programmes[40] have already led to the development and release of locally enhanced rice varieties such as Sunaulo Sugandha for rainfed areas rather than irrigated rice growing areas of the Terai and inner valleys, and Barkhe 3004 as a drought-tolerant variety for the Terai and inner Terai. A number of other rice varieties being bred through such programmes too are in the pipeline for release such as Mansara, Biramphul, Kachorwa and Lumle 2. Such programmes are also in the process of enhancing the local landraces of maize for converting them into improved varieties (Chhetri et al., 2012).

However, notwithstanding the two-way interaction between formal and informal seed systems, it is important to highlight that the formal seed system has the potential to lead to genetic erosion of the existing native and local varieties, and gradually drive out the traditionality or the so-called

[40] http://www.researchintouse.com/nrk/RIUinfo/PF/PSP13.htm (last accessed 23 March 2015).

informality of the seed system through a variety of influences. For example, local, customary practices of seed use and exchange are being negatively affected by the introduction of seeds of hybrid varieties which do not breed true in the next season, thereby reducing the incentive for farmers to save and exchange seeds. Hybrid varieties have the potential to change the customary habits of farmers.

Note that with the allowance under the seed laws, we already discussed the proliferation of hundreds of hybrids of cereals and vegetables in Nepal. According to some estimates, 80 percent of maize production in the Terai and 10 percent in the mid hills, and around 75 percent of the production of tomatoes, cauliflower and many other vegetables are being managed through the use of hybrid seeds in Nepal (Cited from, Adhikari, 2014). This also explains why Nepal has a higher replacement rate of improved seeds in vegetables (66 percent), as compared to cereals (less than 10 percent) (SQCC, 2013).

Similarly, not only hybrid seeds, but seed laws themselves can also restrict farmers' freedom and customary rights to save, exchange, reuse and sell seeds of crop varieties. In a strict sense, the existing seed laws of Nepal do not allow farmers to exchange and sell seeds of native and local varieties as these are not registered or notified varieties, and are also not generally sold with packaging and labelling as per the law. Farmers have the option to use truthful labelling or self-declared quality scheme to promote exchange and sale, but these schemes are meant to serve commercial purposes. Note that the transactions of seeds under the local seed system are, however, mostly done as a social custom or a socio-cultural practice to help farmers in times of shortages or needs of seeds.

In this regard, the amendment made to the Seed Act and the Seed Regulation for incorporating a provision of the registration of traditional varieties can be interpreted as having two possible implications. First, farmers may establish their ownership rights over local and traditional varieties through registration under the seed laws. Second, the registration of local and traditional varieties under the law will make them as formal as any other released or registered varieties.

However, since the Seed Act and the Seed Regulation are silent about the nature and scope of the ownership rights over traditional varieties, it is not clear whether the owners of such varieties become "exclusive" owners as in an intellectual property system. It is also not clear how such registration would impact farmers as a whole (other than owners) and what would be the conditions and requirements if any other third party, including scientists and breeders from the public sector, want to access the registered traditional varieties for research and breeding purposes in the formal seed system.

4.7 Conclusion

Nepal's formal seed system is a classic example of a linear regulatory system of seed sector development. In terms of variety development through breeding, the Nepal Agriculture Research Council, as a major public sector agency, develops plant varieties for release under the Seed Act. The Council's sole engagement in the maintenance of nucleus and breeder seeds and the private sector's participation in the later stages of variety development (that is, in the production of foundation, certified and improved seeds) indicate that the public sector is still a major actor of the formal seed system. Seed cooperatives and community seed banks, together with seed producers' groups, also participate in this process but mostly under the supervision of, or in coordination with, public and private actors.

However, private actors are fully active in the introduction of imported improved seeds, mostly those of the hybrid varieties of cereals as well as vegetables. As a result, the trend of the registration of hybrid varieties, including other improved varieties, is rising, creating a space for the formal seed system to gradually attract farmers towards improved seeds.

On the other hand, for generations, the traditionality in agriculture and local, customary dynamics of seed use and exchange among Nepali farmers have been supportive of livelihood enhancement and on-farm conservation of agricultural biodiversity. Notwithstanding the growth of the formal seed system over the past decades, a majority of farmers do not rely on formal seed markets but on farm-saved seeds and farmer-to-farmer exchange of seeds of their local needs and preferences. Within local or the so-called informal seed system, farmers benefit from saving of seeds and seed flows

at individual, household and community levels through farmer-to-farmer seed exchange networks. In particular, these practices have created an environment of trust, reciprocity and communication across farming households and communities. An example of this is the fact that within the context of social customs and practices, farmers do not possess any exclusive rights but believe in worshipping seeds and sharing of seeds and information.

However, the formal and informal seed systems do not necessarily work in isolation in Nepal. They interact in a complex manner to support the creation of options for variety development and use. For example, farmers' seed system has provided a number of parental lines of landraces for variety improvement and release in the formal seed system. Importantly, in recent years, programmes like participatory variety selection and breeding too have strengthened the interaction between formal and informal seed systems. Likewise, farmers' seed system has also adopted and converted a number of formal varieties into local varieties through years of cultivation and improvement within local climatic conditions.

Notwithstanding such flows of seeds from one system to another, one important aspect that we saw in the case of Nepal is the limited scope of the provisions for plant breeders' rights in the existing seed laws. However, as we will see in Chapters 7 and 8, Nepal is moving ahead towards the development and implementation of new national laws and policies compatible with the TRIPS Agreement, CBD and ITPGRFA. In these contexts, it is more likely for the formal and informal dynamics of the seed system to experience additional impacts once Nepal moves beyond the current seed laws and brings into place laws in relation to plant breeders' rights, farmers' rights, and access and benefit sharing. Before I discuss such issues in Chapters 7 and 8, I will explore the global trends and dynamics of commons and property notions of PGRFA in Chapters 5 and 6.

Chapter 5

Property rights, enclosure movements, and new commons

5.1 Introduction

In Chapters 3 and 4, we discussed the concepts as well as the regulatory trends and dynamics of formality and informality of the seed system, highlighting their relationship with and implications for local, customary practices of seed use and exchange in Nepal. Formality of the seed system is closely interlinked with the notions of property rights over seeds, and importantly, have implications for local, customary dynamics of seed use and exchange. We saw in the previous chapters that property rights over seeds have not, however, so far been a concern in Nepal's seed system. This is because Nepal is yet to provide intellectual property protection in agriculture as part of its obligation under the TRIPS Agreement. In addition, notwithstanding the country's ratification of the CBD and the ITPGRFA, it is yet to bring into force national laws that govern the aspects of access, benefit sharing, prior informed consent, and farmers' rights.

In the previous chapter, as we saw, the existing Seed Act and the Seed Regulation of Nepal provide for ownership rights to breeders, but these laws are not clear about the nature and scope of such rights. Similarly, an amendment to these seed laws provides legal space to register traditional varieties enabling farmers to claim ownership rights over such varieties. However, as in the case of ownership rights to breeders, the scope and nature of the ownership rights over traditional varieties are not clear.

Yet, these legal provisions have a significant relationship with the commons and property notions of PGRFA in Nepal's seed regulation, the remit of which is not confined within the existing seed laws and their implications we discussed in the previous chapters. As Nepal is moving ahead to implement the TRIPS Agreement, CBD and ITPGRFA, a broader national framework for the regulation of the seed system requires the country to steer the flow of events in relation to the regulation of the commons and property

notions of PGRFA as well. For these reasons, it then becomes important to study how Nepal has undertaken regulatory initiatives for the implementation of intellectual property rights as well as the rights of local, indigenous and farming communities over different sets of PGRFA. It also becomes important to examine how state, private and civil society actors and networks at international, national and local levels are engaged in policy- and law-making processes to steer the flow of events in relation to the regulation of commons and property notions of PGRFA.

An inquiry into these aspects leads us to introduce Part II of this thesis in which the current chapter and Chapters 6-8 discuss global and national regulatory trends and dynamics in relation to commons and property notions. This chapter, together with Chapter 6, provides a theoretical basis to discuss Nepal's case of commons and property notions, mainly in relation to the implications of the global agreements and national laws on PGRFA knowledge commons in Chapters 7 and 8. In particular, this chapter analyses the three key concepts of the regulation of PGRFA, that is, "commons", "property rights" and "enclosures". Drawing on the work of commons scholarship, the chapter discusses the notions of property rights beyond their economic rationale, including the types of commons and property regimes. These aspects are important for Nepal as the use and exchange of PGRFA in Nepal are closely associated with societal values, cultural norms, and common property principles.

The chapter also provides a brief historical context of the "enclosures" discussed by scholars as the first and second enclosure movements. The first enclosure movement is said to have initially started in the 15th century with a series of enclosures of land and other resources in England, gradually also extending such enclosures in other countries through colonisation. On the other hand, in the post-World War II period, the second enclosure movement is argued to have started when the trends of privatising intangible resources through intellectual property rights grew as a means of information capitalism to relocate openly accessible intangible knowledge in the private domain. As we will see in Chapter 7, Nepal has not remained isolated from the implications of these enclosure movements, and

interestingly, both of these movements have implications for the use of PGRFA in the country.

In addition to explaining the key concepts, another major objective of this chapter is to analyse how the commons discourse has expanded to deal with knowledge as a "new commons" and identify the complications to explain knowledge commons as a good. This then leads us to further analyse the complicated nature of PGRFA as a knowledge commons in Chapter 6. In sum, this chapter maps the evolution of key concepts that this thesis uses in the next chapter to develop an analytical framework of PGRFA knowledge commons which helps in the analysis of the shifts in common spaces available in global agreements governing PGRFA. This framework will also be used in Chapter 8 on Nepal's regulation of PGRFA and Chapter 10 on community seed banks in Nepal. Below I first discuss the key concepts of property rights, commons and enclosure movements, before discussing knowledge as a new commons.

5.2 Key concepts

5.2.1 Property rights: beyond economic rationale

Over time, property rights have emerged as the most important and substantially discussed category of rights incorporated in resource regimes (Young, 1982). The economic rationale of property rights is that they economise on the use of resources, reduce the transaction costs involved in such use, and assist in a better allocation of resources (Demsetz, 1967).

Nevertheless, the nature, scope and objectives of property rights are not as simple, clear and conclusive as we may infer from their economic rationale. This is particularly when the meaning of property itself has always been a matter of philosophical analysis among economists, ecologists, lawyers, political scientists, etc. In the words of John Edward Cribbet, "the word property remains the same, but the concept is truly in transition", and "the meaning of the chameleon-word like property constantly changes in time and space" (Cribbet, 1986, p. 1).

From a legal perspective, property is a legally enforceable bundle of rights over resources which property rights holders are free to exercise without

interference, neither by the state nor by any private person (Cooter & Ulen, 1988). However, the idea that property is a bundle of legally enforceable rights is subject to philosophical analysis (Drahos, 1996) and the content of such a bundle of rights relies on the nature of the object[41], society and time (Young, 1982). Yet, property rights can be broadly understood as dealing with:

> "what people may and may not do with the resources they own: the extent to which they may possess, use, develop, improve, transform, consume, deplete, destroy, sell, donate, bequeath, transfer, mortgage, lease, loan, or exclude others from their property" (Cooter & Ulen, 1988, p. 74).

In this sense, property rights delineate and convey to the right holders the legally sanctioned conditions for excluding others from the above-mentioned privileges they are entitled to enjoy as the legitimate right holders of the resources (David, 2001). However, the understanding of property rights should not always be limited to the rights of full ownership and the sole authority to use, develop and dispose of a resource, or to exclude all others by privatising the resources (Meinzen-Dick & Di Gregorio, 2004).

Bromley (1989) highlights the need to consider a number of parameters important for society. The core of the property is beyond the physical objects, and involves the rights, the expectations, the duties and the obligations that exist in a society before property can exist (Bromley, 1989; Larson & Bromley, 1990). It is due to such reasons that, in the commons literature, property is often described as referring to certain rights and duties drawn from rules and norms that authorise particular actions regarding the access to and use of common-pool resources in a society. Individuals, for instance, the commoners of a resource, can take such particular actions in relation to other individuals (Ostrom, 2003; Ostrom & Schlager, 1996).

Another important aspect of property rights is the need to understand that these rights are not only about private property. In addition to private

[41] Since the nature of the object of property affects the rights and obligations, there could be more than one bundle of rights on one and the same resource (Björkman & Hansson, 2006).

property, there are other domains of property rights such as common and public property, which we will discuss shortly in relation to common-pool resources.

Over the past few decades, intellectual property rights have also emerged as an important domain of property rights. In order to reward innovations, these rights are given over the creations of the minds, granting the creator exclusive rights over the use of creations, such as through copyrights, trademarks, geographical indications, patents, and plant breeders' rights (Blakeney, 1996; Correa, 2000). In other words, unlike *real* property rights in physical property, intellectual property rights deal with intangible property, or are given in abstract objects as rights of exploitation in information and knowledge (Drahos, 1996, 1999; Matthews, 2002).

All of these domains of property rights have implications for the management of natural as well as human-made resources, including the PGRFA knowledge commons that we will discuss in the next chapter. Since property rights have implications that affect society, people and the environment, they should be designed to promote economic productivity, and at the same time, achieve social goals such as justice (Björkman & Hansson, 2006). Thus, a careful consideration of the "efficiency" of a property rights system to address such a dual objective is of utmost importance, mainly in the context of a country like Nepal that has formal as well as informal dynamics involved in the regulation of its seed system.

Likewise, intellectual property rights should not be used as a means of "information feudalism" which involves "a transfer of knowledge assets from the intellectual commons into private hands" (Drahos & Braithwaite, 2002, p. 2). There are costs involved if intellectual property rights are used to lock up "knowledge at the expense of rewarding innovations", or as blocking rights by depriving "follow-on innovators of access to and freedom to operate with information inputs" (Braithwaite, 2008, p. 111). In essence, intellectual property rights should not merely be based on economic and utilitarian value, underestimating the cultural and identity value attached to intangible resources (Santilli, 2012).

Such cultural and identity value, for example, is an integral part of the traditional rights of local, indigenous and farming communities which they exercise under traditional farming and seed systems in many countries, especially in developing and least-developed ones such as Nepal. These are the rights that enable these communities to conserve, use, exchange and manage a common pool of PGRFA based on their traditional knowledge, and local socio-cultural, economic and ecological contexts (Andersen, 2005; Matthews, 2011).

5.2.2 Commons: a resource and a form of property regime

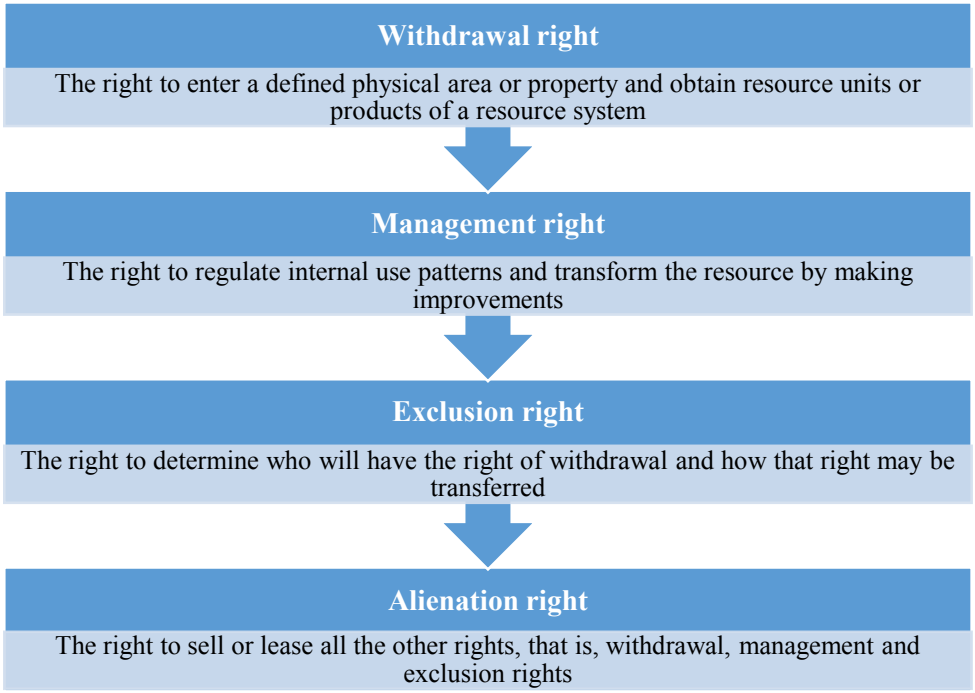
In the commons literature, common-pool resources generally refer to resource systems that are collectively shared and used by multiple individuals. According to Ostrom (2000, p. 1), c ommon-pool resources:

> "…generate finite quantities of units and one person's use subtracts from the quantity of resource units available to others. Most common-pool resources are sufficiently large that multiple actors can simultaneously use the resource system and efforts to exclude potential beneficiaries are costly."

In commons discourse, common property is also an important concept. As a form of property regime, common property is a legal regime that is governed by a set of rights belonging to the commoners of the resources (Ciriacy-Wantrup & Bishop, 1975; Larson & Bromley, 1990; McCay & Acheson, 1990; McCay & Jentoft, 1998; Ostrom, 1990). In this sense, in a common property regime, members of a group exercise their common rights, or a bundle of common rights, such as the right to enter a defined physical area (access right), obtain resource units (withdrawal right), and manage the resources (management right) (Ostrom, 2003; Ostrom & Schlager, 1996).

Agrawal and Ostrom (2001) identify the following four types of property rights that are mostly relevant for the use of common-pool resources: withdrawal (which also includes the right to access), management, exclusion and alienation (Figure 5.1).

Figure 5.1: Four types of property rights relevant to the use of common-pool resources



These property rights are the authority to undertake authorised actions in relation to common-pool resources. Such rights, however, can either be *de jure*, or *de facto* property rights, and remain conditional on the rules that have been generally "agreed-upon and enforced as prescriptions to require, forbid, or permit specific actions for more than a single individual" (Schlager & Ostrom, 1992, p. 250). For example, local community forest user groups may obtain or be given the rights of access and withdrawal to benefit from community forest resources. They may, however, also be subject to operational rules that require them to limit their access and withdrawal rights to only certain timber or non-timber forest products, but not all forest products, including genetic resources.

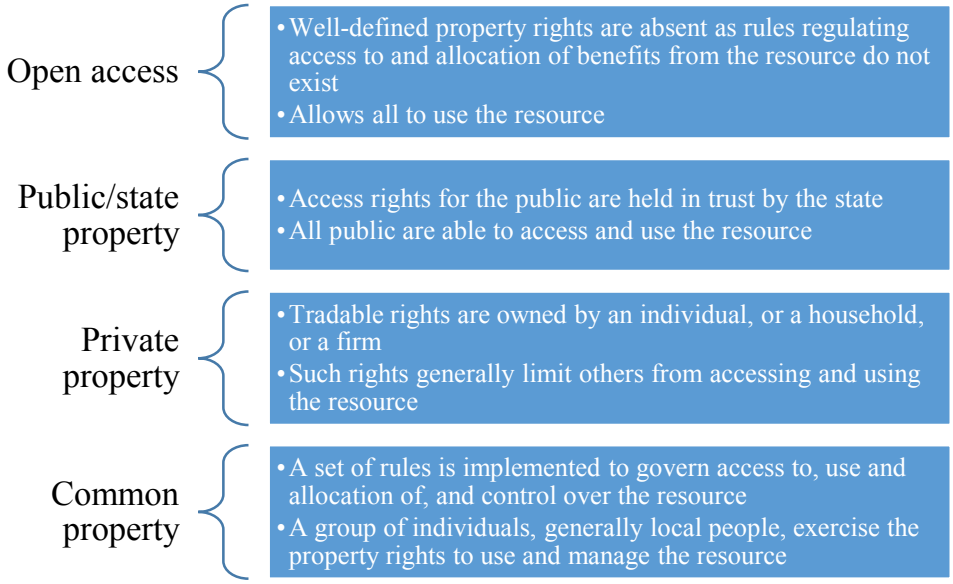
This also points to an important issue that people may derive the authority and exercise such a bundle of property rights, either partially or fully. Those having the rights of access to the resource and to obtain resource units are the "authorised users", and those who have these two plus the right of management are the "claimants". Similarly, "proprietors" hold all the rights of claimants, as well as an additional right of exclusion, but not the right of alienation, which only "owners" possess (Agrawal & Ostrom, 2001; Ostrom & Schlager, 1996; Schlager & Ostrom, 1992). In a common property

regime, individuals or a group of people often appear as "proprietors" with the rights of withdrawal, management and exclusion, but without having the right to alienate (sell or lease) these resources to others. Schlager and Ostrom (1992, 1996) view that these three rights are sufficient for local people and groups to undertake decisions for the use and management of common-pool resources. In the next chapter, we will see that the property rights relevant to the use of physical common-pool resources may not be fully appropriate to explain the use rights of the PGRFA knowledge commons as these are largely subject to intellectual property rights for their real value in intangible property of PGRFA.

5.2.3 Common-pool resources: management under different regimes

It is not right to associate the management of common-pool resources only with common property regimes (Ostrom, 2003). Generally, common-pool resources are managed under four types of property regimes: open access, public property, private property, and common property (Edwards & Steins, 1998; Feeny et al., 1990; Steins & Edwards, 1999).

Figure 5.2: Four types of property regimes to manage common-pool resources



Bromley (1989), arguing that open access is not a property regime at all, highlights the need to understand an important distinction between open-access resources *(res nullius)*, and common-property resources *(res*

communis). According to him, open access is free-for-all, whereas common property means a well-defined set of institutional arrangements for the management of resources, including their access and use (Bromley, 1989).

In the case of common-pool resources, as Ostrom (2000) explains, various actors and agencies can manage these resources under different property rights regimes. While local communities may manage common-pool resources under the common property regime, in the case of state and public property, either national, or depending on the political structure, even regional or local governments can manage common-pool resources. Similarly, private individuals or corporations are the ones who manage common-pool resources as private property.

Another important aspect of the management of common-pool resources is that these resources may also be managed in overlapping and conflicting combinations of different property rights regimes with variation within each of such regimes (Feeny et al., 1990). An example of a mix of property rights regimes is the management of forests in Nepal that is administered based on the regulatory structures and principles prescribed under the Forest Act 1993. Forests in Nepal – despite being a shared resource in principle – have been formally categorised and governed, for example, as *national forests* (government-managed), *community forests* (national forests handed over to the local people forming community forest user groups for development, conservation and utilisation for collective interest), and *private forests* (forests planted, nurtured or conserved in private lands) (Acharya, 2002; Graner, 1997).

As we will see in Chapter 6, in the case of the ownership and management of PGRFA too, these resources may be subject to different property domains such as state property, community property and private property. In Chapter 8, I will also discuss how PGRFA has been made subject to ownership under different property regimes in Nepal's CBD-compatible national law on access and benefit sharing.

5.2.4 Common-pool resources: classification in the quadrant of goods

How common-pool resources are similar to or different from public, private, and club goods is a major focus of the commons literature. Goods are often classified based on two features, that is, whether or not their consumption or use is excludable and subtractable (rivalrous) (Cornes, 1996). For instance, if the consumption of a particular good is non-excludable, and at the same time, non-subtractable, it is a public good. Sunsets are an example of a public good. When we view sunsets, we cannot exclude others from the same viewing, and our viewing will not also subtract any part or amount of sunsets.

However, the same features may not be available in the case of the use of local irrigation systems when these are common-pool resources. It would be difficult or costly to exclude any local user from access to and use of the irrigation systems, but certainly any additional user would mean a reduction in the amount of water available to others. In the commons literature, one of the often-cited illustrations of the two crucial characteristics of common-pool resources (non-exclusionary and subtractability), in comparison to public, club and private goods, is the following:

Table 5.1: Quadrant of different types of goods

		Subtractability	
		Low	*High*
Exclusion	*Difficult*	**Public goods** (e.g., sunsets)	**Common-pool resources** (e.g., irrigation systems)
	Easy	**Toll or club goods** (e.g., journal subscriptions)	**Private goods** (e.g., personal computers)

Source: Ostrom and Gardner (1993)

Since it is difficult to exclude potential beneficiaries in the course of the use of common-pool resources, it is perceived that common-pool resources share the very characteristic of "non-excludability" with pure public goods, an example of which, as mentioned above, are sunsets. Whereas since one person's use of common-pool resources subtracts from the resource units

available to the other users, the very yield of common-pool resources is "subtractable". This characteristic is similar to the characteristic of pure private goods such as personal computers (Bromley, 1989; Ostrom & Gardner, 1993). Using this quadrant, I will discuss how scholars have identified the complications of classifying PGRFA as a good in the next chapter.

5.3 Enclosures: locating the first and second movements

The customary norms of commons, that is, the practices of common use and sharing of resources, have been dismantled time and again by the "enclosure movements", often either through government control or the formalisation of private property rights. The "first enclosure movement" has been observed as the first intervention to implement a series of enclosures that started in the 15th century and continued until the 19th century in England to capture common resources such as shared agricultural fields, forests, and grazing lands[42] (Boyle, 2003; Neeson, 1996; Polanyi, 1944; Travis, 2000). Such an enclosure movement, along with the rise of colonialism[43], had its widespread impact on other countries too, for example, India, encouraging them to enclose land, forests, water, and other resources (Shiva, 1997).

As a result, in much of the 19th and 20th centuries, centrally administered, top-down regulatory policies continued to regulate the control and management of forests and other natural resources (Agrawal et al., 2008), restricting local people's ability to openly access and use the resources for livelihoods. In the 21st century, mainly in the post-World War II period, a further intensification of the enclosure process occurred along with the wave of globalisation, and gradually, in a neoliberal economic order, property rights emerged as the *sine qua non* of markets (Boyle, 2003), favouring the individuals and corporations with private property rights.

---

[42] See, http://www.thelandmagazine.org.uk/articles/short-history-enclosure-britain, explaining how the progressive enclosure of commons over several centuries deprived most of the British people of access to agricultural land (last accessed 12 January 2015).

[43] See, http://p2pfoundation.net/Vandana_Shiva_on_the_Contemporary_Enclosure_of_the_Commons_through_IPR, explaining how the enclosure policies of England, including the policy of deforestation, was later replicated in the colonies in India (last accessed 12 January 2015).

In different times, based on their own rationale and findings, resource economists justified the enclosure approach on the basis of efficiency and incentives, biologists on the basis of avoiding open access and restricting overexploitation for resource conservation, and demographers on the basis of addressing resource degradation caused by the growing population (Feeny et al., 1990; Young, 1982). Particularly in the field of natural resource management, since the 1960s, the theory of the tragedy of the commons by a famous biologist and ecologist Garrett Hardin largely influenced policymakers to pursue further government control and private ownership of resources such as agriculture lands, forests and fisheries (Hardin, 1968).

Since the mid-20th century intellectual property rights have become much more prominent tools of enclosure (Drahos & Braithwaite, 2002). Such rights first appeared to regulate the use of PGRFA with the reform of domestic laws, for example, by the US[44], and later through international laws like the UPOV Convention in 1961 and the TRIPS Agreement in 1995 (Matthews, 2011; Pistorius & van Wijk, 1999). Consequently, the private sector, in the form of giant commercial multinational seed companies, emerged to use new technologies (such as genetic engineering), make improvements to plant germplasms, and monopolise their use, production, reproduction, sale and marketing in the global seed market (Mulvany, 2005; Shiva, 1993).

The size of the monopoly market created through intellectual property rights is also visible from the trends of corporate control over seeds. For example, by 2009, the top 10 multinational seed companies were accounting for 73 percent of the global commercial seed market and just 3 of them were controlling more than 53 percent of the global commercial seed market.[45]

Scholars perceive and describe such a trend as "the second enclosure movement", which aims for "the enclosure of the intangible commons of

[44] The US allowed for the intellectual property protection of the varieties of vegetatively propagated plants since 1930, and of sexually propagated plants (that is, those reproduced through ordinary seeds) since the enforcement of the Plant Variety Protection Act in 1970 (Herdt, 1999).

[45] In 2009, the global commercial seed market was valued at US$27,400 million. See, http://www.etcgroup.org/factoids (last accessed 12 January 2015).

the mind" (Boyle, 2003), and promotes the stringent forms of monopoly-creating intellectual property rights in different fields such as biodiversity and agriculture (Shiva, 1997). As we will see in Chapter 7, multinational companies like Monsanto, together with USAID, has used a number of tactics to influence Nepal's regulation of its seed system, essentially by making efforts to open the door for the sale and marketing of its hybrid seeds in the country.

The enclosure trend is not, however, confined to the first and second enclosure movements as identified and discussed by scholars. There could be and must be many other examples of enclosures. For instance, the analysis of the enclosure movements should not be limited to the capture of openly accessible tangible natural resources such as land and forests, or the ratcheting up of the intellectual property rights over the use of intangible cultural creations such as information and knowledge.

In an era of globalisation, and largely due to the strong influence of the neoliberal approach to the promotion of private sector's interest-driven growth models, the enclosure movements even extend to squeezing the sovereign regulatory space that developing countries need to design their own *sui generis* policies for intangibles. There are scholars who – discussing the restriction on access to medicines vital for HIV/AIDS, malaria and tuberculosis created by the global intellectual property system – observe an international enclosure movement that:

> "…encloses the policy space of individual countries and requires them to adopt one-size-fits-all legal standards that ignore their local needs, national interests, technological capabilities, institutional capacities, and public health conditions" (Yu, 2007, p. 3).

The same argument also holds true in the case of the influence of the international regulation of intellectual property on the country's ability to design *sui generis* laws, mainly in relation to the need to protect the rights of local, indigenous and farming communities over PGRFA (Correa, 2015; Hoekman, 2005). While such cases are more like incidents of regulatory capture, we will also see in Chapter 7, how Nepal was able to prevent such capture during its accession negotiations for WTO membership due to the

mobilisation of civil society actors as third-party gatekeepers. The case of Nepal also shows how the use of networked governance enabled the country to design its regulation in support of the rights of local, indigenous and farming communities.

5.4 Commons scholarship: from traditional to new commons

Four decades have passed since Garrett Hardin put forward his theory of the tragedy of the commons in *Science* in 1968. He developed his idea of the tragedy, using a metaphor to describe how individual and collective rationality[46] functions in a situation of open access to a highly predictable, finite supply of a resource unit. He imagined a case where a group of people using a commons are locked into an inevitable process, which gradually leads to the overexploitation, and eventually, a tragic situation of the destruction of the very resource on which they depend (Hardin, 1968, p. 1244).

In a similar way, an influential work of economist Mancur Olson too discusses the idea of the "incentives" for collective action, the absence of which, according to him, leads to the free-riding problem in groups and organisations. He argues that "rational self-interested individuals will not act to achieve their common or group interests" in the absence of some form of external coercion or certain incentives (Olson, 1965, p. 2).

As an interesting development in the commons scholarship, Elinor Ostrom, a Nobel laureate and a globally recognised expert on commons, criticises the conventional theory of the "simple" common-pool resources being heavily focussed on "open-access resources" and not on the local or indigenous collective action dynamics of a number of "managed commons" (Ostrom, 1990). She argues that the capacity of local people and groups to interact and change institutions for the effective management of common-pool resources is successfully and empirically visible in many cases, in

[46] In economics, the theory of rational choice is the general theory of how people make choices. The logic of this theory begins with an assumption that individuals have preferences and choices to select the most preferred one so as to maximise utility (where the utility function identifies higher preferences with large numbers). See, Cooter & Ulen (1988) for a legal overview of this theory; and Green et al. (1994) for a critical analysis in political science.

developed as well as developing countries (Ostrom, 2000; Ostrom & Hess, 2007).

Since the 1980s, a number of other commons analysts, based on historical and empirical analyses, including a growing volume of socio-anthropological evidence, have also argued why it is not always right to assume that local people or institutions are incapable of self-governing their resources. Such scholars have laid an important emphasis on the efforts of local communities to initiate and sustain collective action, the building blocks of which, according to Ostrom (1998), are "trust, reciprocity and communication" (Agrawal & Ostrom, 2001; Feeny et al., 1990; Freeman et al., 1990; Keohane & Ostrom, 1994; Larson & Bromley, 1990; Ostrom, 1990; Ostrom et al., 1999; Ostrom & Gardner, 1993; Varughese & Ostrom, 2001).

Interestingly, the significance of the commons scholarship in various aspects of resource management is not limited to how a substantial number of experimental studies of common-pool resources have challenged the generalisability of the conventional theory of the commons (Varughese & Ostrom, 2001). The commons discourse has led to the formation of the International Association for the Study of the Commons[47], and a large number of international, interdisciplinary studies have shown an interest in using the findings of the commons research as major theoretical frameworks to understand the dynamics of the management of not just the natural resources (Van Laerhoven & Ostrom, 2007).

An example of this is an incremental focus being given to locating and analysing human-made resources, mainly since the mid-1990s. Based on an analysis of the research undertaken by many scholars around natural as well as human-made resources, Hess (2008) categorises the commons into traditional and non-traditional commons sectors. He describes that a number of "new commons" have been identified and debated by scholars in many

[47] The Association was founded in 1989 to bring "together multi-disciplinary researchers, practitioners and policymakers for the purpose of improving governance and management, advancing understanding, and creating sustainable solutions for commons, common-pool resources, or any other form of shared resource". See, http://www.iasc-commons.org/about (last accessed 22 January 2015).

new areas. Such new commons include cultural creations like the knowledge commons (Hess, 2008). The issues discussed around the knowledge commons range from university libraries as a commons (Forrest & Halbert, 2009) to digital advancements and information technology (Evans, 2005), and copyright and creative commons (Goss, 2007) to the intellectual property protection of the bio commons such as PGRFA (Gulati, 2001; Srinivas, 2006). The knowledge commons is also referred to as intellectual commons (Drahos 1996), information commons (Cunningham, 2014), technology commons, and learning commons (Forrest & Halbert, 2009).

5.5 Knowledge: a new, cultural commons

Scholars have extensively discussed the meaning of knowledge; information and data as a source of knowledge; and the acquisition of knowledge through a personal as well as a social process (Bellinger et al., 2004; Davenport & Prusak, 1998; Polanyi, 2012; Tuomi, 1999). Davenport and Prusak (1998, p.5) define knowledge as:

> "…a fluid mix of framed experiences, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents and repositories but also in organizational routines, processes, practices, and norms."

This is why knowledge is also referred to as "all intelligible ideas, information, and data in whatever form in which it is expressed or obtained" (Ostrom & Hess, 2007, p. 7). However, since knowledge is cumulative and abstract, an understanding of knowledge or a knowledge-creation system is complex too. Hence, the extension of the commons discourse from tangible resources such as pastures to also cover the new commons such as intangible cultural creations like knowledge makes the commons scholarship broadly inclusive, but at the same time, complex.

Some scholars have already discussed the complexity and interdisciplinary nature of the knowledge commons. Therefore, there is a concern whether a typical set of design principles developed for the analysis of collective

action required to manage natural resources may fit well in the analysis of the knowledge commons. The knowledge commons is an intangible resource that characterises the vast number of players with multiple conflicting interests, and is not a small, homogenous resource with clear boundaries (Ostrom & Hess, 2007).

The realm of the knowledge commons covers the analysis of the behaviours, decisions, rights and rules people make in relation to their shared knowledge resource, including the common sharing of "ideas, inventions, discoveries, symbols, images, expressive works (verbal, visual, musical, theatrical), or in short any potentially valuable human product…that has an existence separable from a unique physical embodiment…" (Cooper, 2006, p. 105). However, the complexity in the analysis of the knowledge commons should not ruin the noble purpose it intends to achieve.

As Cooper (2006, p. 105) observes, "…improved access to knowledge, information and communications is critical in building this society. The transformation requires a shift in the balance between the private incentive for production and the public value of circulation, in favour of the latter". Before discussing further the rationale behind the concept of the knowledge commons and its relevance with the international regulation of PGRFA in the next chapter, below I briefly explain different views on the classification of knowledge as a good (including as a commons).

5.5.1 Knowledge as a public good

The intangible form of knowledge is often considered a classic example of a public good, mostly by economists[48]. One person's use of knowledge – such as in the form of ideas, thoughts, and wisdom – neither excludes others from using the same, nor diminishes its availability for others to use (Cooter & Ulen, 1988), for example, the use of Hardin's theory of the tragedy of the commons.

[48] Economists generally identify three characteristics. The first one is non-rival possession, which is done through the "perfect expansibility" of ideas. The second is the low marginal cost of reproduction and distribution, implying that it is more difficult to exclude others from gaining access to ideas. The third one is the substantial fixed costs of original production (David, 2001).

Joseph E. Stiglitz, one of the most influential economists and Nobel laureate, views that knowledge has both of the two critical properties of a public good: non-rivalrous consumption and non-excludability. In fact, he views knowledge not merely as a public good, but as "a *global* public good", and argues that the international community has a "collective responsibility for the creation and dissemination of one global public good -- knowledge for development" (Stiglitz, 1999, p. 308).

5.5.2 Knowledge as a private good

The advent of new technologies and the emergence of intellectual property rights have made a fundamental change in how knowledge is being treated in the real world. Through the use of intellectual property rights, knowledge is being converted from a non-rivalrous, non-exclusionary public good into an excludable private good. In the process of promoting a legal commodification of knowledge, patent laws play a major role in extracting exorbitant costs in exchange for access to knowledge and other technologies, including genetic information contained in PGRFA.

James Boyle calls such a trend "the second enclosure movement", and Steve Weber and Jennifer Bussell "the imperialism of property rights" (Boyle, 2003; Weber & Bussell, 2005). Likewise, Evans (2005) explains the defensive and offensive sides of the second enclosure movement as:

> "There are…two halves to the second enclosure movement. The defensive side focuses on intensifying the enforcement of politically protected monopoly rights to exclude others from using information that has been defined as private property. The offensive side of the agenda involves taking information that has been considered part of nature, or the common cultural and informational heritage of humankind, and transforming it into private property" (Evans, 2005, pp. 86-87).

5.5.3 Knowledge in the tragedy of the anti-commons

The excessive proliferation and application of overlapping intellectual property rights over knowledge is often referred as the tragedy of the anti-commons (Aoki, 1998; Kloppenburg, 2014; Louwaars, 2006; Santilli, 2012; Srinivas, 2006). In a typical situation of the tragedy of the anti-commons, too many owners of a resource utilise the right to exclude others, giving rise to under-exploitation of the resource. This is in contrast to a typical situation

of the tragedy of the commons, where a group of people use a resource, but cannot exclude others, giving rise to overuse and finally the destruction of the resource. The case of Golden Rice, a genetically engineered transgenic Asian rice – containing a precursor of vitamin A called synthesised beta-carotene – is an example of a variety that has been developed using 70 different patented technologies (Hope, 2009).

In 1998, Michael Heller had put forward the idea of the tragedy of the anti-commons, as opposed to Hardin's theory of the tragedy of the commons. In his article "The tragedy of the anti-commons: property in transition from Marx and markets", he offers an example of many storefronts in Moscow to build his argument that a property or a resource is prone to underutilisation when there are too many owners who hold and exercise the right of exclusion (Heller, 1998). In the same year, Heller had also co-authored another article with Rebecca Eisenberg titled "Can Patents Deter Innovation? The Anticommons in Biomedical Research". The article identifies "an unintended and paradoxical consequence of biomedical privatization" in which "a proliferation of intellectual property rights upstream may be stifling life-saving innovations further downstream in the course of research and product development" (Heller & Eisenberg, 1998, p. 698).

5.5.4 Knowledge as a commons

Knowledge has many forms. It could be academic, non-academic, scientific, non-scientific, modern, traditional, indigenous, tribal, local, and specific to a particular field or area, for example, farming and biotechnology. When such knowledge is privatised, it restricts their access and sharing due to the exclusive rights created by the intellectual property system. On the other side, when such knowledge is in the public domain, it basically means that it is subject to open access and use, and has no effective protection against misappropriation (Santilli, 2012); and "what it contains is not defined and legal "rights" to its use are not delineated" (David, 2001, p. 16). It is in between these circumstances that the importance of the knowledge commons is often highlighted and defended, though the concept that knowledge is a new commons, as Ostrom and Hess (2007) view, is still in its early infancy.

The knowledge commons is a more important concept than public domain and has a meaningful purpose in the governance of knowledge dominated by intellectual property rights. According to Drahos (2006, p. 101), public domain is "information and activity that is not restricted by a species of intellectual property law" and thus, merely "a residual category", whereas the knowledge commons "leads directly to questions of moral and political philosophy concerning the kinds of associations and rights we want for the governance of knowledge".

Here, the moral and political philosophy is attached to the notion that knowledge has been a shared resource throughout history and the sharing of knowledge should not be subject to intellectual property rights, but be promoted for the collective good of society, people and the environment. The governance of knowledge, as Drahos (2006) argues, should not be based on monopoly rights in the form of intellectual property rights, as these types of restrictive rights are an especially bad idea for the knowledge commons.

Many scholars and institutions are working around some innovative, alternative approaches to address the impacts of intellectual property rights and the situation of the tragedy of the anti-commons. Examples of some efforts in this area are: open-source softwares, open source biology, the copyleft movement and the creative commons movement (Hope, 2009; Santilli, 2012). The focus of these approaches is to address the threats from withdrawal, commodification and privatisation of knowledge that used to be accessible for all as a shared resource (Ostrom & Hess, 2007). According to Hope (2008, p.20), "open source principles of technology development, licensing, and commercial exploitation offer at least a partial solution to the innovation lock-down caused by extensive private control over scientific and technological information within a highly concentrated industry structure".

5.6 Conclusion

The enclosures of commons have remained a major issue in discussions around property rights and resource regimes. The commons scholarship, in particular, has focussed more on the need to distinguish between open-

access resources and resources that are “managed commons”. The strengths of the commons discourse relates to its identification of the self-governing capacity and collective action of local people and groups to manage a number of physical common-pool resources.

The commons literature shows that the management of common-pool resources is not only possible by government control or private property rights, but also by local people. In fact, local management is probably the oldest form of commons management. In this respect, the ability of the commons scholarship to identify different property rights regimes, and the types of property rights applicable to common-pool resources, is also important in the discourse around resource management.

One of the major developments in the commons scholarship is its increased focus on not just natural resources, but also on human-made resources, mostly since the mid-1990s. As we discussed, there are “new commons”, such as the knowledge commons, which are diverse, and at the same time, complex in their nature as these resources are not homogenous and do not have a clear geographical area. Articulating the concept of the knowledge commons helps to address the threats from privatisation, commodification and withdrawal of information and knowledge that should be accessible for the collective good of society, people and the environment.

However, there are questions if an intangible, cultural commons like the knowledge commons may be analysed with the same or similar institutional frameworks designed for the analysis of natural resource-based commons. These aspects will be explored in detail in the next chapter on international regulation of PGRFA.

Chapter 6

International regulation of PGRFA knowledge commons

6.1 Introduction

In the previous chapter, I discussed the notions of commons and property, the first and second enclosure movements, and the extension of commons scholarship from traditional to new commons like knowledge commons. I also discussed the limitations of the commons scholarship to provide a framework for the study of the complex features of the knowledge commons. The knowledge commons is an intangible resource that characterises the vast number of players with multiple conflicting interests, and is not a small, homogenous resource with clear boundaries. In this chapter, I situate and analyse PGRFA as a component of the knowledge commons, hereinafter referred to as "PGRFA knowledge commons".

PGRFA are an important component of agriculture biodiversity. These resources – other than forest plants and ornamentals – include all those plant species that provide food, medicine, fodder for domestic animals, fiber, clothing, shelter, energy, and other uses (Hammer et al., 2003). As a basis for the world's food security and agriculture, PGRFA are also the raw materials for breeding and development of crop varieties. From ancient times only farmers were domesticating wild plants and improving varieties of local needs by selection and breeding within the informal, local seed system. In the present time, formal actors too access PGRFA for improving varieties or developing new ones within the formal seed system through modern techniques of breeding such as genetic engineering (Lawson, 2009).

In the debates around PGRFA knowledge commons, the effects of intellectual property restrictions on access to and use of PGRFA are a major concern. However, note that as the concept of the knowledge commons as a whole, the concept of PGRFA knowledge commons too is not simple to understand and explain.

This chapter first discusses the ambiguity in the understanding of the property dynamics of PGRFA. Some scholars put these resources somewhere between a pure natural resource (traditional) commons and a knowledge (new) commons as PGRFA possess tangible (physical) as well as intangible (informational) property. Some others classify these resources based on the quadrant of goods. It is not, however, always clear which type of PGRFA are public goods and which others are private, or club or common goods.

The chapter then analyses the complexities that PGRFA face as a knowledge commons. There is complexity in characterising the commons and property notions of PGRFA. This is evident from how international regulation of these resources through the UPOV, TRIPS, CBD and ITPGRFA has led to the introduction of a multiple domain of property rights that affect their use and exchange. The conceptual complexity of the PGRFA knowledge commons is also evident from how these resources face a typically different social dilemma as their overuse and not underuse ensures the maintenance of their diversity and sustainable use.

Against the backdrop of the limitations of the commons scholarship to provide a framework for the study of the complex features of the PGRFA knowledge commons, this chapter seeks to make an important theoretical contribution. In order to develop an analytical framework to better understand PGRFA knowledge commons, the chapter discusses the conceptual scheme of a typology of four types of commons developed by Drahos (1996) as *positive inclusive*, *positive exclusive*, *negative inclusive* and *negative exclusive commons*. It then builds on the analysis of Drahos' typology by Roa-Rodríguez & Van Dooren (2008) in locating the shifting status of PGRFA vis-à-vis the relevant international undertaking, resolutions and agreements.

Through the conceptualisation of the PGRFA knowledge commons framework, the chapter seeks to explain the regulatory influences of different international agreements that govern and regulate PGRFA through multiple property rights domains. The chapter is, however, limited to the discussion of the regulatory influences of the UPOV Convention, CBD,

TRIPS and ITPGRFA. As we will see in Chapter 7, these international agreements have led to network confrontations in Nepal through actors and networks at international, national and local levels. Since the CBD, TRIPS and ITPGRFA are the agreements that Nepal is obliged to implement through national laws and/or measures, this chapter also provides a theoretical basis to analyse Nepal's regulation of the PGRFA knowledge commons in Chapter 8. We will see that Nepal is moving ahead to introduce multiple property domains to regulate the different subsets of PGRFA, or PGRFA knowledge commons. For now, we start the discussion with an analysis of the complexities of PGRFA knowledge commons.

6.2 The complexities of PGRFA knowledge commons

6.2.1 Tangible and intangible property of PGRFA

PGRFA possess two types of objects: tangible, physical objects, as well as intangible, informational objects. The tangible, physical objects of these resources are plant materials containing functional units of heredity such as cells, tissues, plant parts, and sexual and vegetative seeds. The intangible, informational objects of these resources are enclosed in a physical object, that is, the deoxyribonucleic acid molecule (DNA). However, these two objects do not fully define and complete the meaning, nature and significance of PGRFA.

The tangible, physical objects, as well as the intangible, informational objects of PGRFA are also embedded with important knowledge about their agricultural, economic, social, cultural and ecological use and value. Such information and knowledge are mostly the outcomes of the efforts made by various actors in different networked systems of variety selection, use, research and breeding. Mainly farmers and breeders have made valuable efforts to continuously use and develop plant varieties to adapt to or address the needs of food security, agriculture development, climate change and poverty, either through the use of traditional knowledge or modern technologies or both.

Due to these tangible and intangible aspects, PGRFA fall into the category of physical property, and at the same time, intangible property. This then

brings us to an important question of the linkage or the relationship of PGRFA with property rights. According to Correa (1995), while addressing the issue of property rights, there is a need to establish the distinction between rights over physical property and intangible property of PGRFA. He maintains that PGRFA, as physical property, can be the object of private or public property rights, for example, when these resources are situated in private or public lands, just like the tangible common-pool resources studied by the commons scholars. According to him, when the same PGRFA are removed from specific lands and transported outside, these resources may become subject to a different property regime, for instance, in cases of shifts outside the land of origin or to another country. However, he also makes it clear that due to the information contained in these resources, PGRFA hold their real value as an intangible property, and thus, a different property regime governing the knowledge component of PGRFA becomes important (Correa, 1995).

As plant genetic resources are situated somewhere between and not exactly as a natural resource (tangible) commons and cultural (intangible) commons, according to Halewood (2013), the institutional frameworks developed to analyse natural resource commons and cultural commons are not suitable for the analysis of complex commons like PGRFA. More than the property rights of withdrawal, management, exclusion and alienation discussed by the commons scholars in the case of physical common-pool resources, the analysis of the PGRFA knowledge commons requires a careful consideration of the property rights relevant for the regulation of intangible property of PGRFA.

According to Correa (2013), it is where the legal problems are complex, as states continue to come into conflict around the legal status of PGRFA. Such a conflict is visible in the way the international regulation has evolved over last six decades to govern and regulate the use of plant genetic resources (including PGRFA) with different property rights domains.

6.2.2 International agreements to govern plant genetic resources

Before PGRFA became the subject of global governance and property rights, they were largely globally shared and accessible resources. Some

scholars perceive this situation as PGRFA being a "global commons", in the use of which non-members theoretically do not exist (Roa-Rodríguez & Van Dooren, 2008; Safrin, 2004). Similarly, some perceive that PGRFA were part of a "common heritage of humankind" (Andersen, 2005; Corson & MacDonald, 2012).

Notwithstanding these understandings, since the mid-20th century, the global governance of PGRFA has come a long way to introduce and include in its remit a number of regulations for the access, use, exchange, collection, production, reproduction, sale and marketing of PGRFA. As a result, PGRFA are no longer entirely a global commons, or a common heritage of humankind, but subject to different domains of property rights. In the words of Raustiala and Victor (2004):

> "…states have created property rights in these resources in a Demsetzian process: as new technologies and ideas have made PGR far more valuable, actors have mobilized and clashed over the creation of property rights that allow the appropriation of that value" (Raustiala & Victor, 2004, p. 277).

An understanding of the property rights domains created by the international regulation of PGRFA is well understood with the analysis of the provisions of the UPOV Convention of 1961, 1978 and 1991; the CBD of 1992; the WTO's TRIPS Agreement of 1995; and the ITPGRFA of 2001 (Matthews, 2011). The UPOV Conventions and the TRIPS Agreement of the WTO have been designed for the enforcement of intellectual property rights, covering, among others, exclusive-type of patent and plant breeders' rights over plant varieties (Correa, 2000, 2015).

On the other hand, the CBD establishes sovereign rights of states over all genetic resources – including PGRFA but not human genetic resources – that are located within their territories. The Convention calls upon the states to exercise sovereign rights but take measures to facilitate access to genetic resources for other contracting parties through a bilateral system of access and benefit sharing. The CBD also calls for the protection of the rights of local and indigenous people over their genetic resources and traditional knowledge through national laws (Raustiala & Victor, 2004; Swanson, 2013).

Similarly, the ITPGRFA creates a global pool of 64 crops for facilitated access through a multilateral system so that obstacles of access to plant germplasms are addressed at a global level by the contracting parties. The Treaty also provides a legal basis to nationally protect farmers' rights to PGRFA and traditional knowledge through national laws and/or measures.

These agreements clearly show the shift of PGRFA from the state of an unregulated system of access, domestication, cultivation, exchange and collection within farmers' seed system to a situation of a complicated global system governed by a number of property rights domains. Such a shift in the international regulation of PGRFA means that the countries participating in these global agreements have to devise compatible domestic regulations to recognise, as allowed and where necessary, state sovereignty, the rights of local and indigenous people, farmers' rights, and intellectual property rights. The upshot of this is that between the PGRFA-providing countries in the South and the PGRFA-receiving countries in the North, the international conflict was and continues to be mainly around the issue of commercialisation of PGRFA through intellectual property rights (Adhikari, 2009a; Brush, 2013; Posey & Dutfield, 1996; Tansey & Rajotte, 2008).

As we will discuss a bit later, the issue of intellectual property rights is central to the discourse on the PGRFA knowledge commons and have implications for access to and use of PGRFA at global, national and local levels. In particular, the property rights implications could be a major source of restrictions for local and indigenous communities who rely on traditional seed systems to access, use and exchange PGRFA for seed and food security. Such restrictions are not a good idea also because PGRFA are resources that face a typically different social dilemma, and their conservation and sustainable use are best ensured through continuous use and exchange.

6.2.3 PGRFA facing a typically different social dilemma

PGRFA do not face a typical danger of overexploitation and resource degradation, as the commons scholars discuss in the case of physical common-pool resources (Halewood, 2013). Unlike natural resources, as Drahos (2006) mentions, "repletion through use rather than depletion is

what characterises the intellectual commons". In this sense, in the case of the PGRFA knowledge commons, the collective action problem in the conservation and use of PGRFA does not come from the free and unrestricted use of the resource by a group of farmers, but appears due to conditions that force or motivate farmers to underuse or avoid the use and exchange of PGRFA.

An example of this is the loss of traditional varieties of PGRFA from local areas due to a policy that promotes an increased use of modern high-yielding varieties or that restricts reproduction and reuse of seeds through seed laws. We will see in Chapters 9 and 10, such loss of traditional varieties has led some civil society and community actors to establish community seed banks and promote the use and exchange of local varieties in different countries, including Nepal.

Halewood (2013) explains the different type of social dilemma that PGRFA face as following:

> "The principle social dilemma facing PGRFA is quite different: in the absence of human intervention through selection and breeding, the existing diversity of crop species (and diversity within those species) would never have evolved. The corollary is also true: in the absence of continued use (or storage in *ex situ* collections) much of the existing inter- and intra-specific diversity would cease to exist…underuse of PGRFA – not overuse – is the biggest threat to their evolution, conservation and availability for use by others."

Hence, in building a case for the PGRFA knowledge commons, it is to be well understood that PGRFA evolve, develop and expand with human intervention and further use in diverse and complex socio-economic and environmental settings. Understandably, today's diversity of PGRFA – which is important in feeding the global population and sustaining agriculture all over the world – is not merely a product of nature. Such a diversity is also the result of millennia of efforts that farmers and breeders have made by using their knowledge and other resources to understand and benefit from PGRFA, complex ecosystems, and societal and environmental needs (Halewood et al., 2013).

6.2.4 PGRFA as different goods in the "goods quadrant"

The intangible knowledge contained in PGRFA has a complex nature. As some scholars argue, there is ambiguity in what type of resources PGRFA are, and which particular classification of goods suits PGRFA. Some scholars view PGRFA to be a public good, whereas some others find them having the features of a private good (Brown & Swierzbinski, 1988; Fisher, 1988; Sedjo, 1992).

In particular, Sedjo (1992) makes the distinction that PGRFA contain the characteristics of both private and public goods. On the one hand, phenotypes – that is, individual plants – are subject to rivalry in consumption as in the case of private goods, on the other, their genotypes – that is, the information embodied in the genetic constitutions of plant species – are non-rivalrous in consumption, as in the case of public goods[49].

Similarly, Herdt (1999) makes an attempt to classify the PGRFA, but in the form of seeds. According to him, when PGRFA are in use as reproducible open-pollinated seeds, they are like a public good for two reasons: first, farmers cannot be prevented from using them (non-excludable), and second, their use by one farmer does not compete with their use by another (non-rival). However, if they are hybrid seeds, they are nothing but private goods (Herdt, 1999). Hybrid seeds cannot be reproduced as open-pollinated seeds. The same holds true in the case of seeds developed using terminator technologies.

For some other scholars, PGRFA do not only fall within the classification of public or private goods. Halewood (2013) argues that different subsets of PGRFA can be described as public goods, private goods, club goods or common-pool resources. According to him, only a subset of PGRFA that is near extinction and the samples of which are difficult to produce should qualify as common-pool resources. The other subsets of PGRFA, as shown in Table 6.1, are either public, or club or private goods.

[49] Sedjo (1992) also views that both phenotypes and genotypes can possess exclusivity by excluding consumption from some individuals, while allowing for others.

Table 6.1: Classification of PGRFA as different kinds of goods

		Subtractability	
		Low	*High*
Exclusion	*Difficult*	**Public goods** • *Ex situ* collections in CGIAR and many European countries (global public goods) • Collections in national gene banks (national public goods) • *In situ* PGRFA on lands managed and controlled by national government (in the absence of farmer management) • Plant breeders' right-protected PGRFA (for purposes of research, breeding, private, non-commercial use)	**Common-pool resources** • PGRFA embedded in threatened *situ* populations and unique samples/units in threatened *ex situ* collections
	Easy	**Toll or club goods** • Patent pools • PGRFA subject to facilitated access in research consortia • PGRFA subject to humanitarian use licenses	**Private goods** • PGRFA that are subject to strong national access and benefit sharing laws including potentially *ex situ* and *in situ* PGRFA held by provincial government, private universities, companies, civil society organisations, and farmers, and in the wild (except those on public lands) • Patent-protected PGRFA • Plant breeders' right-protected PGRFA (for commercial exploitation) • Hybrid parental lines, hybrid seed (that are not shared publicly)

Source: Halewood (2013).

However, note that the classification of PGRFA in the classic goods quadrant does not clarify the property rights dynamics set under international and national regulatory tools. This classification provides a conceptual understanding of the characteristics and nature of PGRFA in relation to the quadrant of goods, but may not be a comprehensive framework to understand the PGRFA knowledge commons. Moreover, the above classification overlaps and is ambiguous too.

For instance, to say that collections in national gene banks are public goods might not be desired by some local communities if their PGRFA are accessed and stored in national gene banks for the purpose of conservation

and safety duplicates. As we will discuss in Chapter 10, for example, some community seed banks did not initially express their consent to provide their germplasms to the national gene bank of Nepal. Instead, these community seed banks asked for a formal request and demanded the protection of their rights over their seeds and traditional knowledge.

Against the backdrop of these issues and the limitations of the commons scholarship to provide frameworks for the study of the PGRFA knowledge commons, in the following section, I develop an analytical framework that explains the property rights dynamics of regulations that create and affect the PGRFA knowledge commons.

6.3 Four types of PGRFA knowledge commons

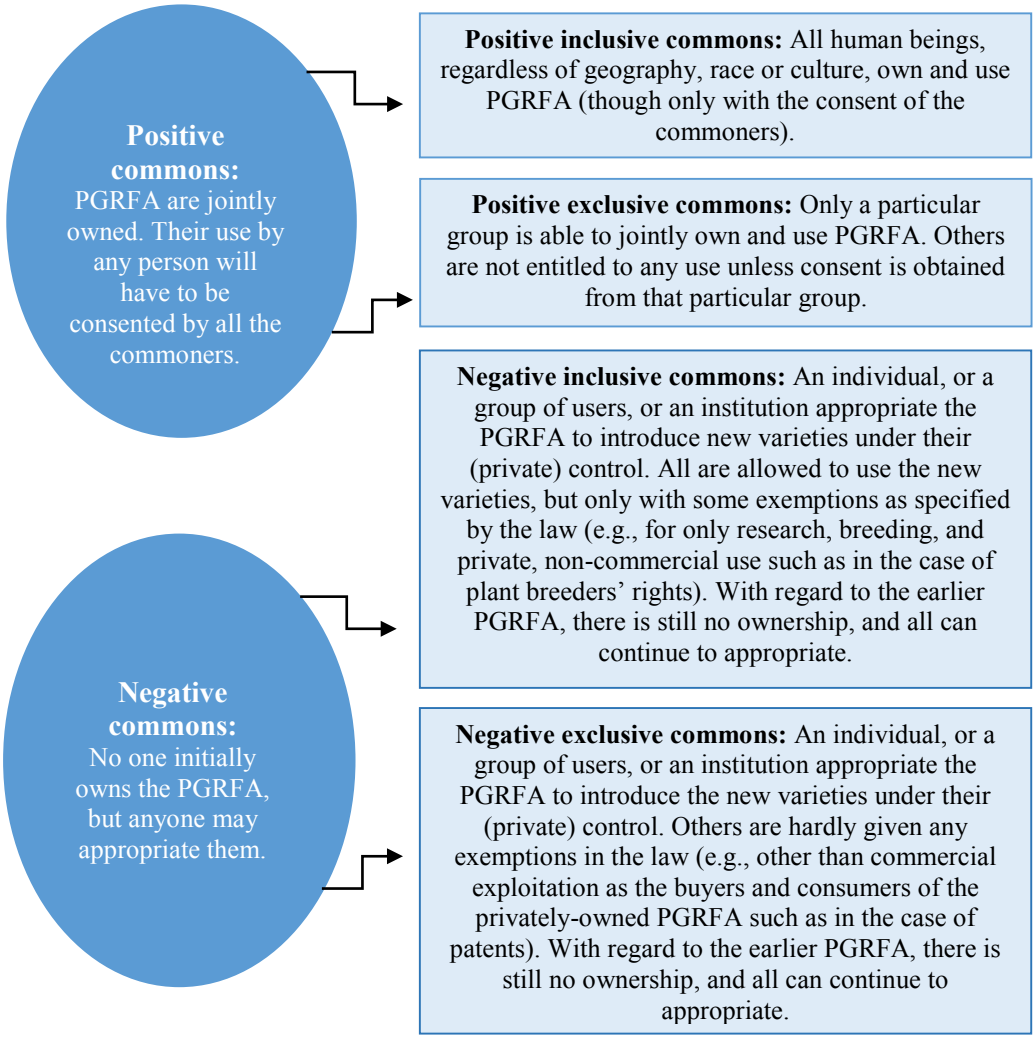
Drahos, in his book "A philosophy of intellectual property" (1996) and in a subsequent article "A defence of the intellectual commons" (2006), has made a philosophical analysis of the commons leading him to derive four types of commons. These commons flow logically from assumptions of exclusiveness, inclusiveness, positive and negative community. They represent visions of commons that are logically available.

According to him, in a negative commons, no one owns the resources, but anyone may appropriate them for personal use. In contrast to that, in a positive commons, resources are jointly owned and their use by any person depends on the consent of all other commoners. For him, inclusiveness means a universal access to the resources by all human beings, irrespective of geography, race or culture[50]; and exclusiveness means the confinement of the use of resources by a group of people, excluding others from accessing and using the same resources. His philosophical analysis of the commons then forms a typology of four types of commons: positive inclusive, positive exclusive, negative inclusive and negative exclusive.

[50] According to Drahos (2006), an ideal situation of the positive inclusive commons may be difficult to be seen in the case of tangible resources. However, for certain types of knowledge, such as the rules of arithmetic, all have use rights, and thus, a situation of the positive inclusive commons exists.

Figure 6.1 explains their meaning and type with an elaboration in the context of access to and use of PGRFA, which I call the typology of the PGRFA knowledge commons.

Figure 6.1: Typology of the PGRFA knowledge commons



In using these categories to develop a framework for the analysis of the PGRFA knowledge commons in the context of international regulation and Nepal, I am not claiming that these logical categories of Drahos' typology of intellectual commons perfectly describe the law and systems of governance for PGFRA to be found in Nepal or in other regimes such as the TRIPS or the CBD regimes. Rather these logical categories represent a vision that an institution or network might have of a commons and that serves as an ideal to which it might work. In other words, there is no perfect fit between the logical categories and the world. As we will see in the next

chapters, many actors and networks in Nepal contest the governance of PGFRA attempting to tilt the rules and regimes in the direction of their preferred vision of the commons.

Previously, Roa-Rodríguez & Van Dooren (2008) have used Drahos' typology of intellectual commons with the addition of Ostrom and Schlager's categorisation of operational-level property rights that I discussed in the earlier chapter. Their analysis locates the shifting status of PGRFA vis-à-vis the four types of commons and the relevant international undertaking, resolutions, and agreements. The analysis that I have made below builds and elaborates on Roa-Rodríguez & Van Dooren's discussion of the shifting common spaces in the international regulation of PGRFA. However, I have given consideration to some important aspects that this framework demands for the analysis of regulations affecting the use and exchange of PGRFA.

Firstly, I have defined the four types of PGRFA knowledge commons as shown in the figure above. Additionally, in the previous analysis, it is not clear if the entire set of PGRFA, or only a subset, shifts from one type of commons to another type, when a particular regulation comes into play to govern the use of PGRFA. I have tried to bring more clarity to this aspect, showing that PGRFA – not as a whole but with their different subsets – become subject to different types of positive and negative commons.

Secondly, I have not mixed Drahos' typology of commons with Ostrom and Schlager's categorisation of property rights, as Roa-Rodríguez & Van Dooren have done. This is mainly because these property rights, as we discussed in the previous chapter, are better explained in the case of the management of physical property or tangible resources. For example, the analysis of the rights of withdrawal, management, exclusion and alienation would be better suited to the study of whether and how local people, or private individuals and public institutions, possess these rights over tangible resources, such as forest products, in a well-defined geographical area.

In the case of PGRFA too, these property rights mainly matter while analysing the possession of tangible components of PGRFA (for example, individual plants) as physical property. However, the analysis I make below

focusses more on how the international regulation of PGRFA has advanced regulatory influences for the use and exchange of PGRFA as a knowledge commons. In this case, the intangible property of PGRFA does not have clear boundaries but is subject to property rights such as intellectual property rights and farmers' rights. Thus, in this analysis, I contextualise the categorisation of property rights by Ostrom and Schlager only when it is important to understand PGRFA as physical property, for example, in the case of the recognition of sovereign rights of states over PGRFA in their territories.

Thirdly, this analysis emphasises that the condition of consent from commoners – as mentioned by Drahos – is relevant for the discussion on the PGRFA knowledge commons. This aspect has not been clearly discussed by Roa-Rodríguez & Van Dooren, and I discuss this more in Nepal's case of *positive inclusive commons* in Chapter 8.

Fourthly, this analysis has not necessarily come to the same conclusions as those of Roa-Rodríguez & Van Dooren. This analysis builds on mostly the new or additional references and/or contexts, and hence, the contents of analysis are different to a significant extent. In addition, this analysis does not simply provide an overview of which international agreement governs what type of negative or positive commons. As we will see below, I examine the diversity of PGRFA and property rights dynamics in detail to show multiple layers of commons being governed by each international agreement. In Chapter 8 too, I use the same approach to analyse Nepal's case of PGRFA knowledge commons.

6.3.1 Pre-UPOV era of positive and negative commons

A common understanding among a number of scholars is that before the 20th century, as there were no legal instruments like intellectual property to restrict the access and use of intangible resources, PGRFA were largely a global commons or a common heritage of humankind (Aoki & Luvai, 2007; Le Buanec, 2005; Thomas, 2005). As Raustiala and Victor (2004, p. 281) put it, until that time "while a particular specimen of a plant could be owned, genetic resources per se were not owned by individuals or states".

An analysis from the lens of the above-mentioned framework of PGRFA knowledge commons shows that PGRFA as a global commons or a common heritage – which is based on the principle of open access and not common property – is more like an ideal situation of PGRFA as a *positive inclusive commons*. However, one must note that even before the globalisation of intellectual property regulation started to proliferate in many countries, there were different visions of the commons, both positive and negative. These different visions of the commons were then central to the governance and regulation of PGRFA among different networks of farmers, breeders, scientists, etc.

For example, between 1850 and 1950, also referred to as "the era of plant exploration and introduction", open access to freely[51] accessible genetic resources had enabled the famous plant collectors (like Frank Meyer and Nikolai Vavilov) and mostly the powerful states in the North[52] to pool and preserve PGRFA in botanical gardens and *ex situ* collection centres (Cohen et al., 1991, p. 867; Fowler & Hodgkin, 2004). In a way, through such *ex situ* collection missions,[53] PGRFA were being treated more like a negative commons. Such missions enabled a number of states, mostly developed ones, to collect the resources from different countries and "appropriate" without any need to obtain the consent from the providers (commoners) of the resources or share the benefits accrued out of such appropriation.

On the other hand, since the time of earliest crop domestications, local, indigenous and farming communities have treated PGRFA under their use and management more like a common property, and as per our typology, a positive commons. Generally, such communities jointly own the PGRFA for use and exchange among themselves with customary norms and

---

[51] The only cost being the expenses of collection (Kloppenburg, 2005).

[52] According to Crosby (1972), long before such as an era, the so-called "Columbian exchange" contributed to the collections of plant germplasms (such as of maize, wheat, olives, onions, radishes and many others) between Europe and Americas. European powers then created worldwide networks of botanical gardens to fulfil the economic needs associated with the agriculture development of colonial possessions (Kloppenburg, 2005).

[53] Since the era of plant exploration and introduction to the recent time, about 7.4 million accessions have been made globally. The *ex situ* collections have widened to such an extent that there are more than 1,750 individual genebanks worldwide, with the largest collections made by CGIAR (FAO, 2010).

practices of obtaining consent for access and use from all the commoners of the resources. For example, in Australia, indigenous communities use PGRFA more like a *positive exclusive commons*, as only these communities jointly own and use the resources based on their customary principles of common property (Drahos & Frankel, 2012). As we will see in Chapter 8, the case of Nepal is a bit different, as farmers in Nepal are widely involved in using and exchanging PGRFA more like a global commons or a *positive inclusive commons*. We will discuss that Nepali farmers have not only exchanged seeds among themselves, but have also provided seeds to other actors, irrespective of geography, race and culture, which is an important element of *positive inclusive commons*.

An important connection of such different visions of the positive and negative commons is with the advent and expansion of the second enclosure movement of intellectual property rights that we discussed in the earlier chapter. In the following sections, we will discuss how the international regulation of PGRFA – through international agreements and resolutions in different forums – has emerged with different property domains to affect the use and exchange of PGRFA.

However, in this analysis, as mentioned above, PGRFA as a whole are not part of any specific type of PGRFA knowledge commons, but with their different subsets, are subject to regulation as commons of positive, negative, inclusive or exclusive nature. For example, we will see that intellectual property rights have emerged to govern a subset of PGRFA with exclusive private rights, treating PGRFA outside the intellectual property system as negative commons, that is, openly accessible for appropriation and conversion into private property without any obligation to obtain consent from the commoners of the initial varieties (resources).

Yet, note that intellectual property-protected varieties too become negative commons once they become public domain varieties after the expiry of intellectual property after certain years, for example, after 20 years in the case of patents. However, until the period of protection, these rights impact significantly on the typology of PGRFA knowledge commons, first by restricting common spaces available for use and exchange of PGRFA

protected as a private property, and second by treating PGRFA (other than intellectual property-protected) as a negative commons. Below I start this discussion with the first international agreement that came into being to provide plant breeders' rights on plant varieties derived out of the appropriation of PGRFA.

6.3.2 UPOV: Appropriation of PGRFA as a negative commons

Following the proposal from the actors of the plant breeding industry, that is, European plant breeders in the 1950s, the UPOV Convention came into being in 1961 and has been revised since then in 1978 and 1991. The first version of the convention – UPOV 1961 – established a system[54] that provided a monopoly-type of protection for the fruits of all forms of plant improvement, including "discoveries", for example, through the protection granted on selections made within natural (pre-existing) variation.

However, the Convention did not impose any obligation to seek consent from or share the benefits with the commoners, treating all the PGRFA as a negative commons, that is, owned by no one but open for appropriation. And in the course of appropriation, if plant breeding led to the introduction of varieties that were new, distinct, uniform and stable, the Convention provided protection on such varieties through plant breeders' rights.

Then, only the plant breeders (often the seed companies) enjoyed the rights to produce and market such varieties for commercial benefits. Such rights, in fact, have widened along with the subsequent revisions of the Convention, first in 1978 and then in 1991.

The latest version of the UPOV Convention, referred to as UPOV 1991, extends the protection to "production, conditioning, offering for sale, selling, exporting, importing, or stocking for above purposes of propagating materials of the variety." This essentially means that the users (farmers) of the UPOV-protected new varieties can only buy the seeds of such varieties for the purpose of producing food, while all are able to use the substantial

[54] See http://www.upov.int/edocs/infdocs/en/0_c_extr_19_2_rev.pdf (last accessed 24 November 2015).

subset of PGRFA that are outside the UPOV protection as negative commons.

Table 6.2: Salient features of UPOV

Provisions	UPOV 1978	UPOV 1991
Protection coverage	Plant varieties of nationally defined species and genera	Plant varieties of all genera and species
Protection type	Producing for purposes of commercial marketing, offering for sale and marketing of propagating material of the variety.	Producing, conditioning, offering for sale, selling or other marketing, exporting, importing, stocking for above purposes of propagating materials of the variety. If harvested materials are obtained through the unauthorised use of propagating material, certain acts are prohibited if the breeder has had no reasonable opportunity to exercise his right in relation to the propagating material.
Breeders' exemption	Yes, breeders are free to use a protected variety to develop a new variety. However, repeated use of the protected variety for the commercial production of another variety is not exempted.	Yes. However, in addition to the 1978 version, essentially derived varieties and varieties which are not distinguishable from the protected variety are not included in the breeders' exemption.
Farmers' "privilege"	Yes, farmers are implicitly free to use their harvested material for any purpose, also when it stems from a protected variety	National governments are entitled to decide whether farmers shall be allowed –within reasonable limits and safeguarding the legitimate interests of the rights holder – to reuse the harvest of protected varieties on their own land holdings without the authorisation of the rights holder.

Source: Santilli (2012).

The only elements of inclusiveness in the UPOV system are the certain flexibilities specified by the UPOV as breeders' exemption and farmers' "privilege". However, as shown in Table 6.2, while plant breeders' rights have been strengthened in the subsequent revisions, the two important inclusive elements – farmers' "privilege", and to some extent breeders' exemption – have been gradually weakened in the 1978 and then the 1991

versions of the UPOV Convention. Based on this analysis, it can be concluded that the UPOV system has narrowed down the "positive" and "inclusive" elements of PGRFA as a global commons.

6.3.3 Restoration of positive inclusive commons through IUPGR

The decades of 1960s and 1970s witnessed a growing trend of granting intellectual property rights on the improved varieties of PGRFA, treating continuously the resources outside the property rights as a negative commons. While such a trend benefitted the PGRFA-receiving countries in the North, there did not exist any fair and equitable mechanism of allocation of benefits to the holders and providers of PGRFA, who were mostly the PGRFA-providing countries and local communities in the South, that is, positive commoners (Footer, 2000; Mooney, 1979). In addition, mainly since the 1960s, due to the introduction of high-yielding modern varieties, the erosion of local PGRFA scaled up at an unprecedented rate, creating concerns for the countries in the South (Andersen, 2008). These issues triggered international conflict and tensions between the PGRFA-providing countries in the South and the PGRFA-receiving countries in the North (Fowler, 1994).

Then came another development in the global governance of PGRFA that tried to create PGRFA as a global commons, that is, a *positive inclusive commons* in the 1980s. The FAO Conference Resolution 8/83 adopted the International Undertaking on Plant Genetic Resources (IUPGR) in 1983[55]. The Undertaking focussed on the conservation of PGRFA, and emphasised to promote unrestricted, wider access under "the universally accepted principle that plant genetic resources are a heritage of mankind and consequently should be available without restriction".

In order to monitor the implementation of the IUPGR and advise the FAO on its activities and programmes on PGRFA, in 1983, the FAO Conference Resolution 9/83 also established the FAO Commission on Plant Genetic Resources[56]. However, as we will discuss below, the negotiations under the

[55] ftp://ftp.fao.org/docrep/fao/meeting/015/aj399e.pdf (last accessed 24 November 2015).

[56] http://www.fao.org/docrep/x5563e/x5563e0a.htm (last accessed 24 November 2015).

FAO Commission on Plant Genetic Resources could not sustain the idea of making the PGRFA a *positive inclusive commons.*

6.3.4 Positive vs negative commons

The two subsequent decisions adopted in 1989 as annexes to the IUPGR in the FAO Conference made a major shift in how PGRFA were being considered to be made available for exploration, documentation and access without any restriction. The first of such decisions came in the form of The Agreed Interpretation of the International Undertaking (Resolution 4/89)[57]. This Resolution added "common" to the initially-accepted principle stating that "plant genetic resources are a *common heritage of mankind* to be preserved, and to be freely available for use, for the benefit of present and future generations". However, the same Resolution recognised that "Plant Breeders' Rights as provided for under UPOV…are not incompatible with the International Undertaking".

Such a recognition by the IUPGR strongly favoured the UPOV-led enclosure process by recognising the UPOV-protected subset of PGRFA to continue to remain as private goods. This was essentially also the interest of the PGRFA-receiving countries in the North as they wanted to capture the PGRFA within the intellectual property system for commercial sale in the global seed market. However, other than UPOV-protected new PGRFA, since rest of the PGRFA (for example those in the public domain) were still considered to be available for appropriation as negative commons, the resource-providing countries in the South expressed their reservation for two main reasons.

First, there was fierce resistance from these countries as intellectual property protection was being extended to such new plant varieties. These countries took the view that this was based on the PGRFA that they had made available, for example, through accessions to *ex situ* conservation programmes. Second, the countries in the South, as resource providers, wanted to ensure that their farmers receive full benefits from the use of

[57] http://www.fao.org/docrep/x5588e/x5588e06.htm (last accessed 24 November 2015).

PGRFA and be supported for continuous conservation and sustainable use of PGRFA (Andersen, 2005; Correa, 2000).

Thus, in order to address the equity and benefit sharing concerns of the resource-providing countries in the South, the second resolution was adopted as Resolution 5/89 on "Farmers' Rights"[58]. This Resolution endorsed the concept of farmers' rights. It, among other things, stated that "farmers, their communities, and countries in all regions" should be able to "participate fully in the benefits derived, at present and in the future, from the improved use of plant genetic resources, through plant breeding and other scientific methods".

Though the IUPGR was not legally binding, it was the first-ever international recognition of farmers' rights in the international instrument. The subsequent negotiations on the concept of farmers' rights led to the incorporation of farmers' rights in 2001 in an international law, the ITPGRFA. We will discuss this issue a bit later while analysing the typology of PGRFA knowledge commons in the context of the ITPGRFA.

6.3.5 From positive inclusive to positive exclusive commons under the CBD

The global governance of PGRFA took a major shift from inclusiveness to exclusiveness in the 1990s, initially when another resolution was adopted as the third annex to the IUPGR in 1991. In the FAO Conference Resolution 3/91, the principle that "plant genetic resources are a common heritage of humankind" was made subject to "the sovereignty of the states"[59]. In other words, promoting unrestricted, wider access to PGRFA became subject to the consent and approval by national governments as and when the PGRFA were available for access in the territories of the respective states.

Such a consensus in the Third Resolution led to a situation when, for the first time in the history of the global governance of PGRFA, all the PGRFA available as *positive inclusive commons* (global commons), other than the intellectual property-protected PGRFA, were considered to become state-owned *positive exclusive commons*. Their access and use were now

[58] http://www.fao.org/docrep/x5588e/x5588e06.htm (last accessed 24 November 2015).

[59] http://www.fao.org/nr/cgrfa/cgrfa-about/cgrfa-history/en/ (last accessed 24 November 2015).

dependent on consent and approval from national governments, making the states positive exclusive commoners of the PGRFA available in their territories. In this case, the logic of state sovereignty derives from states' possession of PGRFA in their territories as physical property. As discussed in the previous chapter, if viewed from the lens of the traditional commons discourse, states then have the rights of withdrawal, management, exclusion and alienation as they are the "owners" of PGRFA. However, since the IUPGR was not legally binding, it did not have that much impact in the international regulation of PGRFA.

The situation changed with the adoption of the CBD at the United Nations Conference on Environment and Development in 1992. This Convention is the first legally binding international regulation to deal with conservation, sustainable use, and access and benefit sharing issues pertaining to all biological diversity (including PGRFA, but excluding human genetic resources)[60]. One of the major features of the CBD is its recognition and reaffirmation of state sovereignty. In its Preamble, contracting parties reaffirm that states have sovereign rights over their own biological resources. In its Principal in Article 3, it recognises the state sovereignty as:

> "States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities in their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the national jurisdiction."

Similarly, in its Article 15 on Access to Genetic Resources, it recognises sovereign rights of states over their natural resources. While recognising this, it states that "the authority to determine access to genetic resources rests with the national governments and is subject to national legislation". Furthermore, while facilitating access, the CBD also requires the contracting parties to ensure that access is granted based on "mutually agreed terms" to ensure that access be subject to the "prior informed consent" from and "benefit sharing" with the resource-providing contracting parties. However, according to Article 15.2 of the CBD:

[60] https://www.cbd.int/doc/legal/cbd-en.pdf (last accessed 24 November 2015).

> "Each Contracting Party shall endeavour to create conditions to facilitate access to genetic resources for environmentally sound uses by other Contracting Parties and not to impose restrictions that run counter to the objectives of this Convention."

This way, the CBD contains the positive as well as exclusive elements. The positive elements lie in its provisions where it requires the contracting parties not to restrict access to genetic resources when such access is in support of its three objectives: conservation, sustainable use and benefit sharing derived from the use of genetic resources. The exclusive elements are built in its provisions where it allows national governments to restrict access to nationally-available genetic resources through the CBD-compatible national laws on access and benefit sharing.

As a result of which, a substantial subset of openly accessible and globally shared PGRFA has become subject to legally binding international regulation that allows national governments to develop national legislation to act as positive exclusive commoners. Thus, the CBD has given an international regulatory support and means to convert the nationally-available genetic resources, including PGRFA, into *positive exclusive commons*, which the FAO Conference Resolution 3/91 also intended to do.

Recognition of state sovereignty over natural and genetic resources is not the only feature of the CBD. The Convention also asks all contracting parties to:

> "Subject to national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles…and promote their wider application with the approval and involvement of the holders of such knowledge."

This provision has two important features. The first is the obligation for the contracting parties to protect traditional knowledge, innovations and practices of indigenous and local communities that are relevant for the conservation and sustainable use of biological diversity through national laws. The second is the need to promote their wider application, where the Convention also states "with the approval and involvement of the holders of such knowledge." This way, the CBD has not only made PGRFA a state-

owned *positive exclusive commons*, but also provided flexibilities to governments to develop national laws for creating another layer of community-owned *positive exclusive commons*. We will discuss the implications of these provisions for Nepal's regulation of PGRFA in Chapter 8.

For now, note that there are two important considerations in regard to such provisions. First, while creating such commons, the CBD has not, however, made any contradiction with the agreements on intellectual property rights. This means that the Convention, like the IUPGR, recognises the intellectual property rights over genetic resources. Second, while implementing the national laws, it is more likely that the rights of local and indigenous communities may be recognised by the states based on how local and indigenous communities possess PGRFA in their lands as physical property. This issue will be further clear when we discuss Nepal's case in Chapter 8.

The incorporation of exclusiveness into the PGRFA governance does not, however, stop within the text of the CBD. The exclusive elements were strengthened further by the Conference for the Adoption of the Agreed Text of the CBD, which was convened by the United Nations Environment Programme in May 1992. This Conference – while adopting the Resolution on the Interrelationship between the CBD and the Promotion of Sustainable Agriculture[61] – made an important recognition that there was a need to seek solutions to outstanding matters. Such outstanding matters were in relation to governing access to *ex situ* collections not acquired in accordance with the CBD and addressing the question of farmers' rights.

Subsequent discussions at the international level led to the expiry of the IUPGR and the birth of a new international treaty in 2001 called the ITPGRFA. Before we discuss how this International Treaty influences the governance of PGRFA through the creation of a protected global commons, and the recognition to different subsets of commons, we will first analyse the regulatory influence of the most dominant global agreement on intellectual property rights, that is, the TRIPS Agreement.

[61] http://www.fao.org/nr/cgrfa/cgrfa-about/cgrfa-history/en/ (last accessed 24 November 2015).

6.3.6 The birth of negative exclusive commons within TRIPS

The adoption of the UPOV in 1961, as discussed earlier, treated the PGRFA outside the UPOV system as negative commons. The introduction of TRIPS[62], as a multilateral agreement of the WTO in 1995, takes a step further by converting the inclusive elements of the UPOV into exclusive elements. With its two provisions, first on patent protection, and second on a *sui generis* system for the protection of plant varieties, TRIPS has critical influences on the governance and regulation of PGRFA. It establishes minimum standards for the protection of intellectual property such as patents (Matthews, 2002, 2011). In its provision on patentability in Article 27.1, it calls for the patent protection of:

> "any inventions, whether products or processes, in all fields of technology, provided they are new, involve an inventive step and are capable of industrial application".

This implies that technologies, such as genetic engineering, can be used to convert the existing PGRFA into new plant varieties. If these varieties also meet the other two criteria for patent – inventive step and industrial application – they can be patentable.

The patents under the TRIPS Agreement and plant breeders' rights in the UPOV Convention establish monopoly-type of rights for the inventors over the new varieties. Both of these consider PGRFA as a whole are available for appropriation for the advancement of innovations, and in a way promote the enclosure of PGRFA into private domain. Such negative elements are well understood since neither of these agreements deal with prior informed consent and benefit sharing arrangements, as in the case of the CBD.

Nevertheless, there are some differences too, when we analyse these two international agreements from the viewpoint of inclusiveness and exclusiveness. The exemptions provided by the UPOV Convention, though highly restrictive in the version of 1991, allow others to benefit from the Convention's inclusive elements. For example, as Santilli (2012) states, the UPOV Convention enables plant breeders to use the protected new varieties as a source of variation in research and breeding, only restricting the

[62] https://www.wto.org/english/docs_e/legal_e/27-trips.pdf (last accessed 24 November 2015).

production, reproduction and sale of the same varieties for commercial purposes. In addition, in the UPOV system, if a breeder, in the course of research and breeding, develops another new variety that is distinguishable from the protected variety, that breeder will have the right to produce and sell the new variety without any authorisation from the inventor of the protected variety.

However, in the patent system, such exemptions are much more restrictive, implying that patents comprise exclusive elements in terms of using the patent-protected varieties of PGRFA. Similarly, unlike the patent rights, plant breeders' rights do not cover the protection of processes of plant breeding such as cross-breeding and backcrossing (Santilli, 2012).

As mentioned before, TRIPS also has a provision on the protection of plant varieties, which enables Members (countries) to exclude from patentability:

> "plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes. However, Members shall provide for the protection of plant varieties either by patents or by an effective *sui generis* system of or by any combination thereof".

What is clear from this provision is that WTO member countries are not required to only choose the patent system for the protection of plant varieties. They can also opt for an effective *sui generis* system (Matthews, 2002). However, what is not clear in TRIPS and has remained a major source of conflict among member countries negotiating for the review of TRIPS Article 27.3(b)[63] is the uniform meaning of the effective *sui generis* system (Correa, 2000, 2015; Dhar, 2002). This is sometimes interpreted as a system similar to the UPOV, or the UPOV itself, or a domestic law that provides flexibilities to recognise—in line with the CBD and the ITPGRFA—the rights of local, indigenous and farming communities over genetic resources and traditional knowledge.

[63] TRIPS Article 27.3 (b) itself mandates for the review of the Article. The review had to commence from 1999, that is, four years after the implementation of the TRIPS Agreement. The review begun only since 2000 within the Council for TRIPS, but member countries continue to remain divided, for example, on the issue of the reconciliation between the TRIPS Agreement and the CBD.

As a result of such interpretations, on the one hand, some member countries have already been pressured into joining UPOV and some others are under pressure to do the same[64]. On the other hand, as alternatives to UPOV, some states have developed (such as India[65]) or are considering to develop (such as Nepal) their domestic law in a way that not only safeguards plant breeders' rights but also the rights of local, indigenous and farming communities. We will discuss the case of Nepal in Chapters 7 and 8.

To sum up, the TRIPS Agreement treats PGRFA outside the intellectual property system as a negative commons for appropriation without any obligation to obtain consent from the holders of the resources. However, one important aspect of intellectual property is that when countries choose to follow the option of joining the UPOV or extend a similar type of protection for plant varieties under the TRIPS Agreement through a *sui generis* option, new varieties of PGRFA become inclusive in nature as there could be certain exemptions for the use of protected varieties. On the other hand, if countries choose or are pressured to choose to introduce patent systems for plant varieties in accordance with TRIPS or with TRIPS-plus conditions, it creates, promotes and expands the use of the new varieties of PGRFA with exclusive, restrictive elements.

---

[64] The pressure to join UPOV has not come merely from negotiations with acceding countries for WTO membership, for example, in the case of Nepal and Cambodia which joined the global trade body through accession negotiations (Adhikari & Adhikari, 2004; Adhikari & Dahal, 2004). Mainly the powerful states in the North such as the US and the European Union have exerted such pressures through bilateral and regional trade negotiations and agreements, for example in the case of Jordan and Nicaragua by the US (Drahos, 2001), and Bangladesh, Lebanon and Malaysia by the European Union (Adhikari & Adhikari, 2004; Faso et al.). Such pressures are not though limited to joining the UPOV Convention, but even with regard to extending the patent protection beyond the flexibilities contained in the TRIPS Agreement (often termed as TRIPS-plus conditions), for example, in the case of Bahrain, Morocco and Singapore.

[65] India enacted the Plant Variety Protection and Farmers' Rights Act in 2001 to comply with TRIPS Article 27.3 (b). It chose to provide for plant variety protection through this domestic law, establishing it as the effective *sui generis* system. See Brahmi et al. (2004) for an analysis of the historical context, and the salient features of this Act.

6.3.7 ITPGRFA: from a protected global commons to a complex mix of commons at global, state and community level

As discussed before, following the decisions made in May 1992, the negotiations for addressing the outstanding matters of farmers' rights and *ex situ* collections made before the entry into force of the CBD continued in the FAO forum. The negotiations also focussed on the issues of access to and use of overall PGRFA, and harmonisation of the IUPGR mechanism with the CBD.

As the CBD established a bilateral approach of access and benefit sharing between the contracting parties, the subsequent negotiations found complexities in such a system for access to and use of PGRFA. One of the major concerns was that the bilateral approach of access and benefit sharing would be overly restrictive and bureaucratic. The other concern was that the bilateral approach of benefit sharing did not suit the case of PGRFA, as these resources originate and are made up with different stages of domestication, adaptation and breeding at the centre of origin, as well as the centre of diversity (Ten Kate & Laird, 2000).

Finally, the lengthy negotiations culminated in the adoption of the ITPGRFA in 2001. The Treaty makes a major influence on the global governance of PGRFA, as it establishes a multilateral system of access and benefit sharing that includes samples of PGRFA of 64 crops enlisted in Annex 1 of the ITPGRFA[66]. The multilateral system, with such a global pool of PGRFA important for the world's food security and agriculture, aims to facilitate access to PGRFA for its contracting parties, and among them, share the benefits arising from the utilisation of these resources in a fair and equitable way.

One of the major features of this Treaty's mechanism is its difference with that of the CBD. As a legally binding international agreement, the CBD, as discussed above, recognises "state sovereignty" and creates state-owned *positive exclusive commons*. In harmony with the CBD, the ITPGRFA also recognises state sovereignty over PGRFA in national jurisdiction, including their authority to determine access to their PGRFA. However, as a step

[66] ftp://ftp.fao.org/docrep/fao/011/i0510e/i0510e.pdf (last accessed 30 November 2015).

further, it also requires all contracting parties to exercise their sovereignty for the purpose of making the multilateral system "effective, efficient and transparent".

In the exercise of their sovereign rights, all the contracting parties are then required to include in the multilateral system all Annex 1 PGRFA that are under the management and control of the state, and in the public domain. As another feature, the coverage of the multilateral system also extends to other PGRFA that are within the jurisdiction of natural and legal persons; and held as *ex situ* collections in international gene banks and other institutions (Correa, 2013b). Likewise, the Treaty also deals with PGRFA under *in situ* conditions, provides for the protection of farmers' rights, and restricts intellectual property on PGRFA of Annex 1 "in the form received" (Andersen, 2008).

As per the Treaty, once the materials are made part of the multilateral system, their access is subject to the Standard Material Transfer Agreement (SMTA). One of the obligations for the user of the PGRFA received through the SMTA is to ensure monetary benefit sharing, if the user commercialises the product containing the material from the same PGRFA (Correa, 2013a).

In that case, the amount derived through the monetary benefit sharing goes to the Multilateral Benefit Sharing Fund, which is to be used primarily for farmers, especially in developing countries, who conserve and use PGRFA. However, if the user includes the improved PGRFA in the multilateral system, there is no obligation of monetary benefit sharing. Such an inclusion is itself interpreted as a non-monetary benefit sharing, since it allows all to access the improved PGRFA as in the case of other PGRFA of the multilateral system. Below I analyse how the ITPGRFA promotes and/or deals with different types of PGRFA knowledge commons.

6.3.7.1 PGRFA under the management and control of the state

According to the Treaty, subject to their national legislation, if the contracting parties hold Annex 1 PGRFA under their management and control, they must include such PGRFA in the multilateral system. Correa

(2013) interprets the PGRFA under the management and control of the state as:

> "all those materials that are property of, held by or in the possession of the contracting parties, or that are under other forms of control or management of the contracting parties, with the sole exception of those resources under development or subject to intellectual property rights" (Correa, 2013b, p. 185).

In this sense, the PGRFA found in all types of state and public property, including in the national gene banks and government farm stations, have to be included in the multilateral system, though the interpretation of these relies more on the respective national laws of the contracting parties.

According to the Treaty, the parties also need to include the PGRFA found in the public domain. Intellectual property laws constitute a public domain by not covering certain subject matters or through limitations of the duration of protection. The public domain information belongs to all to use (Drahos, 2006). This means, the contracting parties have to include in the multilateral system those PGRFA that have never been protected by intellectual property, or the intellectual protection for which has expired (Correa 2013).

The inclusion of all these PGRFA will then facilitate multilateral access to a global pool of Annex 1 PGRFA for all the contracting parties. This avoids the CBD's bilateral approach of access and benefit sharing, but only for PGRFA of 64 crops included in Annex 1.

As for its feature of establishing a multilateral system for facilitated access to such a global pool of PGRFA, some scholars perceive the ITPGRFA to have created a "protected global commons" (Halewood, 2013; Halewood et al., 2013; Santilli, 2012) or an attempt to restore the principle that PGRFA are a common heritage of humankind (Andersen, 2007). In the framework of PGRFA knowledge commons, the Treaty could be interpreted to have created or affected a number of commons, suggesting that it deals with a complex mix of positive and negative commons.

The so-called protected global commons under the multilateral system could be seen as a global-level *positive exclusive commons* (for PGFRA of 64 crops) as it represents the global accumulation of state-owned *positive*

exclusive commons. For this to happen, the contracting parties include materials under their management and control and in the public domain to facilitate access through the Treaty's multilateral system. In this sense, the Treaty is characterised by the elements of positive commons for reasons of the consent and agreement of the contracting parties to exercise their sovereign rights to include Annex 1 PGRFA in the multilateral system.

Similarly, the Treaty possesses exclusive elements, as the multilateral system is accessible only for the contracting parties and not for others. If all or almost all states join the Treaty in years to come, the Treaty's global pool of Annex 1 PGRFA may also be seen as *positive inclusive commons*. However, the elements of *positive inclusive commons* would only apply to the PGRFA under Annex 1.

From another perspective, the Treaty's multilateral system can also be argued to be negative commons. In this case, the elements of negative commons being the absence of any condition to bilaterally obtain the prior informed consent from the resource-providing contracting parties, as in the case of the CBD. Similarly, being permitted to access and use the materials "in the form received" creates an element of negative commons, though such a flexibility should only be used "for the purpose of utilization and conservation for research, breeding and training for food and agriculture, provided that such purpose does not include chemical, pharmaceutical and/or other non-food/feed industrial uses".

Based on this, the multilateral system could also be interpreted as a supportive mechanism for public and private entities to access Annex 1 PGRFA for the purposes of breeding and development of new varieties and finally to obtain intellectual property rights over the new varieties. In the Treaty, the intellectual property restriction is only on "in the form received" materials. This means that the recipients can make improvement to Annex 1 PGRFA accessed from the multilateral system, and even claim intellectual property on the improved PGRFA.

Furthermore, in cases of improvement to the received/accessed PGRFA, the recipients are also allowed to have discretion as to whether or not to make the improved varieties of PGRFA available to others. Due to these

provisions, if the multilateral system is used more by private researchers and breeders to obtain intellectual property rights over the accessed plant varieties, it is more likely that this would promote the expansion of intellectual property rights by enabling actors, often seed industries, to appropriate the global-level *positive exclusive commons*, that is, PGRFA in Annex 1. In such a context of intellectual property, it is important to highlight two issues.

First, as an obligation under the SMTA, if the recipients obtain intellectual property on the improved PGRFA, they have to either share the benefits on a monetary basis, or on a non-monetary basis. If they decide to share the benefits on a non-monetary basis, they would be obliged to include the improved PGRFA in the multilateral system, which would make the global-level *positive exclusive commons* more comprehensive. However, if the recipients decide to do the monetary benefit sharing, the improved PGRFA will either join the subset of PGRFA with inclusive elements (if protected with exemptions for others by plant breeders' rights) or the subset of PGRFA with exclusive elements (if protected under strict forms of patent rights).

Second, the Treaty also intends to include in the multilateral system the PGRFA that are, as discussed below, subject to the rights of individuals or legal entities.

6.3.7.2 PGRFA within the jurisdiction of natural and legal persons

The ITPGRFA requires all contracting parties to take appropriate measures to encourage natural and legal persons within their jurisdiction to include the PGRFA in the multilateral system if they are listed in Annex 1. This means that at the time of negotiations for the multilateral system, governments did not want to, or were not in a position to, make any commitment to include PGRFA that were subject to the rights of individuals or legal entities, that is, natural and legal persons (Halewood et al., 2013).

This way, the ITPGRFA has recognised that in cases of PGRFA under certain rights of individuals or legal entities (for example, intellectual property rights), the contracting parties can only take appropriate measures

to encourage intellectual property holders to include PGRFA within their jurisdiction in the multilateral system. In this case, it is clearly the intention of the Treaty to include the Annex 1 PGRFA, which are subject to the rights of individuals and legal entities, such as plant breeders' and patent rights, into the global pool of the multilateral system.

Though such an inclusion is voluntary in nature, it is aimed at making the global-level *positive exclusive commons,* as we discussed initially, more comprehensive by including both the types of intellectual property-protected varieties into the global pool of germplasms. In addition, this provision is also aimed at including the PGRFA that are or could be under the domains of farmers, or local and indigenous communities (I will discuss this shortly). The Treaty's aim to expand the global pool does not, however, stop here, but also extends to include the *ex situ* collections of international gene banks and research centres.

6.3.7.3 PGRFA held as ex situ collections by CGIAR and others

Until the ITPGRFA came into being in 2001, what was missing from the regulation of the international regulation of PGRFA was the *ex situ* collections that were made prior to the entry into force of the CBD. The CGIAR collections received a great deal of attention as they were hosting substantial *ex situ* collections to conserve plant genetic diversity; acting as the principal breeders of crops that were developed for countries that lack breeding programmes; and were also making available their collections to others. Though the centres were not claiming ownership of the germplasm but were holding the collections in-trust for the international law, they became subject of discussion in which non-government organisations also raised questions regarding the complex nature of the centres, as well as the confusion regarding the *ex situ* collections and the rights of states and communities (Andersen, 2007; Fowler, 2004).

In this regard, one of the major features of the multilateral system is the inclusion of the *ex situ* collections made by the gene banks of the agriculture centres of CGIAR, and other institutions who host *ex situ* collections of PGRFA. As a progress on this front, so far, CGIAR centres, and others such as – the Tropical Agricultural Research and Higher Education Centre

(CATIE), The Coconut Genetic Resources Network (COGENT) and the Mutant Germplasm Repository of the FAO/International Atomic Energy Agency Joint Division in Vienna – signed agreements with the Treaty's Governing Body for such inclusion (Correa, 2013b).

In the case of the inclusion of such *ex situ* collections, the Treaty, thus, expands to cover a "new" subset of PGRFA into the multilateral system. These are a "new" subset of PGRFA for two main reasons. First, the CBD had not dealt with the *ex situ* collections made before its entry into force, and second, such PGRFA were outside the scope of the regulation through state sovereignty or the rights of natural and legal persons. More or less, such resources were, as Halewood (2012) views, global and national public goods.

6.3.7.4 PGRFA under farmers' rights

The International Treaty is the first legally binding international agreement to recognise the protection of farmers' rights pertaining to PGRFA and traditional knowledge. Table 6.3 lists farmers' rights as provided for protection and implementation by the Treaty in Article 9.

Table 6.3: Farmers' rights provisions in the ITPGRFA

Provisions	Description
Recognition in Article 9.1	The contracting parties recognise the enormous contribution that the local and indigenous communities and farmers of all regions of the world have made and will continue to make for the conservation and development of PGRFA.
Implementation in Article 9.2	The contracting parties agree that the responsibility for realising farmers' rights rests with national governments. In accordance with their needs and priorities, each Contracting Party should, as appropriate, and subject to its national legislation, take measures to protect and promote farmers' rights.
Rights in Article 9.2 and 9.3	Protection of traditional knowledge relevant to PGRFA; the right to equitably participate in sharing benefits arising from the utilisation of PGRFA; the right to participate in making decisions, at the national level, on matters related to the conservation and sustainable use of PGRFA; and the right save, use, exchange and sell farm-saved seed/propagating material.

Since the implementation of farmers' rights is subject to national legislation, the ITPGRFA does not as such protect them internationally. Yet, it provides a legal option to contracting parties willing to protect farmers' rights through national laws and/or measures. In such circumstances, the Treaty's implementation at the national level will have influence on the typology of PGRFA knowledge commons as well.

For example, when the contracting parties decide to protect traditional knowledge in relation to PGRFA, access and use of such traditional knowledge will be subject to the consent of the farmers holding the knowledge. In addition, their right to benefit from the use of PGRFA under their domain will also have to be respected. This means that a subset of PGRFA (when they are embedded with traditional knowledge) will fall under the farmers' domain, making the farmers positive exclusive commoners, and at same time, giving them the authority to decide whether to make their varieties part of the multilateral system.

In other words, if farmers' rights to PGRFA and traditional knowledge are recognised by the national law, such varieties of PGRFA might not be the so-called public domain varieties. Such varieties may become farmers' varieties with some form of ownership vesting in farmers at the national level. This is what India has done by recognising farmers' ability to register local landraces as farmers' varieties under the Plant Variety Protection and Farmers' Rights Act 2001 (Bala Ravi, 2004).

Access to and use of such farmers' varieties then become subject to the consent of and benefit sharing with the farmers who registered these varieties. The same may also apply in the case of the varieties under development in "in situ conditions", as the Treaty provides exemption to "material under development". It means that the developer has the discretion to permit or deny access to such materials.

In such cases, the contracting parties too can only take appropriate measures to nationally encourage farmers to include their varieties in the multilateral system, but any such initiative would be at the discretion of farmers. For example, others can access and use the PGRFA protected by farmers' rights,

but only with the consent of the farmers. Farmers, other than the right holders, may however be allowed to save, use, exchange and sell seeds of such varieties for non-commercial purposes.

The same logic may hold true when the so-called public domain varieties are protected on the basis of the rights of local and indigenous communities, for example, through the national legislation developed to comply with the CBD. Under these circumstances, certainly the community rights-protected PGRFA are more likely to be community-owned *positive exclusive commons*.

To sum up, the implementation of the ITPGRFA is more likely to create multiple subsets of PGRFA to fall into different categories of PGRFA knowledge commons – from global-level *positive exclusive commons* to state-owned *positive exclusive commons* to community-owned *positive exclusive commons*. Since the Treaty allows for appropriation of PGRFA (though not in the form received), it also has the elements of negative commons. Actors and networks of the contracting parties have the ability to access PGRFA through the multilateral system for appropriation, though only under the terms of benefit sharing or putting the protected varieties derived from the germplasms of the multilateral system into the global pool of germplasms.

6.4 Conclusion

PGRFA are an important component of agriculture biodiversity, a basis for food security and agriculture, and are the raw materials for breeding and development of plant varieties. Scholars have been discussing the regulation of the commons and property notions of PGRFA for a long time. PGRFA are, however, a complex resource for regulation due to several factors.

There are complexities in the understanding of PGRFA as these resources possess tangible as well as intangible components of property, and are not entirely a natural resource commons or only a knowledge commons. There is also ambiguity in the classification of PGRFA as a good. For instance, not all subsets of PGRFA may be categorised as public goods or private goods or even common goods.

The international regulation of PGRFA is not free from complexity, as there exists a number of international agreements to govern PGRFA with different property rights domains. Such a complexity is visible when we apply the conceptual scheme used and developed in this chapter to analyse the global governance of PGRFA vis-à-vis the typology of PGRFA knowledge commons.

The framework of PGRFA knowledge commons – that I developed and used in this chapter based on Drahos' typology of intellectual commons – explains the shifts in common spaces available for access to and use of PGRFA at the global level due to different notions of commons and property. The framework shows that the international regulation of PGRFA has moved away from the elements of *positive inclusive commons*, as the use and exchange of PGRFA are now subject to the commons of exclusive and negative nature. This framework, however, does not necessarily allow us to suggest what types of commons could help a nation address its local and national interests in a particular given context of how issues of PGRFA governance are progressing at national and local levels.

For example, the PGRFA knowledge commons framework does not itself suggest whether it is better for a nation to move down the path of, for example, *positive inclusive commons,* or whether nations are in a better situation when they exercise their rights to establish PGRFA as *positive exclusive commons.* Nations – since they do not have homogenous contexts or are at the same development stage – perhaps need to consider tailor-made *sui generis* options that recognise a variety of commons to manage PGRFA at national and local levels.

For these reasons, a detailed analysis of the case of a country is important to enhance the effectiveness of the analysis of the global dynamics of PGRFA knowledge commons. As we will see in the coming chapters, various networks have pushed different visions of the knowledge commons in Nepal. Different actors and networks have been formed and mobilised at local, national and global levels to steer the flow of events of the regulation of the commons and property notions of PGRFA.

In this regard, particular attention needs to be given in understanding the PGRFA knowledge commons from the cases and experiences of the local-level practices of access to and use of PGRFA, local-level PGRFA management dynamics, and the rights of local, indigenous and farming communities in relation to PGRFA and traditional knowledge. In the words of Hardinson (2006):

> "The commons movement is providing a much-needed antidote to the disease of hyper-enclosure of the public commons and the need to restore a balance between monopolies and the public good. But there are some troubling aspects of this movement as it stands. By failing to take into account the many different commons that exist, the commons movement may be creating some injustices of its own, in ways that parallel problems of enclosure. In particular, the commons movement inadequately takes into account the rights and aspirations of indigenous people and local communities."

Taking these insights further, the next two chapters analyse the case of Nepal, exploring the historical and emerging contexts (Chapter 7) and the contents (Chapter 8) of the national regulation of PGRFA knowledge commons. As in this chapter, the main focus would be to identify different visions of the commons among actors and networks (Chapter 7) and in the national laws to be implemented by Nepal in compliance with the CBD, TRIPS and ITPGRFA (Chapter 8).

Chapter 7

Historical and emerging contexts of the regulation of PGRFA in Nepal

7.1 Introduction

The previous two chapters have provided a theoretical basis to explore the case of the regulation of PGRFA in Nepal in this and the next chapter. In this chapter, I first set a broader context of the first enclosure movement in Nepal, particularly highlighting the historical trends of enclosures of natural resources and their linkages with the second enclosure movement, that is, the enclosure of PGRFA through intellectual property rights. Then, I discuss historical and emerging contexts of the regulation of PGRFA in Nepal to understand how actors and networks have been formed and mobilised to steer the flow of events that matter for the national implementation of the international regulation of PGRFA we discussed in the earlier chapter.

As international negotiations on the regulation of PGRFA have always witnessed, the conflict between the countries in the North and the South is due to diverse interests of private, civil society and community actors and networks. Matthews, in his book "Intellectual Property, Human Rights and Development" (2011), makes a comprehensive analysis of the role of non-government organisations and social movements in generating responses to the globalisation of intellectual property regulation. Nepal also seems to have witnessed a similar trend. This is evident, as I discuss below, in Nepal's participation in international treaties, agreements and bodies, and the involvement of national and international actors in policy discourse and the design of the regulatory principles and norms of the national regulation of PGRFA.

The chapter's focus is on Nepal's struggle against the enclosure of policy space and the incidents of regulatory capture in regard to the development of *sui generis* national laws and policies to govern PGRFA in the era of the globalisation of regulation. As Braithwaite and Drahos (2000, p. 23) state, in the regulatory process of globalisation, "each regulatory domain has a distinct range of actors contending for victory at different sites." We will

see that in Nepal, there is confrontation among a number of strategic actors of different sectors, nationally and internationally, in regard to the regulatory domains (sites) dealing with formality, informality, property and commons.

In particular, the incidents of regulatory capture by international actors and networked confrontation among international, national and local actors are visible when I analyse the civil society movements like "No to UPOV" and "No to Monsanto" in Nepal. In incidents like these, for Nepal, the role of the non-government organisations as important third party gatekeepers has been key to avoid international and domestic pressures coming from the actors of the intellectual property domain. In the era of globalisation, the involvement of such third parties in the regulation of PGRFA is also a classic case of how meta-regulation has worked in Nepal. Non-government organisations have been active in monitoring and influencing regulatory behaviours and steering the flow of regulatory events in relation to the protection of customary norms of seed use and exchange, including the rights of local, indigenous and farming communities over PGRFA and traditional knowledge.

Such developments also show that Nepal offers an important regulatory site of networked governance in which actors from the government and non-government sectors create an enabling environment of network enrolment to support their visions of property and commons. As I will explain below, the government and some key non-government organisations have been partnering in the country to develop national laws and policies in accordance with the principles and provisions of the CBD, TRIPS and ITPGRFA, mainly with the aim of creating legal space to protect the rights of local, indigenous and farming communities. Below I start the analysis of this chapter by first discussing Nepal's linkages with the first and second enclosure movements.

7.2 The first enclosure movement: setting a broader context

Before 1769, Nepal was fragmented into small principalities (states) under the two clusters called *Baise* and *Chaubise*. Prithvi Narayan Shah, King of

Gorkha, expanded his state by conquering the other states of *Baise* and *Chaubise* clusters, and finally, led to the founding of a unified Nepal. One of his major objectives behind the unification of Nepal was to maintain independence and security of his kingdom from the British colonisation (Regmi, 1999). As Nepal was never colonised, one may tend to suggest that there was no influence from the first enclosure movement that started in England in the 15th century and expanded in India and other colonised nations until the 19th century.

On the contrary, a closer look at the historical trends of enclosures of natural resources in Nepal suggests that the country did not remain isolated from the trends of enclosures that were common in Britain or colonised countries. A reason is that the country's resource governance was largely influenced by the then colonised India. For example, while promoting the enclosure of forests for trading timber with the British India Company, in 1927, the government had formed an entity *Kathmahal*, and in 1942, had established the Department of Forests with the help of a British expatriate and a colonial representative named E.A. Smithies (Bajracharya, 1983; Robbe, 1954).

If the history is any guide, over the last centuries, the state has not just enclosed forests, but also lands and irrigation systems. Though the cases of the enclosures of lands, forests and irrigation systems are not the focus of this research, these have been discussed briefly for three main reasons.

First, as PGRFA are not isolated from lands and forests, it is important to discuss Nepal's situation of the enclosure of lands and forests. For example, as we discuss in Chapter 8, the country's CBD-compatible Access to Genetic Resources Bill of 2002 has recognised rights of the state, private persons and institutions, and local communities over PGRFA based on the ownership and use of land.

Second, these cases highlight how common-pool resources have been made subject to restrictions for access and use, undermining traditional, customary and local practices of natural resource management. This aspect is especially important as the use, management and exchange of PGRFA, as

we discussed in Chapter 4, are closely related to traditional, customary and local practices in Nepal.

Third, a brief discussion on the influence of the first enclosure movement in Nepal gives us an important link to move on to discuss the influence of the second enclosure movement on Nepal's governance of PGRFA and local, traditional systems of use and exchange of PGRFA.

While describing the cases of these enclosures below, I do not, however, intend to argue that Nepal witnessed these enclosures only due to the first enclosure movement initiated and expanded by Britain between the 15th and 19th centuries. Probably, as is the case for all states in the world, these cases of enclosures are also the outcomes of the state's objective to generate incentives to maximise wealth by economising on the use of resources, reducing the transaction costs and facilitating better resource allocation. Not surprisingly, the state has thus created and implemented measures for the protection of state sovereignty and private property rights in Nepal.

7.2.1 Enclosure of lands

Mainly after the unification of Nepal in 1769, interventions were made in favour of a few feudal, elite groups who largely represented the so-called high caste people such as *Brahmin* and *Chetri.* Such favours enabled the high cast people to capture the lands of indigenous people such as *Limbu, Chepang* and *Tharu* in different regions of Nepal. According to Cox (1990), the *Kipat* tenure system had enabled the indigenous people to use tribal lands as common property. It meant that the *Kipat* lands were not supposed to be treated as private property and sold to the members of other ethnic groups. Under this system, each person had a right to exclusively use the land but not to transfer the use right to the people outside the community, or sell the land (Regmi, 1976).

Over a period of time, either as hired labourers or as new settlers in the post-unification period, the high caste people started to cultivate the lands being maintained as common property (Cox, 1990). Gradually, the government converted the *Kipat* tenure system into the *Raiker* tenure system, under which private land ownership was established based on

claims of ownership by whoever cultivating the lands at that time (Regmi, 1976).

This way, on the one hand, the *Raiker* tenure system enabled the state to generate revenue and exercise the right of foreclosure in the event of tax delinquency (Cox, 1990; Regmi, 1999). On the other hand, since land ownership is considered a symbol of status and a determinant of power in Nepal (Regmi, 1976; Sharma et al., 2014), the conversion of land from *Kipat* to *Raiker* largely benefitted the high caste people to emerge as politically and economically dominant landlords (Cox, 1990).

According to the Nepal Living Standards Survey of 2010-11, only 74 percent of the agriculture households own land, around 53 percent of these households hold less than 0.5 hectares of land, and 32 percent of households operate some land rented-in from others (CBS, 2011). Some scholars assert that the concentration of land in the hands of a few elites or the so-called landlords has negatively affected the landless, poor and indigenous people (Adhikari & Bjorndal, 2014; Adhikari, 2006; Stein & Suykens, 2014). It is one of the reasons that land ownership continues to remain a major source of political, economic and social tensions in Nepal (Bhandari & Linghorn, 2012). An example of this is visible in the disputes at the courts where more than 60 percent of disputes are either directly or indirectly related to lands (Sharma et al., 2014).

7.2.2 Enclosure of forests

The enclosures of commons are not uncommon in the case of forests. Initially, local people were openly accessing and relying on forests for sustaining livelihoods. In the pre- as well as post-unification period, the rulers intensified the enclosure of forests by capturing the forest lands for resource extraction and agriculture, that too, in the interest of their closer allies (Malla, 2001). The enclosure of forests was intensified further in the period of the Rana dynasty (1846-1951).

The Rana rulers reduced the Shah monarch to figurehead by capturing all the political power. The Ranas not only enclosed forests to trade timber with the British India Company, but also enabled a few elites and their families

to capture the forest lands in different forms such as *Jagir* and *Birta* (Regmi, 1999). *Jagir*, which was also practiced in India until its independence from the British colonisation in 1947, was promoted to provide lands to government officials in appreciation of their service to the Rana governments. *Birta* was a form of land grant for rewarding the priests, religious teachers, soldiers and other closer allies of the Rana family (Adhikari, 2011).

The enclosure of lands promoted under the Rana regime is well-understood in how Malla (2001) describes the trend of land grabbing by the elites and the Ranas:

> "By 1950, one-third of the country's agricultural and forest lands had been granted to private individuals, and of that some three-fourths belonged to the Ranas…A significant proportion of the peasant farmers and their families were eventually forced to work as bondage labor (slaves) in the houses of local government functionaries and large *birta* owners."

Following the demise of the Rana dynasty in 1951, the first democratic government abolished the *Birta* system. The same government then nationalised the forests in 1957 through the Private Forests Nationalization Act. A major objective was to recover the forests from the private control of the feudal elites. In 1961, when the Shah king regained the political power and sacked the democratic government, all the forests were brought under the administration of the state (Guthman, 1997; Malla, 2001). Until the 1980s, the state largely controlled the use of forests, but failed to control forest degradation. The control of forests by the state also made local lives more difficult by restricting people's ability to use locally-available forest resources (Fisher, 1995).

Such outcomes under the state-controlled forest regime created the need to think of innovative approaches for forest conservation, use and management. It led some forest officials to collaborate with the Nepal Australian Forestry Project to involve local forest users in forest management. Such involvement of local forest users has now been well-structured in the famous national movement of "community forestry".

Initially, as a new form of collaborative management of forests for empowering local people to exercise use and management rights, community forestry received regulatory space in the Master Plan of the Forestry Sector in 1988. Following the restoration of democracy in 1990, the new government enacted the Forest Act, 1993 and implemented the Forest Regulations, 1995. Both of these strongly favour the creation and expansion of community forests that were/are part of the state-managed national forests (Acharya, 2002; Graner, 1997).

In Nepal's community forestry, local people are not the "owners" of forests, but play the role of "proprietors" for forest management. Community forest user groups are given only the use and management rights to benefit from forest products and to contribute to conservation and sustainable use of community forests. As proprietors, they use the forest products, buy and sell such products in markets, and manage forest use with their collective choice rules (Agrawal & Ostrom, 2001).

Community forests, with the involvement of 2.24 million households and more than 18,000 community forest user groups, manage over 1.7 million hectares of forests. This represents over 30 percent of the country's total forest area with a strong potential to expand as many new user groups are being formed for community forest management in different parts of the country. Different cases of community forestry in Nepal have been studied. A number of scholars have provided evidence of local people's self-governing capacity to manage forests in an effective way, though there are wide variations in the degree of such success, for instance, between those in the hills and the Terai (low land) (Gautam et al., 2004; Malla, 2000; Nightingale, 2002; Pokharel & Suvedi, 2007; Varughese & Ostrom, 2001).

7.2.3 Enclosure of irrigation systems

As in the case of lands and forests, the trends of enclosures are also visible in Nepal's irrigation systems. Historically, Nepal's irrigation systems evolved and developed either through a religious trust, or individual initiatives and community efforts. This meant that even before the unification of Nepal, irrigation activities – water acquisition from the source to the delivery to the field – were locally controlled and managed by

farmers based on local rules and norms set for collective action (Pradhan, 1990).

While thousands of such farmer-managed irrigation systems are still operational, since the 1950s, the government has also promoted the agency-managed (government-managed) irrigation systems in some regions of Nepal (Ostrom & Gardner, 1993). Donors such as the Asian Development Bank, the World Bank and CARE are a few major supporters of such government-managed irrigation systems. Comparing their performance and impacts, a series of studies have shown that on an average, farmer-managed irrigation systems have performed better than agency-managed irrigation systems on multiple dimensions, including the physical condition of the irrigation systems (Gautam et al., 1992; Lam, 1999; Ostrom, 2014; Ostrom et al., 1999).

7.3 The second enclosure movement: the case of PGRFA

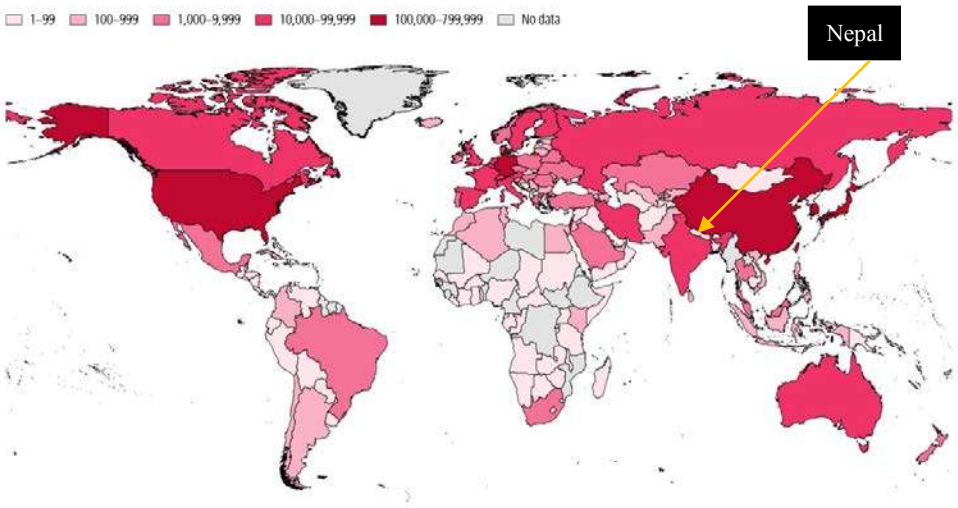
As in the case of the first enclosure movement, Nepal has not managed to escape the influence of the second enclosure movement that has been expanding with the extension of intellectual property rights to privatise and capture the intangible knowledge inputs, including PGRFA (Boyle, 2003). Mainly since the 1960s, as the developed countries intensified the second enclosure movement by using intellectual property to privatise the use of knowledge products, Nepal also followed suit, though not specifically to deal with patents or breeders' rights on plant varieties. After it started to implement periodic development plans since 1957, Nepal's first patent law was introduced as the Patent, Design and Trademark Act, 1965[67]. The Act defines patent broadly, covering:

> "any useful invention relating to a new method of process or manufacture, operation or transmission of any material or a combination of materials, or that made on the basis of a new theory or formula" (Section 2.a).

[67] Together with patent law, Nepal had also introduced Copyright Act, 1965, but its discussion is beyond the scope of this research.

According to a study[68], the intellectual property laws of 1965 had come into effect at a time when the infrastructural developments and institutional arrangements were virtually non-existent to provide protection to and benefit from intellectual property. Nepal's limited capacity to benefit from the intellectual property system is still evident from the data of registered patents provided by the Department of Industry during the main fieldwork. Until 2013, only 72 patents, of which 36 were domestic, had been registered. While comparing Nepal's case with the world, it stands among the countries having the lowest patent applications and grants by origin[69] (Figure 7.1).

Figure 7.1: Patent applications and grants by origin



Source: http://www.wipo.int/export/sites/www/ipstats/en/wipi/2014/pdf/wipi_2014_patents.pdf

Moreover, even within limited number of registered patents, not a single patent deals with plant variety protection. Yet, it would not be right to assume that the discourse on the implications of the second enclosure movement for Nepal ends within the patent law of 1965. The global governance of PGRFA – along with major developments on property rights since the 1980s – has significant implications for the national governance of PGRFA, including local, traditional seed system in Nepal.

---

[68] http://unesdoc.unesco.org/images/0012/001255/125505e.pdf (last accessed 10 December 2015). Though this study discussed this issue in the case of copyrights, it is equally applicable in the case of patents, which we verified through the data on the trends of patent registration.

[69] WIPO statistics database, http://ipstats.wipo.int/ipstatv2/editIpsSearchForm.htm?tab=patent (last accessed 10 December 2015).

The country is a WTO member, and a contracting party to the CBD and the ITPGRFA. Nepal is undertaking a number of policy and legal measures to amend or introduce policies and laws relevant to these international instruments. Such measures are likely to change and/or affect the nature and the scope of the national regulation of PGRFA, and the dynamics of how farmers save, exchange and use seeds within local, traditional seed system.

Before I discuss in the next chapter the salient features of Nepal's traditional seed system and relevant national laws and policies in relation to commons and property notions, I discuss here the historical and emerging contexts of Nepal's engagement with the global agreements, namely the CBD, the UPOV Convention, the WTO's TRIPS Agreement, and the ITPGRFA. In the light of the second enclosure movement, these historical and emerging contexts build an understanding of the engagement, role and interests of different actors and networks in the reshaping of the policy discourse and regulation of PGRFA in Nepal.

7.4 Emerging contexts of PGRFA regulation

7.4.1 First recognition to ownership rights over plant varieties

Until the late 1980s, Nepal did not have any law to govern the use, development, dissemination and marketing of seeds. The Seed Act, 1988 is the first example of such governance. As discussed in Chapter 3, the Act had been introduced after the country's first National Seed Seminar in 1983 – as an activity of the USAID-supported Seed Production and Input Storage Project – initiated a policy discourse to design a national seed law.

The first legal recognition of the right of plant breeders in Nepal can be seen in the same Seed Act. It mentions that the National Seed Board may grant "ownership right" to breeders of seeds of new plant varieties under specified conditions (Section 5.6). However, the Act is silent about such conditions. During the fieldwork, an official of the Seed Quality Control Centre said:

> "We are not sure about how to grant such an ownership right, particularly in the light of the national debates on intellectual property and farmers' rights. The Seed Board has not so far received any variety release applications with claims from public- or private-sector breeders for ownership (exclusive) rights. This is a reason that until 2013, no breeder was provided with such rights, though hundreds of improved seeds have already been registered, released and certified for production and dissemination in Nepal" (Interview with KIGS#2).

In connection with these issues, it is important to highlight that through the first amendment of the Seed Act in 2008, a provision was added to establish ownership rights over local varieties that have been traditionally used (Section 18A). The added provision does not elaborate on how local farmers would be entitled to such ownership rights, but only indicates that it would be done through specified rules. In order to enforce the same added provision, the revised Seed Regulation of 2013 then incorporates a provision for local farmers to register their traditional plant varieties as local varieties, but not specifying the ownership rights to which local farmers would be entitled (Rule 12.2).

Though these regulatory systems for seed production and business are silent on the nature and scope of breeders' and farmers' ownership rights, the first recognition of breeders' rights in 1988 and then the recognition of farmers' ownership rights in 2008 demand an inquiry of the reasons behind such regulatory developments. A review of 'grey' literature and a further examination in the fieldwork revealed that Nepal's policy discourse and governance of PGRFA have always been subject to influences from the regulatory trends and processes of globalisation, and there have been a lot of networked activities to steer the flow of events in relation to the regulation of PGRFA.

7.4.2 WTO membership and CBD ratification

In 1989, Nepal applied for the membership of the General Agreement on Tariffs and Trade (GATT). Nepal became a GATT-observer in 1993 and participated in the Uruguay Round of multilateral trade negotiations (1986-1994), which involved 123 countries to discuss the design of global regulations for trade in goods, trade in services, and trade-related

intellectual property rights. Following the establishment of the WTO in 1995[70], Nepal became a WTO observer and a Working Party of interested WTO members was formed for its accession to the multilateral trade body.

As a requirement for new membership through accession, Nepal headed to join the WTO in 1998 by submitting the Memorandum on Foreign Trade Regime to the Working Party. The Memorandum covered all aspects of the country's trade and legal regime, including policies and laws on trade in goods, trade in services, and intellectual property. This was followed by a lengthy process of accession negotiations with its Working Party members until 2003.

Nepal's ratification of the CBD in 1994 and involvement in WTO accession negotiations between 1998 and 2003 took the country's trade and intellectual property policy discourse in a new direction. The discourse involved discussions on the implications of the WTO's intellectual property regime for the rights of local, indigenous and farming communities over genetic resources and traditional knowledge. The discourse also involved discussions on the conflict between the TRIPS Agreement and the CBD, and the implementation challenges for their harmonisation at the national level.

With a number of networked activities, some non-government organisations were developing awareness on the implications of the WTO's intellectual property regime for farmers' rights to save, exchange, reuse and sell seeds. They were also advocating for the protection of farmers' rights to benefit from the use of their PGRFA and traditional knowledge at the local level. While recognising the significance of the CBD, such non-government organisations were also active in advocacy for the protection of the rights of local, indigenous and farming communities over genetic resources and traditional knowledge.

Some such non-government organisations were ActionAid Nepal, Pro Public and SAWTEE. In addition to these, some non-government

[70] After the conclusion and signing of the Final Act to the Uruguay Round in 1994, the GATT was replaced in 1995 by a treaty body in the form of the WTO, the most powerful rules-based multilateral trade body.

organisations of indigenous communities and the Nepal office of the World Conservation Union (IUCN) were also calling for effective provisions for the protection of the rights of local and indigenous communities in intellectual property, and access and benefit sharing laws.

The experts from some of these organisations claimed that Nepal would not be able to safeguard the traditional rights of farmers to save, exchange, reuse and sell seeds by opting for patent protection as set out by the TRIPS Agreement (Adhikari et al., 2000; Upreti & Upreti, 2002). Some other scholars also asserted that Nepal would lose by joining UPOV as the Convention does not allow for the protection of farmers' rights to seeds and traditional knowledge (Gauchan et al., 2003). Some other studies suggested that Nepal should seek to implement a *sui generis* law to protect plant varieties. One of the suggestions was also to harmonise Nepal's obligations under the TRIPS Agreement and the CBD, and importantly, create a balance between the rights of breeders and farmers (Adhikari & Adhikari, 2003).

Based on such national discourse and taking into consideration the international responsibility to implement the CBD, the Ministry of Forests – as a focal point to implement the obligations under the Convention – took the lead in preparing the Nepal Biodiversity Strategy in 2002. The adoption of this Strategy then paved the way for the formulation of a national law on access to genetic resources and benefit sharing. In the same year, the Ministry of Forests prepared the first draft of the Genetic Resources (Access, Use and Benefit Sharing) Bill, 2002 and circulated it for comments to relevant stakeholders (to be discussed in the next chapter).

In the case of policy discussions on the TRIPS Agreement and the rights of breeders and farmers, a "No to UPOV" campaign played a vital role in organising civil society actors to voice against the pressure for Nepal to join UPOV in 2003. This case shows that in the event of an attempt of regulatory capture by global actors, Nepali civil society actors emerged as important third party gatekeepers and convinced the government not to join the UPOV Convention.

7.4.3 No to UPOV campaign

After the submission of the Memorandum on Foreign Trade Regime in 1998, Nepal negotiated bilaterally with a number of Working Party members for WTO membership. The major ones were Australia, Canada, China, the European Union, India, Japan, Malaysia, New Zealand and the US. Nepal was able to complete its last Working Party meeting on 15 August 2003, but finalising the terms and conditions to accede to the WTO was not easy for a least-developed country (LDC) like Nepal.

As in the case of other acceding countries such as Cambodia, Nepal was also asked to join UPOV[71]. On 9 August 2003, the US, as a Working Party member, sent a note implying that Nepal would have to agree to become a UPOV member for the protection of plant varieties. The government of Nepal had received such a note a day before its delegates were scheduled to travel to Geneva for the last Working Party meeting. According to a key informant who was involved in accession negotiations:

> "Though the US had initially asked Nepal to join UPOV during negotiations, some European countries had also asked Nepal to consider joining UPOV and other global bodies dealing with intellectual property" (Interview with KIGS#4).

Following this external pressure, an anxious team of government delegates, headed by the Ministry of Commerce, called for an immediate meeting on the same day. A trade policy expert from a non-government organisation was also invited to the meeting of the government delegates. The expert was from SAWTEE. The meeting prepared a brief note citing reasons for Nepal's unwillingness to join UPOV. The note also made a point to

[71] Pressures for developing and least-developed countries to become a member of the UPOV Convention are not a new phenomenon. A few developed countries willing to promote intellectual property system for plant variety protection have often emerged as key players in exerting such pressures. They convince or force their developing and least-developed counterparts to agree to join UPOV or introduce a patent system to safeguard the interests of private plant breeders and seed companies. Such pressures generally come through trade deals such as bilateral and regional trade agreements (Antons & Hilty, 2015; Khatoon, 2013; Vivas-Eugui, 2003). The pressures to join UPOV or agree to implement broad patents are also exerted during accession negotiations for WTO membership, which is also referred to as "WTO plus" or "TRIPS plus" conditions (El-Said, 2005; Forsyth, 2013).

negotiate based on a policy space/option provided by the TRIPS Agreement to devise a national *sui generis* law for the protection of plant varieties.

Following this, there were two major developments in Nepal's struggle to avoid the pressure to join UPOV, one at the domestic level and the other at the WTO level. At the domestic level, a day after the government delegation left for Geneva, the trade expert of SAWTEE played a key role in informing other civil society organisations about the pressure from the Working Party member to join UPOV. SAWTEE was also the secretariat of the National Alliance for Food Security in Nepal (NAFOS), a loose national network of more than 20 civil society organisations and the FAO Nepal.

On 11 August 2003, a meeting of the NAFOS network was held. The meeting discussed strategic issues to help the government delegation avoid the pressure to join UPOV[72]. On 13 August 2003, the secretariat of the NAFOS network followed up with the government delegates in Geneva about the situation in the Working Party meeting. According to a key informant involved in this campaign:

> "Soon after the delegates informed that it was becoming hard for them to fend off the pressure to become a member of UPOV, NAFOS members decided to build up further support for No to UPOV campaign by involving media and other stakeholders, including the leaders of the politically affiliated farmers' organisations" (Interview KICS#1).

As part of this campaign, a press conference was organised by NAFOS in the capital Kathmandu on 13 August 2003. The next day the national dailies were full of coverage about the pressure for Nepal to join the UPOV Convention[73]. The media coverage explained Nepali experts' views on UPOV's negative implications for Nepalese agriculture, including the rights of farmers to save, exchange, reuse and sell seeds. The media coverage also highlighted the experts' argument that UPOV membership is neither a

---

[72] As important outcomes, the NAFOS members published articles in national dailies and posters with the title "Say No to UPOV". The articles and posters were published in English as well as Nepali language, and circulated to a variety of organisations, including media, community-based organisations and farmers' groups.

[73] "US proposes Nepal to sign UPOV", NepalNews.com, Kathmandu, 14 August 2003. http://www.nepalnews.com.np/archive/2003/august/arc781.htm (last accessed 2 February 2015).

mandatory requirement under the TRIPS Agreement, nor a necessary condition for WTO accession.

At the WTO level, the "No to UPOV" campaign, mainly the media coverage, was used by the government delegates as a major agenda in the Working Party meeting. With such support at the domestic level, the government was finally able to become a WTO member in 2004 without any mandatory obligation to join UPOV[74]. This is well-reflected in Nepal's Working Party Report for Accession to the WTO. As the Report suggests, Nepal does not have any obligation to become a UPOV member and can make a future decision on this based on its "national interest". The following sentence from the Report also shows Nepal's independent line:

> "…Nepal would also look at other WIPO and IP related Conventions, e.g., Geneva Phonograms Convention, UPOV 91, WIPO Copyright Treaty and WIPO Performances and Phonograms Treaty, in terms of *national interest* and explore the possibility of joining them in the future, *as appropriate* (WTO, 2003, p. 40)." (emphasis added)

Nepal's successful campaign against the pressure to join UPOV draws attention to a number of lessons that a country not willing to join UPOV can learn. Some studies on Nepal's campaign against UPOV membership have also been done. Such studies include a comparative study of Nepal and other countries such as Cambodia and Vanuatu, and a case study "Nepal: The Role of an NGO in Support of Accession", published in a book by the WTO in 2005 (Adhikari & Adhikari, 2004; Adhikari & Dahal, 2004; Andersen & Winge, 2013; Gallagher et al., 2005).

From the regulatory viewpoint of this thesis, one of the important lessons is in relation to the active involvement of civil society actors in the regulation of PGRFA. This case shows the use of meta-regulation through which non-government organisations have played a major role in safeguarding the national and local interests. This case also represents an example of networked governance in which the actors from the government and non-government sectors have worked together to develop national agenda for

[74] http://www.ictsd.org/bridges-news/biores/news/farmers-rights-endangered-by-the-cafta (last accessed 2 February 2015).

global negotiations in addition to preventing the incidents of regulatory capture by the global actors of the North. As we will discuss in the sections below, such cases are also visible in various other networked activities of the government and non-government organisations.

However, we will also see that irrespective of such an achievement to secure the policy space needed for a *sui generis* law for the protection of plant varieties by the networked activities of the civil society and government actors, the subsequent developments have not been fully positive. The government and civil society actors continue to witness a number of constraints and challenges in their efforts to design, draft and enforce a *sui generis* law for breeders' and farmers' rights.

7.4.4 Drafting of a *sui generis* law for breeders' and farmers' rights

As part of its WTO accession deal, Nepal has made a commitment to implement TRIPS in compliance with its obligations under the Agreement. As an LDC member, it made a commitment to implement all the substantive provisions of the TRIPS Agreement by December 2005, which was also the end of the transition period the LDC members had been initially granted.

In the Working Party Report, Nepal has made a specific commitment on plant variety protection[75]. It committed to develop "a separate free-standing Act" for the protection of plant varieties. Nepal has stated that through this legislation, it intends to "protect the rights of related stakeholders in accordance with the needs of the country". According to a key informant from the government sector:

> "This wording in Nepal's commitment had much to do with the No to UPOV campaign launched by NAFOS. The accession deal provides Nepal with policy space to devise a *sui generis* law for protecting the rights of not just breeders, but also of farmers who rely on subsistence agriculture and local systems of use, reuse, exchange and sale of seeds" (Interview KIGS#5).

[75] As for its compliance with TRIPS, the commitment is also to amend the Copyright Act, 2002. For other major intellectual property protection, Nepal has committed to devise an Industrial Property (Protection) Act, as the existing Patent, Design and Trademark Act, 1965 does not meet the requirements of the TRIPS Agreement (WTO, 2003).

After WTO membership, the Ministry of Industry and Commerce initiated the law-making process. In consultation with the Ministry of Agriculture, a draft was prepared as Plant Variety Protection and Farmers' Rights Bill in 2005. The bill did not come into implementation by the end of 2005, which was a timeline agreed by Nepal in its Working Party Report. It was because, being an LDC member, Nepal was able to obtain a further transition period until June 2013 for the implementation of the TRIPS Agreement[76]. Following such an extension of the transition period, though Nepal did not pursue the enactment of the bill, pressures to introduce a law that strongly favours the private sector and seed companies did not stop.

Seed associations and companies from Europe and the US continuously networked with local seed companies and traders for a national legal regime that recognises breeders' rights of the kind protected in UPOV. Nepali seed entrepreneurs were invited to international meetings in Europe and Asia, and were educated about the need for Nepal to join UPOV and have a seed law that protects breeders' rights. The Seed Entrepreneurs' Association of Nepal, in association with the European Seed Association, also organised a training of trainers (TOT) for local seed traders and government officials in 2006. According to a key informant from the national seed association of private seed traders:

> "I, along with some members of the Seed Entrepreneurs' Association of Nepal, were convinced by the foreign seed companies that without a regime for plant breeders' rights, Nepal would not receive foreign investment for variety development and plant breeding, and benefit from technology transfer needed for the development of breeding programmes. The foreign seed companies also told us that local seed traders would miss business and job opportunities if there would be no foreign investment in Nepal's seed sector due to absence of an effective intellectual property system" (Interview KIPS#1).

[76] On 29 November 2005, the Council for TRIPS extended the transition period until 1 July 2013 for all LDC members, recognising "the special needs and requirements of least-developed country Members, the economic, financial and administrative constraints that they continue to face, and their need for flexibility to create a viable technological base". See, https://www.wto.org/english/news_e/pres05_e/pr424_e.htm (last accessed 2 February 2015).

With support from international seed actors and agencies, the Seed Entrepreneurs' Association of Nepal continuously engaged in formal and informal negotiations with the officials of the Ministry of Agriculture and the National Seed Quality Control Centre. The members of the Association lobbied for UPOV membership and the enactment of a UPOV-style plant variety protection act in national seed seminars and meetings of the government and the non-government organisations. Foreign seed companies and domestic seed traders were not, however, alone in their mission to ask Nepal to provide for plant breeders' rights through a formal law. As a key informant from the civil society organisation claimed:

> "The experts of the USAID-sponsored project "Nepal Economic, Agriculture and Trade Activity (NEAT)"[77] also suggested that Nepal pursue a regime for the protection of breeders' rights, and revise the Seed Act, 1988 to incorporate a similar protection" (Interview with KICS#4).

Due to these developments, some non-government organisations working on these issues took the lead in collaborating with the Ministry of Agriculture, the National Seed Quality Control Centre and the Nepal Agriculture Research Council. Their objective was to help the government utilise TRIPS flexibilities to devise a *sui generis* law that respects the spirit of the "No to UPOV" campaign.

Such an initiative of the non-government organisations was led by SAWTEE, Pro Public and LIBIRD. Another collaborating non-government organisations was the Centre for Environmental and Agricultural Policy Research, Extension and Development (CEAPRED). The government included some of these organisations in committees formed for policy and law making, including in the National Agriculture Biodiversity Coordination Committee formed for the implementation of Nepal's Agriculture Biodiversity Policy, 2007. For the revision of the Plant Variety Protection and Farmers' Rights Bill of 2005, an expert committee was formed with the collaboration of the representatives of the government and non-government organisations. This is an example of how a country like

[77] Also see, http://www.usaid.gov/news-information/press-releases/usaid-and-government-nepal-partner-create-and-distribute-food (last accessed 2 February 2015).

Nepal can use networked governance to steer a more independent process of policy formulation on the issues raised by the international regulation of PGFRA and the globalisation of intellectual property regulation.

In addition to the government officials from the Ministry of Agriculture, the Nepal Agriculture Research Council and the National Seed Quality Control Centre, the committee included the non-government representatives of SAWTEE, LIBIRD and CEAPRED. The committee also included two legal experts, one from the Ministry of Law and the other from the International Centre for Integrated Mountain Development (ICIMOD). The ICIMOD, as a regional inter-governmental centre serving the eight regional member countries, was implementing an access and benefit sharing programme and helping the Ministry of Forests to devise national strategies and policies for the implementation of the CBD through national measures.

The expert committee met several times between 2007 and 2011, and revised the Plant Variety Protection and Farmers' Rights Bill of 2005. The committee recommended a number of revisions and strengthened the provisions on farmers' rights in relation to intellectual property-protected as well as farmers' varieties of PGRFA (these provisions will be discussed in the next chapter).

The committee members of the non-government organisations also recommended the authorities of the Ministry of Agriculture to coordinate and consult with the Ministry of Forests. This recommendation was made to help the government avoid the possible conflict between the Plant Variety Protection and Farmers' Rights Bill of 2005 and the Genetic Resources (Access, Use and Benefit Sharing) Bill of 2002. The non-government organisations also recommended the government officials to improve these bills by seeking views of farmers and local groups based on their local experiences on biodiversity conservation and use.

Between 2009 and 2011, as a step further for the required policy and legislative reforms in a new political context of Nepal, the two leading non-government organisations – SAWTEE and LIBIRD – organised local-level awareness meetings and workshops. These two organisations also took the lead in making further revisions to the bill and submitted the revised bill to

the officials of the Ministry of Agriculture. Following the revision of the Plant Variety Protection and Farmers' Rights Bill of 2005, the same committee members also collaborated in the revision of the Seed Act, 1988, Seed Regulation, 1995, Seed Policy, 1999 and Agriculture Biodiversity Policy, 2007. These revisions were made mainly to strengthen the rights of local, indigenous and farming communities in line with Nepal's willingness to benefit from the implementation of the national laws that are compatible with the TRIPS Agreement, the CBD and the ITPGRFA (to be discussed in the next chapter).

On 11 June 2013, the Council for TRIPS made another decision on the transition period for the LDC members of the WTO, extending the timeline for the implementation of the TRIPS Agreement until 1 July 2021. This encouraged the Ministry of Agriculture not to pursue the enactment of the Plant Variety Protection and Farmers' Rights Bill in 2013, and postpone its implementation until June 2021. Yet, there were other developments that threatened the country's policy choice and space to address its national needs, mainly after Monsanto, a multinational seed company, used its networks to expand its seed market in Nepal. It led the country into another civil society campaign, the "No to Monsanto in Nepal".

7.4.5 No to Monsanto in Nepal

In 2009 and 2010, Nepal's several districts of the Terai region suffered a crop failure as a total of 46,000 hectares of hybrid maize production collapsed. The local farmers of Bara, Rautahat, Sarlahi, Parsa and Nawalparasi districts reported that their maize plants grew up to 4 meters tall but without developing kernels. This resulted into a massive loss of maize production and financial traps for thousands of resource-poor farmers.

Media news reported a number of factors behind the failure of these hybrid maize seeds[78]. Some agronomists suspected that the failure was due to bad

[78] http://www.dw.de/agronomists-suspect-gm-seeds-behind-nepal-crop-failure/a-6003064, http://www.radioaustralia.net.au/international/radio/onairhighlights/nepal-seeks-explanation-for-corn-crop-failure, http://www.ekantipur.com/the-kathmandu-post/2013/04/01/money/early-

seeds or an early sowing of seeds by farmers. Some others, including the Monsanto's Indian manufacturers and suppliers, claimed that it was due to unusual cold weather, and not because of the quality of seeds. Some others blamed it on the illegal imports of "defective hybrid and genetically modified" seeds via open and porous Nepal-India borders. During the fieldwork, an official of the Seed Quality Control Centre was of the view that:

> "Local agrovets and farmers used the informal channels to access the bad seeds, either in ignorance of the seed regulation or due to negligence towards quality control and safety measures of the law" (Interview with KIGS#3).

Notwithstanding such claims, the protest by farmers and strong support from civil society organisations forced the government to finally compensate the farmers for their loss. According to a key informant from the government sector:

> "Due to inadequate preparation in times of such a crisis, the government could not negotiate with the Monsanto's Indian suppliers for any amount of compensation. Instead, the government was compelled to announce a relief package of NRs. 200 million from its own budget" (Interview with KIGS#6).

Despite the losses and sufferings of local farmers, the interviews revealed that this issue contributed positively on two fronts. First, it did alert the authorities at the Ministry of Agriculture and the National Seed Quality Control Centre to the need to become more responsible in the implementation of seed laws. According to a government official:

> "Soon after this case, the government revised its Seed Regulation, 1995 and added a provision on compensation to farmers. In cases of crop failures or losses, the new provision enables farmers to claim compensation if seeds are found to have been supplied with bad quality or misinformation" (Interview with KIGS#2).

---

sowing-of-maize-seeds-blamed-for-repeated-crop-failures/247129.html (last accessed 2 February 2015).

Second, this issue contributed to unite the voice of civil society organisations against multinational seed companies like Monsanto. In the words of a key informant of a civil society organisation:

> "Following the failure of hybrid seeds of maize in the Terai districts, the civil society organisations started to get united for a movement against companies like Monsanto. Such a movement took momentum after civil society organisations became active with a No to Monsanto campaign, mainly after Monsanto's networks with state, private and diplomatic organisations became further visible" (Interview with KICS#4).

Nepal's movement against Monsanto reveals that civil society organisations started to stage protests after Monsanto tried to use its networks for the sale and distribution of Monsanto's seeds in Nepal. An example of such network use is a formal plan designed by the USAID through its NEAT project in September 2011. The USAID's plan was to work with the Ministry of Agriculture to plant Monsanto's hybrid maize seeds in farmers' fields by piloting a hybrid maize production project for 20,000 Nepali farmers of three districts: Chitwan, Nawalparasi and Kavre. As the news about it came to the notice of Nepali civil society organisations, protests started in social networking sites such as Twitter and Facebook, including through a facebook account "Stop Monsanto in Nepal"[79], which had around 3,500 followers at that time, and 4,530 followers as of 20 December 2015.

Gradually, civil society actors scaled up their protests by organising meetings and rallies, including a silent protest rally in front of the US Embassy in Kathmandu. Some civil society experts and activists used print and electronic media to argue that Nepali farmers would gradually lose ownership and control over local seeds/landraces by approving such a pilot project. Due to widespread protests against such an attempt of regulatory capture, the Ministry of Agriculture finally decided to avoid the agreement with the USAID and Monsanto, and eventually, did not implement the pilot project for hybrid maize plantation.

Another example of Monsanto's tactics to use its networks to promote the marketing of its seeds in the Nepali seed market is its alliance with the

[79] https://www.facebook.com/stopmonsantoinnepal/ (last accessed 20 December 2015).

domestic private sector. In December 2013, an advertisement appeared in a national daily calling for bulk buyers of Monsanto's seeds. It was published by a local company "CG Seeds and Fertilisers Pvt. Limited", which is a Nepali subsidiary of Chaudhary Group, one of the major private business enterprises in the country. The advertisement frustrated the civil society organisations as it was clear that Monsanto partnered with a local seed enterprise to market its seeds in Nepal. A number of civil society actors – including a network of non-government organisations "The National Right to Food Network" – started to raise their voices against the local company and Monsanto.

International experts such as Vandana Shiva, an environmental activist, also supported the civil society campaign in Nepal. She published an article on Monsanto's bio-imperialism[80] and gave an interview to a national daily condemning the tactics of multinational seed companies[81]. On 22 December 2013, she also made a public speech in a nationally reputed platform of *Social Science Baha*, informing a mass of Nepali stakeholders from different fields about the bio-imperialism of Monsanto[82].

Some scholars suggested the government and stakeholders that they analyse Monsanto's tactics based on a series of events. According to Adhikari (2013), Monsanto's entry into Nepali seed market had its roots in earlier events relating to pressure applied by the US on Nepal to join UPOV during WTO accession. Since this did not happen, in 2011, a few months before the USAID made its plan public, the US had signed a Trade and Investment Framework Agreement (TIFA) with Nepal. However, it takes time for a TIFA to eventually result into an effective comprehensive agreement. The entry of Monsanto through the route of the USAID's project was a well-designed plan to move the issue through the guise of foreign aid (Adhikari 2013).

---

80 http://archives.myrepublica.com/2012/portal/?action=news_details&news_id=38786 (last accessed 2 February 2015).

81 http://www.ekantipur.com/the-kathmandu-post/2013/12/23/development/interview-vandana-shiva/257294.html (last accessed 2 February 2015).

82 http://www.soscbaha.org/downloads/mcrl2013.pdf (last accessed 2 February 2015).

Following the growing civil society protests against Monsanto, the local company "CG Seeds and Fertilisers Pvt. Limited" tried to clarify the issue in a press meet in Kathmandu on 20 December 2013. The company stated that it would not import genetically modified seeds and their deal with Monsanto was to market hybrid seeds only[83]. The protest did not stop there, and the issue took a new turn, following a decision from the Supreme Court. The Supreme Court issued an interim order on 8 January 2014 banning the import of genetically modified seeds, including from Monsanto[84].

Since then, the government authorities started to impose restrictions on the import of all seeds from Monsanto. Monsanto has not, however, left any stone unturned to seek entry into the Nepali seed market. The company met the officials of the National Seed Quality Control Centre and the Crop Development Directorate of the Ministry of Agriculture in February 2014, seeking the entry of its hybrid seeds into the Nepali market. According to a government official:

> "The nationwide protests against Monsanto have put them in an awkward standoff, forcing them to even restrict the import of hybrid seeds, though the Supreme Court's decision only restricts the import of genetically modified seeds" (Interview with KIGS#6).

Due to the order to ban genetically modified seeds, the government authorities said that there was a confusion regarding the existing policy and law, and future policy and legislative initiatives they need to undertake in cases like this. According to one of the respondents:

> "The existing National Agriculture Policy, 2004 does not ban the use of genetically modified organisms but calls for regulation. Similarly, the revised Seed Regulation bans the use and import of seeds with terminator genes, but allows for the registration of genetically modified seeds on the basis of a biosafety report" (Interview with KIGS#5).

The government officials further added that Monsanto and many other international seed enterprises were already selling seeds in different regions

---

[83] http://myrepublica.com/portal/index.php?action=news_details&news_id=66538 (last accessed 4 February 2015).

[84] http://kathmandupost.ekantipur.com/news/2014-01-08/supreme-court-says-no-to-gm-seeds.html (last accessed 4 February 2015).

of Nepal through local seed entities. The government officials were not, however, sure why Monsanto was strongly pursuing the Nepali seed market, which is one of the world's smallest markets for formal seeds.

Some officials and informants from the civil society organisations expressed the view that probably, Monsanto's interest lies in using the diversity of topography that Nepal has for trial plantations in different agriculture systems of the mountain, hill and low land regions. Some of the informants also said that Nepal's experience with Monsanto has much to do with what is happening in its neighbouring country India, with which Nepal shares open borders on three sides, except in the North. According to an informant of the civil society sector:

> "Monsanto's struggle to capture India's seed market is often weakened by strong movements of civil society organisations and the government of India's global positions in favour of the protection of farmers' rights. By capturing the market of other smaller South Asian countries like Nepal, Monsanto's long-term plan could be to seek further influence in India's seed market, which is progressively ahead in terms of technological growth, including in agriculture biotechnology and adoption of high-yielding varieties" (Interview with KICS#3).

The regulatory influence of Monsanto's networks in Nepal is visible from what a senior authority of the Crop Development Directorate of the Ministry of Agriculture had to say:

> "Monsanto and other foreign seed companies have already been able to establish networks with senior bureaucrats and politicians. On the issue of banning seeds from such companies, we might not be in a decisive position at a future date, as Monsanto has been lobbying for market expansion even at the level of the ministers" (Interview with KIGS#6).

While a policy decision awaits on whether Nepal will impose long-term restrictions on the import of genetically modified and hybrid seeds of multinational seed companies, there are some other developments that are no less important for the governance of PGRFA. These developments relate to Nepal's preparation to implement the ITPGRFA.

7.4.6 Preparation for the implementation of the ITPGRFA

Nepal has been a member of the FAO Commission on PGRFA since 1994. Nepal was also a signatory country at the time of the establishment of the ITPGRFA by the FAO Conference in November 2001. As in the case of the CBD, TRIPS and UPOV, the case of Nepal shows that state and non-state actors and networks worked in different ways to apply the principles of networked governance which helped in shaping a policy discourse on why Nepal should join the ITPGRFA. As briefly discussed below, such a discourse also identified benefits Nepal has in implementing farmers' rights at the national level, and finally led to the revision of its Agriculture Biodiversity Policy of 2007.

After the Treaty's entry into force in 2004, Bioversity International, in partnership with the Nepal Agriculture Research Council, supported the government in gaining an understanding of the Treaty and helped it to prepare for its ratification through an international project "Genetic Resources Policy Initiative (GRPI)". Two scientists of the Nepal Agriculture Research Council – one of them was a coordinator of the GRPI Nepal and the other a member of its multistakeholder taskforce – assessed Nepal's prospects and challenges stemming from the implementation of the Treaty. This is also an example of networked governance showing how countries like Nepal gain capacity from networks. Through networked activities, the members of the taskforce published a book in 2006 recommending the government to become a contracting party of the Treaty. Their main recommendations were in relation to benefits Nepal could derive from the utilisation of the Treaty's multilateral system of access and benefit sharing, and a legal space available to all parties to implement farmers' rights at the national level (Gauchan & Upadhyay, 2006).

Non-government organisations like SAWTEE, Pro Public and ActionAid Nepal were also part of the multistakeholder taskforce of the GRPI initiative. SAWTEE and Pro Public promoted the policy dialogue on how the Treaty's recognition of farmers' rights would help Nepal strengthen its *sui generis* options for farmer-friendly policies and laws on PGRFA.

The parliament of Nepal approved the instrument of ratification of the ITPGRFA in 2007. The government, however, delayed the submission of the instrument to the Treaty's Secretariat, and Nepal formally became a contracting party only in 2010. In view of this development, non-government organisations like SAWTEE, LIBIRD and USC Canada Asia collaborated in a joint initiative to advance a policy discourse on Nepal's obligations under the ITPGRFA.

On 9 February 2010, the Ministry of Agriculture formed a team of experts from the government and non-government organisations to revise Nepal's Agriculture Biodiversity Policy, 2007 in accordance with the country's obligations under the international agreements. Initially, this Policy was introduced in line with the Nepal Biodiversity Strategy Paper of 2002, which the government had developed in view of the implementation of CBD commitments.

The majority of the members of this expert committee were from the earlier committee formed for the revision of the Plant Variety Protection and Farmers' Rights Bill and other seed laws. SAWTEE, LIBIRD and USC Canada Asia shared their project's resources to organise meetings of the expert committee formed to revise the Agriculture Biodiversity Policy. Besides addressing the needs of the ITPGRFA, this process intended to seek the Agriculture Biodiversity Policy's harmonisation with related laws and policies dealing with the CBD and the TRIPS Agreement.

In 2012, the Ministry of Agriculture signed an agreement with Bioversity International for the implementation of the GRPI Phase II. Following this, the experts of the GRPI II project made further revisions to the Policy. The revision intended to create an institutional mechanism to include Nepal's PGRFA in Annex 1 of the ITPGRFA by identifying the national gene bank as a focal agency. Then on 14 November 2014, Nepal approved the revisions to the Policy, introducing a revised Agriculture Biodiversity Policy.

7.5 Conclusion

Nepal has never remained isolated from the trends of enclosures that scholars discuss as the first and second enclosure movements. The first enclosure movement in Nepal is well reflected in the trends of enclosures of physical, tangible resources such as lands, forests and irrigation systems. An important aspect of the enclosures of these physical resources is their linkages with the second enclosure movement that promotes the capture of intangible resources like PGRFA through intellectual property rights. As PGRFA contain physical property and are located in lands and forests of private or public property, the regulatory framework on PGRFA has to consider these aspects while conceptualising the property domains applicable for the use and management of PGRFA.

Nepal's Patent, Design and Trademark Act of 1965 is the first example of the country's involvement in the second enclosure movement. The Act does not, however, deal with patents and plant breeders' rights over plant varieties. Nepal's legislative initiative of 1988, that is, the introduction of the Seed Act, is another example of its inclination towards the second enclosure movement. Through this Act, Nepal not only made an attempt to create a formal seed system, but also to provide ownership rights to breeders. Since the Act is silent on the nature and scope of ownership rights, not a single variety in Nepal has so far been registered with plant breeders' rights.

An analysis of the historical and emerging contexts of the regulation of PGRFA in Nepal suggests that such a situation is, however, likely to change as Nepal is moving ahead to implement national laws to fulfil the obligations under the CBD, TRIPS and ITPGRFA. Importantly, the case of Nepal offers important insights about how actors and networks at global, national and local levels, and from state as well as non-state sectors, have been interacting to steer the flow of events in regard to the regulation of PGRFA.

Clearly, Nepal's case shows that the country is a site of network confrontation on matters relating to the regulation of PGRFA. On the one hand, there are developed countries – such as the US and foreign seed

companies like Monsanto and some others from Europe – pushing for a stronger plant variety protection law in Nepal. In particular, some foreign seed companies, mainly Monsanto, have even got into their network the members of the Seed Entrepreneurs' Association of Nepal, and high-level bureaucrats, politicians and ministers.

On the other hand, there are some government authorities of the Ministry of Agriculture and the Ministry of Forests who have collaborated with the initiatives of non-government organisations to develop *sui generis* national laws on access and benefit sharing, plant variety protection and farmers' rights. These are important developments in regard to the use of networked governance in Nepal. Also, the recognition to the role of the non-government organisations in the regulation of PGRFA shows that meta-regulation has helped Nepal in steering the flow of regulatory events that matter for the governance of PGRFA and the protection of the rights of local, indigenous and farming communities. The campaigns such as No to UPOV and No to Monsanto are social movements that have contested the enclosure of policy space Nepal needs for protecting its mission to safeguard the rights of local, indigenous and farming communities. These are also the cases that show Nepal's ability to prevent the incidents of regulatory capture by the actors of the intellectual property domain.

After these conclusions, it is important to examine whether Nepal's policy and legislative initiatives involving the interaction between state and non-state actors have been able to address the dynamics of local, customary practices of seed use and exchange and the PGRFA knowledge commons. In view of these aspects, the next chapter analyses the contents of the regulatory provisions of relevant policies and laws, including the draft legislation Nepal is considering to implement to fulfil the obligations under the CBD, TRIPS and ITPGRFA.

Chapter 8

National regulation of PGRFA knowledge commons

8.1 Introduction

The previous chapter showed the case of network confrontation between state and non-state actors at global and national levels, discussing the historical and emerging contexts of the regulation of PGRFA in Nepal. As a whole, the chapter provided an analysis of how Nepal is struggling to implement international agreements governing the use and exchange of PGRFA.

Taking further the policy discourse in Nepal in view of the PGRFA knowledge commons, this chapter first highlights the salient features of Nepal's local, traditional seed system in relation to the elements of *positive inclusive commons*. Then, the chapter makes an analysis of the contents of national governance of PGRFA in order to provide an account of Nepal's departure from the elements of *positive inclusive commons* to a complicated system of multiple layers of commons, of both inclusive and exclusive nature.

The chapter analyses how the CBD-compatible Genetic Resources Bill of 2002, which is still in the draft form, intends to set new regulatory principles for access, prior informed consent and benefit sharing, including on issues of sovereignty and ownership of genetic resources. Then the chapter briefly discusses the key provisions of Nepal's Plant Variety Protection and Farmers' Rights Bill of 2005, which is drafted by the government to comply with the TRIPS Agreement. Finally, the chapter analyses the key aspects of the revised Agriculture Biodiversity Policy of 2014, which intends to implement the obligations under the ITPGRFA. In the analysis of these policy and legal initiatives, I use the same analytical framework of PGRFA knowledge commons that I discussed in Chapter 6 in relation to the international agreements.

8.2 Local, traditional seed system: a case of *positive inclusive commons*

As discussed in Chapter 4, Nepali farmers are widely integrated into local, traditional seed system that is characterised by farmer-to-farmer seed networks and that relies on open access, use, exchange and sharing of seeds, including traditional knowledge. For the analysis of this chapter, such features then raise a pertinent question: whether the traditional seed system in Nepal is a case of *positive inclusive commons.* An answer to this question is not simple. It requires us to establish a case that within the farmers' seed system in Nepal, the fundamental elements of *positive inclusive commons* exist – that is, all human beings, regardless of geography, race or culture, own and use PGRFA, though only with the consent of the commoners.

Nepali farmers, as discussed in Chapter 4, make efforts through farmer-to-farmer seed networks to use, save and exchange seeds at individual, household and community levels. They do not hold ownership rights to exclude others from using their seeds but take PGRFA as a common property and cultural heritage. Their societal and cultural values are integrated in their practice of saving, sharing and exchanging seeds in such a way that open access to and sharing of seeds form the basis of their agriculture and livelihoods. Their societal and cultural values of saving and exchanging seeds, or sharing traditional knowledge, are not confined to a local area, but extend in other districts, regions, and even countries.

In addition, they do not differentiate between farmers and visitors, whether they come from government or non-government or international organisations. They welcome visitors with great hospitality, and provide them germplasms and share their traditional knowledge without any formal conditions. Based on the same values, they also adopt and localise the improved seeds they obtain from the formal seed system or other sources.

All these features support the case that not just Nepali farmers, but many other stakeholders, regardless of geography, race or culture, are using the country's PGRFA based on the principles of open access and a global commons. In particular, native and local seeds of local, traditional seed system are not protected by any ownership rights to exclude or prevent

others from using, saving and exchanging PGRFA. These features of local, traditional seed system form an important element of *positive inclusive commons*.

Importantly, these features are not only evident from the use and exchange mechanisms farmers practice through farmer-to-farmer networks. These can also be substantiated by looking at a table of the historical trend of the exploration of PGRFA since the 1930s (Table 8.1). It shows that since the 1930s, Nepal is involved in plant exploration activities of international missions, providing germplasms, as *ex situ* collections, to different international missions.

Table 8.1: A historical trend of the exploration of PGRFA in Nepal by different international missions

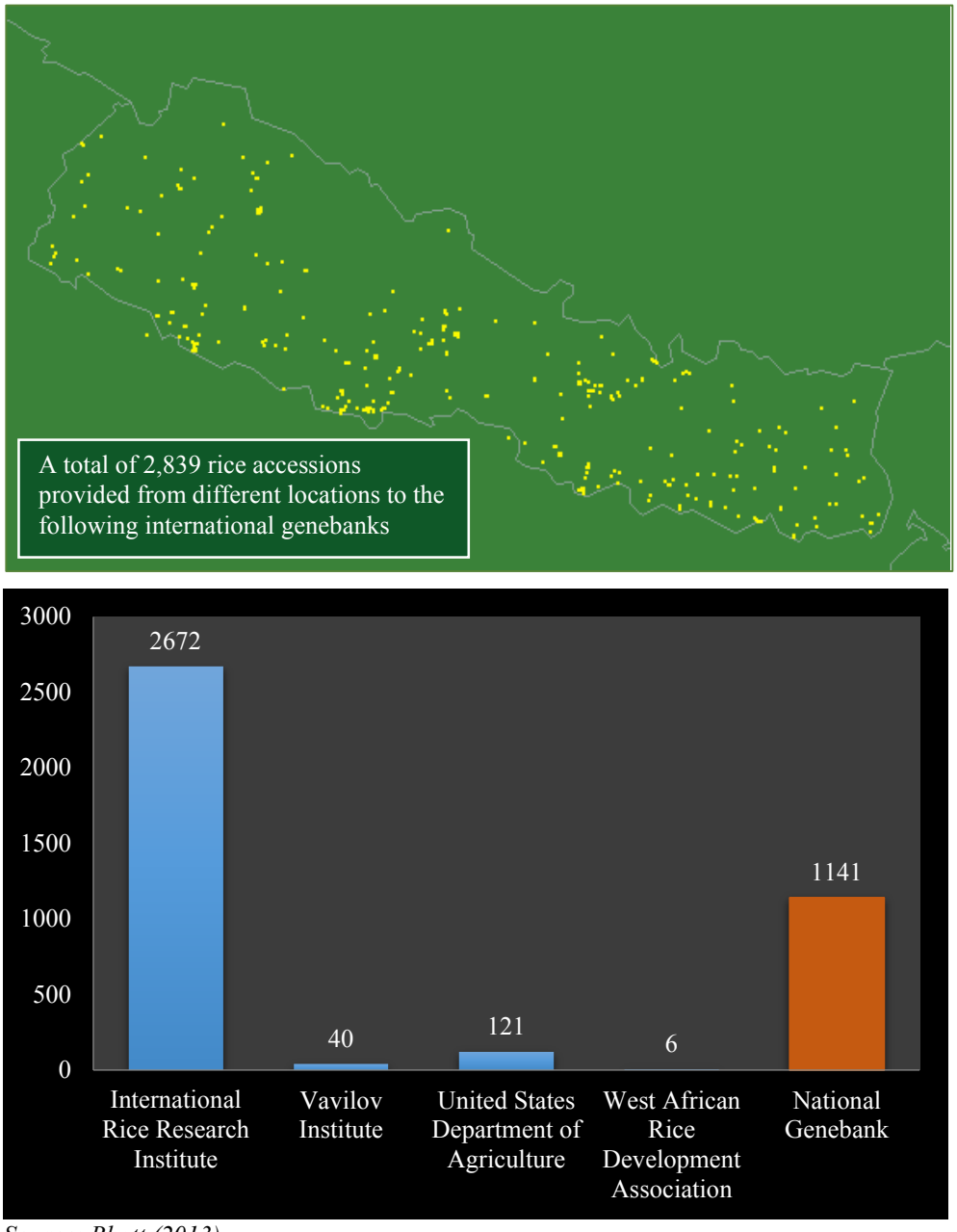
International missions	Team	Year
Germany	Heerlich	1937-1938
Japan	H. Kihara and S. Nakao	1952-1953
UK	J.R. Witcombe and A.M. Martimore	1971
UK	L.W. Beer	1975
IBPGR	W. Erskine and J.J. Bourgois	1979
FAO	P. Whiteman	1979
IBPGR	M. Lizuka and M. Nakagahara	1984
Japan	Japan/Nepal	1986
IRRI	IRRI/Nepal	1988
Japan	Japan/Nepal	1988
IBPGR	IBPGR/Nepal	1990
Japan	Japan/Nepal	1993
IRRI	Lu BR	1988, 1999
Source: Bhatt (2013)		

During the fieldwork, government authorities, including the ones involved in some of these missions, disclosed that the practice of plant exploration and seed collection has always been based on an implicit notion that PGRFA are a common cultural heritage. In the words of an official of the Nepal Agriculture Research Council:

> "Only based on bilateral letters by the international missions (countries and gene banks), and in some cases, simple material transfer agreements, the government authorities remained involved in such plant exploration activities and provided accessions to thousands of crop germplasms to the international missions" (Interview with KIGS#11).

Such international missions included plant exploration teams of developed countries like Germany, Japan and the United Kingdom (UK). The missions also included international organisations like the International Board for Plant Genetic Resources (IBPGR), FAO and IRRI. The figure below shows rice accessions provided from different locations of Nepal to the national and international gene banks through such plant exploration programmes (Figure 8.1).

Figure 8.1: Rice accessions from different locations of Nepal to international gene banks



Source: Bhatt (2013).

Interestingly, not only Nepal provided access to germplasms to the international missions. During the fieldwork, the government authorities of the Nepal Agriculture Research Council said that national and regional agriculture research and breeding programmes of the country also collected exotic plant varieties for breeding and dissemination in Nepal, for example, from international agriculture research centres such as IRRI and CIMMYT, and countries of different regions such as Bangladesh, Columbia, India, the Philippines, Sweden, Taiwan, Thailand and the US (we discussed these trends in Chapters 3 and 4).

One may, however, raise a question that for Nepal's PGRFA to represent a case of *positive inclusive commons*, evidence of the consent of the commoners to use PGRFA is important. To answer this, we can assume that in local, traditional seed system, the consent of the commoners (farmers) is embedded in their societal and cultural values of sharing and exchanging seeds and traditional knowledge. In other words, by promoting the practice of openly accessing, sharing and exchanging seeds, they also provide or obtain consent to use PGRFA.

During the fieldwork, the authorities of the Nepal Agriculture Research Council, including the ones involved in plant exploration activities, further said that they did not have any experience of completing a formal process to obtain consent from the local commoners of PGRFA. They said that as and when asked, local farmers did not express their grievances or reservations in regard to their consent to share seeds and traditional knowledge. Thus, it can be ascertained that Nepali farmers are closely linked with local, traditional seed system as positive inclusive commoners. When inferring such a conclusion, we should, however, also remain aware of the legislative developments that affect Nepal's case of *positive inclusive commons,* mostly due to the influence from the global governance of PGRFA. While within local farming communities relying on local, traditional seed system, seeds are still being shared as *positive inclusive commons,* below I discuss how the legislative development in relation to access and benefit sharing rules is likely to create a different scenario.

8.3 Regulating access to and use of genetic resources: departure from positive inclusive commons

A CBD-compatible Genetic Resources (Access, Use and Benefit Sharing) Bill of 2002 is the first legal initiative in Nepal that aims to mark a major departure in the regulation of access to and use of not only PGRFA, but also other genetic resources. Among other things, it intends to bring into force a bilateral access and benefit sharing agreement to be negotiated and concluded between the providers and recipients of the genetic resources.

8.3.1 Coverage: defining the terms and procedures of access

In its entirety, the Bill, excluding human genetic resources, deals with the regulation of access to and use of not just agricultural crops, but also of medicinal plants and animal breeds. The Bill builds on the definitions adopted by the CBD to define genetic materials and genetic resources. According to the Bill, "genetic materials" mean complete or partial part of plant, animal, microorganism or virus containing functional units of heredity and "genetic resources" mean genetic materials of actual or potential value under *in situ* as well as *ex situ* conditions in Nepal (Sections 2.c and 2.d). The definition of genetic resources also includes components or derivatives of all other genetic resources, implying that the law would also cover isolated molecules or compounds, or a mixture of them.

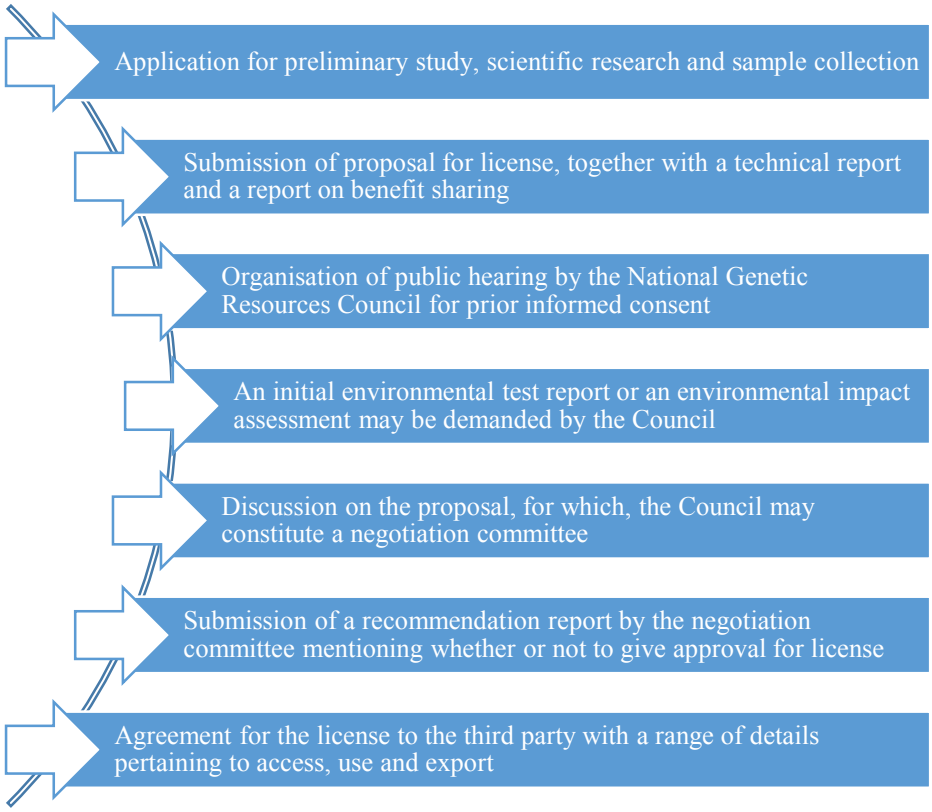
The Bill defines the term "access" to cover the collection, acquisition and possession of genetic resources and genetic materials. The term "access" also covers access to traditional knowledge, skill, innovation, technology and practice of local community (Section 2.g), meaning that the Bill also regulates access to intangible knowledge property of local communities. Then the Bill defines the term "use" as the use of biological or genetic resources or genetic materials for study, research, commercial, or industrial or any other purpose (Section 2.h).

With such definitions and coverage, the Bill requires that a license to access, use and export genetic resources should be obtained from the National Genetic Resources Council, which is an autonomous body formed through this law to implement its provisions on access, use and benefit sharing. Such a license is not, however, applicable for any local community

to use genetic resources, as their use and exchange are the basis of livelihoods for most farmers relying on agriculture biodiversity.

As the Bill puts it, "…no local community shall have to obtain approval or license pursuant to this Act for the use of genetic resources and genetic materials through traditional knowledge" (Section 10.1). The Bill defines local communities to mean "inhabitants including indigenous nationalities having access to biological or genetic resources or genetic materials on the basis of traditional knowledge, skill, innovation, technology and practice or using such resources or materials or living in or around of the place of origin of such resources or materials" (Section 2.i). As also shown in Figure 8.2, for the third parties, other than local communities, a number of procedures are to be completed to obtain license to access, use and export genetic resources.

Figure 8.2: Step-wise procedures to obtain a license to access, use and export genetic resources and genetic materials



The first step is to apply for preliminary study, scientific research and sample collection. It requires the third parties to also provide information in regard to right and ownership of the genetic resources to be studied or to be

collected as samples, including information about traditional knowledge (Section 11.1.h). The second step is to submit a proposal for license, together with a technical report and a benefit sharing report (Section 12). The proposal should also include comprehensive details of genetic resources and traditional knowledge; information in regard to right and ownership of genetic resources and traditional knowledge of local communities; and details of expected financial and scientific outcomes from access, use and export (Sections 12.e, 12.j and 12.k).

The third step is then to organise a public hearing for prior informed consent, for which the National Genetic Resources Council is responsible (Section 13.1). It is mandatory for the third parties or their representative to be present in any public hearing (Section 13.5). The Council shall have to publish the notice relating to public inquiry in at least two national and local newspapers and should forward the required details to the relevant local government institution, local communities and local organisations for organising public hearing at the local level (Section 13.1). If the genetic resources requested for access and use are in two or more villages, districts or municipalities, the Council may make arrangements for public hearing through appropriate local bodies (Section 12.4).

The fourth step is the environmental impact assessment. The Council, based on the nature of the proposal for access and use by the third party, shall take a decision on whether or not to ask for an initial environmental test report or an environmental impact assessment to be conducted as per the prevailing law of Nepal (Sections 14.1 and 14.2).

The fifth step is the discussion of the proposal, for which, the Council may constitute a negotiation committee. This committee will discuss the proposal taking into account (1) technical report; (2) benefit sharing report; (3) recommendation received from the local government bodies based on public hearing; and (4) if applicable, environmental impact assessment (Section 16.1). The committee shall include a technical person, an expert in the field of law and management, representatives of the local bodies and local communities, and if the owner of the genetic resource is a person or an

institution, a representative of the same person or institution (Sections 16.2 and 16.3).

After completing all the formal procedures, the same committee shall submit a recommendation report, and within the next 30 days, the Council shall take a decision on whether or not to conclude the agreement with the third party (Sections 16.6 and 16.7). The Council shall not conclude such an agreement if the proposal is contrary to the prevailing laws on environment and biological diversity; causes adverse impacts to the life or health of human beings, animals and plants; causes degradation to soil and decline in productivity; causes adverse effects to food security; and negatively impacts livelihoods of local communities, including indigenous nationalities. If these conditions are met, then the Council – before granting license to the third party in a prescribed format – shall inform the third party to conclude the agreement.

These provisions in the Bill clearly indicate that Nepal is intending to introduce such a CBD-compatible law that sets new procedures and conditions of access and use of genetic resources and traditional knowledge. While such procedures and conditions are likely to bring about a new regulatory structure for access, use, prior informed consent and benefit sharing, the Bill, with its provisions on state sovereignty and ownership over genetic resources, is also geared towards affecting the elements of *positive inclusive commons* prevalent in local, traditional seed system.

8.3.2 Sovereignty and ownership

In the spirit of the CBD, the Bill states that sovereign rights over genetic resources shall rest with the state of Nepal (Section 3). There is no further provision to explain the nature and scope of such sovereign rights. Yet, it certainly establishes the state as the sole and legitimate regulator to govern the entire genetic resources of the territory of Nepal – whether these exist in *in situ* conditions in public and private lands, forests and waters resources, or in *ex situ* conditions at the national gene bank and research centres.

As discussed in Chapter 6, state sovereignty on PGRFA is a case of state-level *positive exclusive commons*. It means, PGRFA that are within the

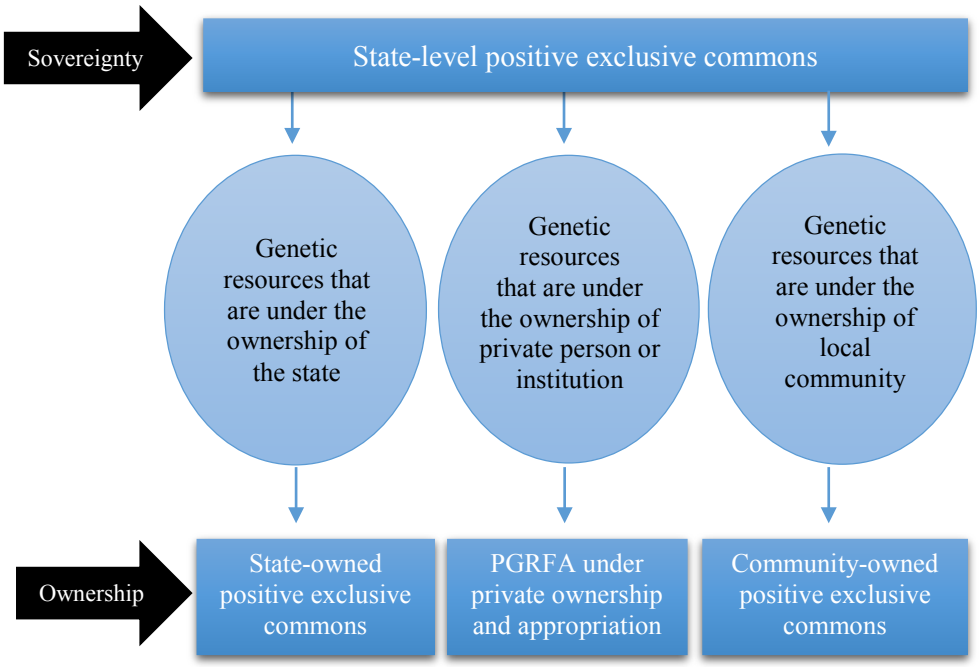
territory of Nepal do not remain *positive inclusive commons* of all human beings, but come under state sovereignty and remain subject to national regulation of access and use. While determining access and use rules, Section 4 of the Bill has enabled the state, as an exercise of its sovereign rights, to establish ownership over the country's genetic resources at three levels.

At the first level, a person or an institution will be entitled to ownership of genetic resources if these exist in any building, land, forest and water resources that are under the ownership of or in use by a person or an institution (Section 4.a). At the second level, if genetic resources exist in any building, land, forest and water resources that are under the ownership of or in use by more than one person or institution, the ownership of genetic resources is vested in local communities (Section 4.b). At the third level, the state will have the ownership over genetic resources not covered by Sections 4.a and 4.b (Section 4.c).

It means that state-level *positive exclusive commons* are subject to ownership by the state, as well as private persons, institutions and local communities. This way, access and use rules for PGRFA create other layers of commons from state-level *positive exclusive commons*. While the PGRFA that are owned by the state become state-owned *positive exclusive commons,* the PGRFA that come under the ownership of local communities become community-owned *positive exclusive commons.* As these PGRFA are owned and used by local communities, their access and use by the third parties then become subject to consent from and benefit sharing with local communities.

Moreover, the PGRFA that come under the ownership of private persons or institutions become the resources under private appropriation like a private property. It means that access to and use of these commons become subject to consent from and benefit sharing with the owners, that is, the same private persons or institutions. Figure 8.3 shows how Nepal's initiative to comply with the CBD has led to the design of a law that deals with multiple layers of commons and property dynamics created due to state sovereignty and ownership over genetic resources.

Figure 8.3: Multiple layers of commons created due to the concepts of sovereignty and ownership



The above-mentioned provisions on state sovereignty and ownership over genetic resources raise four other important issues for further discussion. First, the existence of two layers of commons and private ownership of PGRFA may sound comprehensive, but could be a source of conflict among state, private and community actors. Due to generations of open access and regular exchange of the same seeds in many regions and under varied physical property domains in Nepal, it remains a challenge to determine who actually owns the resources and who does not.

Second, in this Bill, the government assumes genetic resources that are not owned by a person, an institution or local communities are under state ownership. It means that not only the genetic resources existing in government buildings, lands, forests and water resources, but also the resources that are not claimed for ownership by private persons, institutions and local communities may become subject to state ownership. This clearly suggests that if private persons, institutions or local communities do not want to claim ownership over genetic resources, or if they do not get or lack information about how to obtain such ownership, the state may continue to treat such resources as state property, even if these exist in private or community property.

Third, the Bill's recognition of ownership over genetic resources is not based on the concept of intangible knowledge property, but depends more on the ownership or use of physical property such as buildings, lands, forests and water resources. It means that the concept of physical property domains – private property, community property and state property – will prevail to establish ownership over genetic resources. Complications can also be added as physical ownership and use of lands, forests and water resources keeps changing among different persons and institutions, for example, through the sale of private lands and forests, change of national forests into community forests, or enclosures of natural resources or community property by the state or private individuals. As we saw in Chapter 7, the enclosure of lands and forests by the state has already led to significant property rights implications in Nepal.

Moreover, such provisions also indicate that if a farmer or local communities, for example, stop planting the seeds of a particular native crop due to a preference for other or modern seeds and do not save such native seeds within their lands, they will not be able to gain benefits from future commercial use of such seeds by others. Such an emphasis on physical property domains also may not be in favour of landless or poor farmers as they may not be able to own or always hold incentives to protect and own native seeds.

During the fieldwork, local farmers in all three sites – Bara, Lalitpur and Sindhupalchok – had reported that many of their local seeds are not in their lands or even in their village, though they still remember their traits and characteristics. Some poor farmers had also expressed their inability to continue to conserve local seeds, as they were gradually becoming inclined to use improved seeds. These trends surely indicate that there would be implications from physical property dynamics for identifying who owns PGRFA.

Fourth, the Bill does not explain anything about "ownership rights". If we take how commons scholars perceive the types of ownership rights in a commons, there are, as discussed in Chapter 5, "authorised users", or "claimants", or "proprietors", or "owners" (Ostrom & Schlager, 1996).

Since the Bill establishes ownership over genetic resources based on the concept of physical property domains, it is clear that the "owners" of genetic resources will have all the rights of access, use, management, exclusion and alienation as long as they hold ownership over or use physical property in which the same genetic resources are available. In such conditions, in the exercise of their rights of access, use, management, exclusion and alienation, the Bill also enables the owners of genetic resources to require the third parties to obtain their prior informed consent for access and use, and share with them the benefits derived from such access and use.

8.3.3 Prior informed consent

According to the Genetic Resources Bill of 2002, prior informed consent is an important principle and regulatory tool to restrict unauthorised access to resources. Such consent, on the basis of complete and correct information, needs to be obtained from the person, institution or local communities in two situations. The first situation in which prior informed consent is required is in relation to preparing a "record" (kind of documentation) that should contain information such as place of origin of genetic resources, their availability, ownership domains, using method, status, importance, and other prescribed matters including, if applicable, relevant traditional knowledge of local communities (Section 6.4 and 7.1). The Bill also contains some provisions outlining the procedures to prepare, as well as rules about registering and publishing such records (Section 6 and 7).

During the fieldwork, the government authorities suggested that such provisions would assist them to regulate the practices of obtaining, documenting and publishing information about genetic resources and traditional knowledge, and ensure that the third parties obtain the consent of the owners. In this regard, an informant working in a national non-government organisation provided important information regarding a pilot project of the IUCN Nepal and the Ministry of Forests that obtained and documented information about local genetic resources and traditional knowledge in a number of villages. In his words:

> "Between 2003 and 2005, a number of experts of indigenous, non-government organisations became vocal and asked if the project appropriately obtained prior informed consent from the indigenous communities and organisations for documenting such information. Due to such disputes, in recent years, some non-government and government organisations, with the involvement of local communities, have started to maintain such records through community biodiversity registers" (Interview with KICS#2).

The second situation in which prior informed consent is required is in relation to the requirement for the third parties to get approval for a license to access, use and export genetic resources. For this, the Council is supposed to make an arrangement for public hearing at the community level so as to obtain the consent from local communities. The informants from the government as well as non-government organisations expressed the view that such a requirement would curb biopiracy and misappropriation of local genetic resources and traditional knowledge. They also said that the requirement to obtain prior informed consent would help in ensuring that benefits are channelled to the consent providers, that is, actual owners or right holders.

Some researchers and scientists from the national gene bank, the national agriculture research centre and the agriculture college, however, said that the requirements of prior informed consent and benefit sharing would discourage researchers and scientists, especially from public sector and universities, to go to local areas. According to a scientist of the Nepal Agriculture Research Council:

> "Researchers and scientists would find it difficult to negotiate for access and use through public hearing, particularly when they are not accessing and using the resources for commercial purposes. Therefore, researchers' interests, in fact I should say rights, in relation to study and research should also be addressed in this law by relaxing conditions for non-commercial access and use of resources and traditional knowledge" (Interview with KIGS#10).

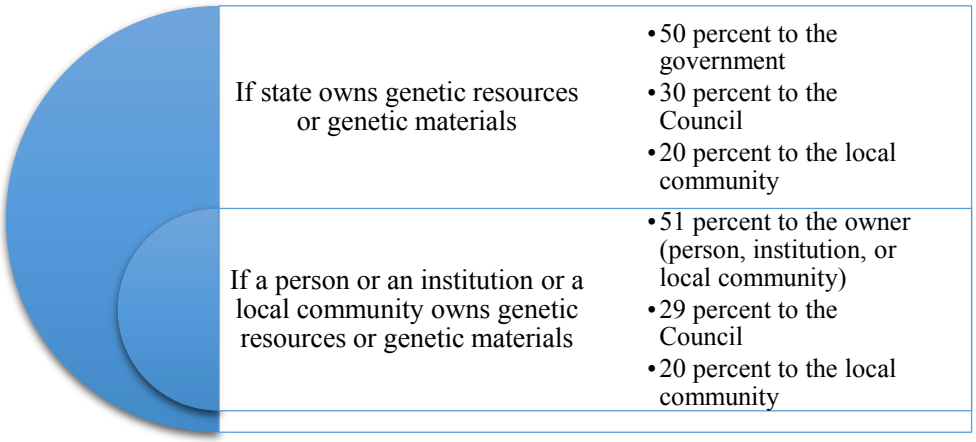
Citing similar concerns, some informants also called for clear, simplified procedures to obtain prior informed consent from a private person or an institution or the government. The Bill, as mentioned above, only provides

for the organisation of public hearing to obtain prior informed consent from local communities, not clearly mentioning how to obtain such consent from private persons or institutions or the government.

8.3.4 Benefit sharing

Benefit sharing could be monetary or non-monetary or a combination of both. Nepal's Genetic Resources Bill only mentions monetary benefits accrued from access to and use of genetic resources (Section 24). For an arrangement of the distribution of monetary benefits, it puts an emphasis on who owns the resources and how any derived benefit can be distributed (Figure 8.4).

Figure 8.4: Distribution of monetary benefits accrued from access to and use of genetic resources



From the benefits accrued as per Figure 8.4, the Bill further states that the owners of the genetic resources shall have to provide 10 percent of the received benefits to the local body of the government. The Bill also mentions that the benefits to be received by local communities shall be distributed through the related local body of the government (Sections 24.3 and 24.4).

In addition to the provisions for the distribution of benefits, the Bill also contains provisions obliging third parties to share the benefits received from access, use and export of genetic resources done or commenced before the commencement of this law. The Council is also given the authority to conclude the agreement with the concerned party for sharing the benefits derived from access to and use of genetic resources located outside Nepal

for *ex situ* or other purposes. However, during the fieldwork, some informants, including from the Ministry of Forests, expressed the lack of domestic capacity to track such cases of access and use, including biopiracy.

On the issue of distribution of benefits, the government authorities stated that the sharing of benefits with all stakeholders, irrespective of who owns the resources, is justified as the state has sovereign rights and also responsibilities to ensure distributive justice from any access and use of the country's genetic resources. A government authority of the Ministry of Forests said:

> "The Bill's distribution mechanism of the benefits derived from the access and use of genetic resources and materials are in the interest of all, including local communities. While making an arrangement to receive a share of the benefits accrued from the genetic resources of private persons, institutions and local communities, the state has also expressed its commitment to share the benefits it derives from access to and use of state-owned genetic resources and materials" (Interview with KIGS#8).

On the other hand, experts working on access and benefit sharing issues in the non-government organisations take the view that the law should review its benefit sharing mechanism as it largely benefits the state than local communities. An informant working with community-based non-government organisation said:

> "A national benefit sharing fund or a community benefit sharing fund can be considered to ensure that monetary benefits are channelled to a fund to be utilised for conservation and sustainable use of biological diversity" (FGD#2).

Some informants of non-government as well as government organisations also called for creating a legal process to generate non-monetary benefits and sharing of such benefits through conservation- and development-related activities at the local level. They feared that sharing of monetary benefits would invite conflicts between the state and local communities.

8.3.5 Intangible knowledge property: traditional knowledge and intellectual property rights

The Bill deals with intangible knowledge property rights issues at two levels – traditional knowledge of local communities and intellectual property rights. The Bill defines traditional knowledge as the knowledge, skill, innovation, technology and practice existing for a long time in local people or a community regarding conservation or use of biological resources or genetic resources or genetic materials (Section 2.k). It does not state anything about what traditional knowledge rights are, but makes a legal provision that such rights rest with the concerned local communities (Section 5.1).

Another important feature in this regard is the Bill's provision that if any local community possesses traditional knowledge important for conservation and use of genetic resources that are owned by a person or an institution or the government, priority would be given to the same community for access to, use and sharing of benefits of the same genetic resources (Section 5.2). It means two completely different things.

First, notwithstanding who owns the genetic resources, local communities will have priority to access and use such resources, and also obtain a share of the benefits derived from their use by others. It is a positive scenario from the viewpoint of local communities. For instance, as discussed before, even if a farmer or local community has stopped planting the seeds of a particular crop and does not possess ownership over such seeds as per the provisions of the Bill, such a farmer or local communities, based on traditional knowledge, may benefit in terms of access to such seeds or obtain benefits from their access and use by third parties.

Second, notwithstanding the traditional knowledge of local communities, any person or an institution or the government may obtain ownership over genetic resources, based on the claim that such resources exist in their physical property like private lands or forests or water resources. It also means that notwithstanding the traditional knowledge of community-level positive exclusive commoners about a particular plant variety, a person or an institution can become the private owners of the same plant variety. It is a negative scenario from the viewpoint of local communities. For example,

as many farmers in the fieldwork sites reported, the loss of their local seeds from their lands – by virtue of such a provision – will not enable them to continue to remain the owners or positive exclusive commoners of the seeds they, based on their traditional knowledge, used to conserve and plant in the past.

Coming to the issue of another intangible knowledge property, that is intellectual property rights, the Bill mentions that "any person or institution…may acquire intellectual property right over any substance or the process of its use as per the prevailing laws", but only after obtaining the license to access, use and export genetic resources as required by this law (Section 23.1). It means that after concluding the agreement to access, use and export genetic resources with the Council, any person or institution can obtain intellectual property rights over genetic resources to use such resources. Irrespective of such a provision, the Bill does not allow anyone to "register publicly known traditional knowledge", or "genetic resources and genetic materials available in the nature" for the purposes of obtaining patent or a similar right. It implies that for anyone to claim such rights, they must prove that the claimed substance or process is new, and meets the other criteria of intellectual property determined in the prevailing laws of Nepal.

What these provisions on intellectual property rights mean is that state-owned and community-owned *positive exclusive commons* as well as privately owned PGRFA can be accessed and used by the third parties, and later on, such parties can claim intellectual property rights over the "new" products derived out of such access and use. This way, Nepal seems to have adopted the principle of the ITPGRFA in that there cannot be any intellectual property claim over materials in the received form, but resources under any form of ownership may become subject to appropriation based on mutually agreed terms of access, prior informed consent and benefit sharing.

8.4 The *sui generis* law on plant varieties

Nepal is not a UPOV member or observer, though most of its neighbouring South Asian countries such as Bangladesh, India, Pakistan and Sri Lanka

have observer status. Following WTO membership, Nepal has drafted the Plant Variety Protection and Farmers' Rights Bill, 2005 for fulfilling its obligations under the TRIPS Agreement. The preamble to the Bill indicates three objectives for which this law is desirable for Nepal. The first objective is to promote crop variety development and protection for agriculture development, sustainable food security and management of agriculture biodiversity. The second objective is to encourage research, investment and technology transfer for crop variety development and protection. The third objective is to protect the rights of breeders and farmers.

8.4.1 Coverage: defining the terms of plant varieties

The Bill deals with plant varieties of crops, vines and trees. The Bill also covers in its regulation the propagating materials, including seeds, of plant varieties. For this law, plant varieties should have a clear, separate and special identity and could be in the form of local varieties, farmers' varieties, breeders' new varieties, essentially derived varieties[85] and genetically modified varieties (Section 2.b).

The Bill defines local variety as any traditional plant variety that is within the territory of Nepal and that is in the knowledge or under information and use of local farming communities for generations (Section 2.m). Farmers' varieties are varieties that have the characteristics of distinctness, uniformity and stability and have been registered by farmers under this law (Section 2.l). It means that local varieties are different from farmers' varieties as the latter has to be registered by farmers, meeting the criteria of distinctness, uniformity and stability.

In the case of breeders' new varieties, breeders must register these varieties under this law and such plant varieties should not only have, as in the case of farmers' varieties, the characteristics of distinctness, uniformity and stability, but also be new (Section 2.f). It means that breeders' new varieties should have an additional characteristic of novelty for enabling the inventors of the new plant varieties to exercise plant breeders' rights.

---

[85] Essentially derived varieties are the varieties that have been derived predominantly from the initial variety and that have retained the essential characteristics of that initial variety (Sections 2.g and 2.h of the Plant Variety Protection and Farmers' Rights Bill, 2005).

8.4.2 Breeders' and farmers' varieties and rights

The Plant Variety Protection and Farmers' Rights Bill, 2005 is similar to the UPOV Convention in the case of breeders' varieties and breeders' rights, but moves beyond the UPOV system to deal with farmers' varieties and farmers' rights.

8.4.2.1 Registration of breeders' new plant varieties

Any breeder can apply for registration of new plant varieties with the registrar of the Plant Variety Protection Committee formed to enforce the provisions of this Bill. The applicant breeder will have to provide the evidence of distinctness, uniformity, stability and novelty of the plant variety to be registered (Section 5.1). The applicant breeder, in accordance with Section 5.1, should also provide a range of other details such as denomination of the plant variety; information regarding whether the plant variety is genetically engineered and if genetically engineered, a risk assessment report; and declaration that terminator technology is not embedded into the plant variety.

The applicant breeder should also provide information about the source and geographical details of the variety used for breeding and development of the new plant variety, including passport data; and the evidence that an agreement has been done with the indigenous community or local people or farmers for prior informed consent and benefit sharing in the case of the use of their plant variety by the breeder. If the above-mentioned requirements of Section 5.1 are not met, the registrar will not register the plant variety. The plant variety that seriously affects the environment, cultural and religious norms, and public morale and interest will not also be registered as breeders' new plant variety (Section 9.1).

During the fieldwork, an official, who previously led the drafting of the Bill on behalf of the Ministry of Agriculture, said that through these provisions, Nepal has clearly indicated that the country does not want to provide approval to register seeds with terminator technology, and in the case of genetically engineered ones, will give approval for registration only based on a biosafety risk assessment. He, however, also said:

> "Given the influence of Monsanto to export hybrid seeds in Nepali seed market, the existing national debates on genetic engineering and the interim order issued by the Supreme Court to halt the import and use of genetically modified seeds, the government needs to reconsider the provisions of this Bill and make changes to safeguard the interests of farmers and citizens" (Interview with KIGS#5).

Two other informants from the Ministry of Agriculture and the Nepal Agriculture Research Council said that with conditions of registration and non-registration for new plant varieties, Nepal enjoys certain policy flexibilities and space to prevent the registration of new plant varieties if such varieties, for example, affect public interest and the environment. They also said that the expert committee formed to revise this Bill (in which they were involved) gave serious consideration to including the "disclosure requirement" so that the providers and geographical locations of the initial varieties would be identified and the requirements of obtaining prior informed consent and concluding benefit sharing agreement be imposed on breeders who apply to register new varieties by using the varieties of farmers or other owners.

8.4.2.2 Breeders' ownership certificate and rights

Unlike the Seed Act of 1988 (as discussed in Chapter 4), the Plant Variety Protection and Farmers' Rights Bill, 2005 is not silent on breeders' ownership rights. As per the Bill, breeders can obtain an ownership certificate by registering their new plant varieties and exercise certain breeders' rights over new plant varieties. While exercising their rights, breeders can prevent others from or require authorisation for production, reproduction, conditioning for the purpose of propagation, sale, distribution, export and import of the propagating materials of their new plant varieties (Section 20.1). Breeders also have the right to transfer or sale or permit to use their breeders' rights to any other person or institution (Section 20.2).

These rights to breeders clearly indicate that a UPOV-like system of plant breeders' rights is likely to be implemented in Nepal to promote the interests of breeders, including private seed entities. These breeders' rights are not, however, without exceptions and limitations. Breeders are not allowed to exercise their rights in respect of the use of the propagating

materials of the new plant varieties for certain acts of others. Such acts include private or non-commercial uses of the propagating materials of the protected new varieties; study, teaching and research on the propagating materials of the protected new varieties; and plant breeding and development on the propagating materials of the protected new varieties (Section 22).

The informants from the private sector and the government agencies considered these exceptions to breeders' rights – almost the same as those in the UPOV Convention – important for accommodating the interests of other breeders, farmers and researchers. Most informants from the non-government organisations, however, questioned if the government or the private sector would be able to use these exceptions to advance national and local interests. An informant from the non-government organisation said:

> "Nepal's public and private sector, forget about local farmers and organisations, lack technological capacities to promote research and breeding for developing new varieties out of plant breeders' rights-protected new varieties" (FGD#1).

Breeders' rights can also be subject to provisions on compulsory licensing. Under certain circumstances, any other person or institution can apply to exploit a new plant variety registered by a breeder and the registrar can issue a compulsory license to authorise the applicant person or institution to produce and supply the seeds of the breeders' rights-protected variety (Sections 23 and 24). Such circumstances include the breeder's inability to supply the new variety's propagating materials as per farmers' demands for three years after the registration of the same variety.

A Compulsory licence may also be issued to any other person or institution if the breeder is found to have engaged in anti-competitive practices in relation to supply, price determination, sale and distribution, including the imposition of inappropriate prices that farmers and public at large cannot afford to pay to purchase the seeds of the protected new variety.

The informants involved in the drafting of this Bill said that the provisions on compulsory licensing have been incorporated based on lessons learnt from global conflicts on TRIPS and public health issues (Correa, 2002;

Drahos, 2007; Matthews, 2004). According to the informants, as compulsory licensing has enabled developing countries such as Brazil, India and Thailand to produce generics of patent-protected drugs (Ford et al., 2007), such provisions would also be critical in the field of seed production and business, for instance when plant breeders' rights would limit farmers' access to seeds due to anti-competitive practices.

On this matter, a seed entrepreneur believed that if the government creates an enabling environment for plant variety research, breeding and development, Nepali seed entrepreneurs would be in a position to use compulsory licencing and deliver seeds of varieties protected by plant breeders' rights.

8.4.2.3 Registration of and rights over farmers' varieties

In order to register plant varieties as farmers' varieties and related knowledge, farmers will have to apply by providing the required samples of the plant varieties, denomination to adequately identify the varieties, and details of related knowledge (Section 28.2). The registrar will then inspect if the variety is distinct, uniform and stable. The registrar will also issue a public notice to verify if other farmers express their reservations or claim ownership over the same variety and related knowledge. If all conditions of registration are met, the plant variety, including related knowledge, will be registered for protection under the law as farmers' variety and related knowledge.

Farmers are given three types of rights in relation to the registered farmers' varieties and related knowledge. First, without paying any fee, farmers have the right to register the plant varieties and related knowledge they have been using, protecting and promoting (Section 27.2.a). This right is considered important because it will not only enable farmers to avoid any financial burden to register the local plant varieties as farmers' varieties, but will also establish ownership of such varieties with ownership certificates.

The informants working with the farmers and local communities, however, said that if the criteria of distinctness, uniformity and stability are strictly followed by asking farmers to provide technical details and passport data,

most farmers would not be able to register local plant varieties as farmers' varieties. They also said that maintaining technical details and meeting such requirements demand costs that poor farmers cannot afford to bear without organisational, or financial and technical support.

Second, farmers have the right of prior informed consent in cases of access to farmers' varieties and related knowledge for the sake of research and use for commercial purposes (Section 27.2.b). This means that farmers' prior informed consent must be obtained, but only if research and use of farmers' varieties and related knowledge are for commercial purposes. This is further supplemented by the third right given to farmers in regard to farmers' varieties and related knowledge, that is, farmers have the right to know about the primary, secondary or any other use of their varieties and knowledge for bioprospecting (Section 27.2.c).

The drafters of the Bill expressed the view that such rights would require the third parties to go through a process of obtaining prior informed consent, and disclose the information regarding any commercial use. They also said that since these rights are limited for commercial or bioprospecting purposes only, any other farmers or local communities or researchers will not be obstructed to access and use farmers' varieties for non-commercial purposes. This would, among other things, protect the rights of other farmers to save, exchange, reuse and sell farm-saved seeds of the registered farmers' varieties.

8.4.2.4 Farmers' rights over breeders' new varieties

Another important feature of the Bill is its recognition of five types of farmers' rights over breeders' new varieties. First, farmers have the right to save, exchange, reuse and sell seeds (in non-branded form) of the breeders' new varieties. This right addresses the local needs and preferences of local farmers to continue to advance their practices of saving, reusing, exchanging and selling seeds within local, traditional seed system.

Most informants from the government and non-government sector said that such a right would ensure that farmers are able to localise plant breeders' rights-protected seeds as per their needs and preferences and be less

dependent on the formal seed market. Some informants, however, raised a concern that a frequent increase in the exercise of such a right by farmers may, on the one hand, lead to the erosion of local PGRFA and related knowledge, and on the other hand, encourage farmers to informally promote the sale of protected seeds. A seed entrepreneur said:

> "The law should not be broadly dealing with the sale of protected seeds by farmers, even if they are only allowed to sell without using the brand. The law should elaborate under what conditions farmers can use and sell protected seeds. Farmers may be allowed to sell protected seeds produced within their farmlands with some ceiling of land size clearly indicated so that only small farmers exercise such a right" (Interview with KIPS#2).

Second, if breeders develop and register plant varieties by using farmers' varieties and related knowledge, farmers have the right to obtain a share of the benefits derived from the commercial use of their varieties and related knowledge. This right creates conditions for farmers to benefit from any commercial use of their varieties and related knowledge. Since farmers' varieties often originate from local varieties, the Bill provides that for access, prior informed consent and benefit sharing rules in relation to local varieties and traditional knowledge, the prevalent national law on access and benefit sharing will be applicable. The drafters of the Bill said that it was purposively done as it is important to limit the focus of the Bill on farmers' varieties and breeders' new varieties. According to them, the national access and benefit sharing law under the CBD is the right legal framework to deal with access, prior informed consent and benefit sharing conditions for local varieties and traditional knowledge.

Third, farmers have the right to nullify breeders' rights, or claim compensation or ownership over new varieties if breeders are found not to have registered new varieties without obtaining their prior informed consent, concluding benefit sharing agreement and disclosing the source of origin and community of the initial variety. This right is in favour of farmers to make sure that breeders comply with "disclosure requirements" and do not commercialise farmers' varieties and related knowledge without due recognition, consent and benefit sharing. The informants from the

drafting committee disclosed that this provision had been discussed at length and agreed upon not only to protect farmers' rights, but also to design a *sui generis* plant variety protection law that demands the implementation of "disclosure requirements" from plant breeders, or anybody willing to commercialise farmers' varieties and related knowledge.

Fourth, farmers have the right to receive compensation for any loss if the breeders of the new varieties supply bad seeds, or export, import, sell and distribute seeds with misleading and wrong information. According to the informants from the Ministry of Agriculture, the incorporation of farmers' right to receive compensation in the *sui generis* plant variety protection law is intended to oblige the breeders of new plant varieties to supply seeds with good quality and correct information.

Fifth, farmers have the right to access seeds of new varieties if breeders fail to supply seeds as per farmers' demand, or engage in anti-competitive practices for the sale and distribution of seeds. This right demands that the government finds alternative systems to ensure that seeds are supplied as per farmers' demand, well in time and at affordable prices. According to an informant from the National Seed Quality Control Centre:

> "It is wise that the law includes provisions on compulsory licencing to make sure that if circumstances arise, there is legal space for others, including the domestic private seed entities, to produce and market the seeds of protected new plant varieties" (Interview with KIGS#1).

8.4.2.5 The case of private property rights vs commons

As we discussed above, the TRIPS-compatible Plant Variety Protection and Farmers' Rights Bill of 2005 provides for breeders' rights over new plant varieties that breeders must prove to be new, distinct, uniform and stable. The Bill also provides for farmers' rights over new varieties of breeders and over farmers' varieties (and related knowledge). The breeders' rights-protected varieties could be the varieties derived from local varieties, or farmers' varieties, or essentially derived varieties, or other varieties such as varieties accessed in other countries or stored in *ex situ* collections in Nepal or outside. With the characteristics of distinctness, uniformity and stability, farmers' varieties must be derived from local varieties or varieties accessed

by farmers for domestication, use and exchange at the local level. How do such rights and plant varieties of breeders and farmers relate or belong to the typology of PGRFA knowledge commons we discussed in the context of the international regulation of PGRFA in the earlier chapter?

What is similar between the UPOV Convention and Nepal's Bill on plant variety protection is the scope of and exceptions to breeders' rights. The UPOV Convention clearly provides that the following acts in respect of the propagating materials of the protected varieties requires the authorisation of the breeder: production or reproduction (multiplication); conditioning for the purpose of propagation; offering for sale; selling or other marketing; exporting, importing, stocking for any of the purposes of production or reproduction and importing (Article 14). Nepal's Bill on plant variety protection too enables breeders, in respect of their propagating materials of the new varieties, to prevent others from or require authorisation for production, reproduction, conditioning for the purpose of propagation, sale, distribution, export and import (Section 20.1).

Similarly, as per the UPOV Convention, breeders' rights would not extend to acts done for: privately and for non-commercial purposes; experimental purposes; and breeding other varieties and exploiting new varieties provided the new variety is not a variety essentially derived from another protected variety (the initial variety) (Article 15). According to Nepal's Bill on plant variety protection also, breeders are not allowed to exercise their rights in respect of the propagating materials of the new plant varieties for certain acts: private or non-commercial; study, teaching and research; and plant breeding and development (Section 22).

While being similar to the UPOV system of plant breeders' rights, it is important here to highlight two issues that have been differently provisioned in Nepal's Plant Variety Protection and Farmers' Rights Bill. First, the Bill, compared to UPOV, provides for a lesser period of protection for breeders' rights. While Section 14 of the Bill specifies a protection period of 18 years for plant varieties of vines and trees, and 15 years for other plant varieties, Article 19 of the UPOV Convention provides for a minimum of 25 years of protection for trees and vines, and 20 years for other plant varieties.

Second, unlike the UPOV Convention, the Bill includes strong provisions in favour of farmers and local communities. By weakening the farmers' privilege or exemption through revisions in 1978 and 1991, the UPOV is moving away from inclusive elements to exclusive elements. However, Nepal's Bill on plant variety protection aims to move closer to incorporate the inclusive elements. The Bill does so by strongly recognising the rights of farmers over new plant varieties. Such rights not only allow farmers to save, exchange, reuse and sell seeds of the breeders' new varieties, but also empower them in relation to prior informed consent and benefit sharing. Farmers' right to access seeds, and in this regard the provisions on compulsory licencing for fair, regular supply of seeds of the protected new varieties, also add to the inclusive elements. In other words, the Bill uses the idea of a negative commons to enable ease of appropriation by farmers. It is an example of where the negative commons can serve the poor.

Similarly, with provisions for farmers' rights over farmers' varieties and related knowledge, it creates a legal route for farmers to register their varieties and related knowledge and obtain ownership rights. In this respect, what is clear is that Nepal also intends to empower farmers to become positive exclusive commoners of the varieties they prove to have the characteristics of distinctness, uniformity and stability. It means that the Bill enables farmers to register a local variety they have been conserving and using in their physical property as a collectively owned farmers' variety, that is, as a *positive exclusive commons*. However, in cases, when an individual farmer may register a local variety, he/she may establish private ownership over the use of such varieties.

It is important here to highlight that in the case of local varieties that farmers may register as farmers' varieties under this law, the revised Seed Regulation, 2013 has a provision for farmers to register their traditional plant varieties as local varieties and include such varieties in the national registry of plant varieties (Rule 12.2). In addition, the Genetic Resources Bill of 2002 also covers in its remit local varieties, meaning that access to local varieties is subject to prior informed consent, benefit sharing and other conditions specified.

In this respect, what is not clear is whether ownership rights overlap or to what extent registration of and ownership over a local variety and a farmers' variety would be similar or different. It is also not clear if prior informed consent and benefit sharing issues become complicated at the local level when a farmers' variety is derived from a local variety that could be already, or may fall, under the ownership of a farmer or a local community under the revised Seed Regulation or CBD-compatible Access to Genetic Resources Bill of 2002.

The informants from the National Seed Quality Control Centre and the Ministry of Agriculture said that it would not be complicated as farmers' varieties, for the purpose of the plant variety protection law, must be distinct, uniform and stable in comparison to the initial varieties, be these local or native or public domain varieties. The informants from these government agencies were not, however, sure if a farmer or a farmers' group should go through the processes of access, prior informed consent and benefit sharing to register farmers' varieties, if and when these varieties are derived from local or other varieties owned by other farmers.

As discussed earlier, according to Nepal's Genetic Resources Bill of 2002, local communities are not required to obtain any license to use genetic resources through traditional knowledge, but it is not clear if farmers need to obtain a license or prior informed consent and conclude benefit sharing agreement if they want to register a local variety as a farmers' variety. Some informants found such provisions to have property rights implications for local, traditional seed system which relies on open access, sharing and exchange of seeds at the farmers' level. Some informants from the community-based organisations observed that it would create a complicated system as farmers may not have the interest and capacity to negotiate for access, prior informed consent and benefit sharing, nor to provide the evidence of the variety's distinctness, uniformity and stability. An expert working with the local farmers in a project on agriculture biodiversity conservation asked:

> "Why would farmers be willing to register a local variety as a farmers' variety, mostly when they are not in a position to enter into seed business?" (FGD#2).

He emphasised that poor farmers would not find this beneficial as they cannot commercialise and market the seeds of farmers' variety. According to him, it would probably be in the interest of community-based seed producers' groups or community seed banks to research on local varieties and register them as farmers' varieties for commercial purposes.

On the other hand, some informants believed that such provisions on farmers' varieties and rights are not only critical to safeguard the interests of farmers to emerge as seed producers of farmers' varieties, but also important from the viewpoint of generating *sui generis* legal options to recognise and protect farmers' rights that have been identified for protection in the ITPGRFA.

8.5 Nepal's policy on agriculture biodiversity and ITPGRFA: an attempt to harmonise different layers of commons

After Nepal's entry into the ITPGRFA as a contracting party in 2010, the Ministry of Agriculture decided to revise Nepal's Agriculture Biodiversity Policy, 2007. Initially, this Policy was introduced in line with the Nepal Biodiversity Strategy Paper of 2002, which the government had developed in view of the implementation of CBD commitments. The revised Agriculture Biodiversity Policy, 2014 is so far the only policy document that guides Nepal to devise a law pursuant to the commitments and obligations under the ITPGRFA.

8.5.1 Coverage: defining the terms

The Policy covers entire genetic resources and materials for food and agriculture, including those of plants and animals that are available in *in situ* and *ex situ* conditions. It defines "access to agriculture genetic resources" as collection, acquisition and possession of genetic resources or materials or traditional knowledge owned by others. It also defines "farmers" as a person or a community who develops and uses genetic resources or materials or traditional knowledge.

8.5.2 Focus: setting of four policy objectives

The Policy's strength is in its four policy objectives and different initiatives the government plans to undertake under these objectives. It is important to highlight that these four policy objectives have been aligned with national-level obligations covered by different Articles of the ITPGRFA for its contracting parties. The first policy objective is to recognise, conserve, develop and sustainably use agriculture biodiversity and traditional knowledge. Under this objective, the government plans to promote programmes to support and strengthen *in situ* conservation, *ex situ* conservation and sustainable use of agriculture genetic resources, all of which are covered in Articles 4 and 5 of the ITPGRFA.

The second policy objective is to protect farmers' rights to agriculture genetic resources and traditional knowledge, which is in line with the provisions on farmers' rights of Article 9 of the ITPGRFA. Under this objective, the government aims to protect farmers' rights to save, exchange, reuse and sell farm-saved seeds, and to participate in local- and national-level decision-making processes. The government also seeks to undertake initiatives to provide compensation to farmers from the parties who cause loss to farmers by biopiracy, illegal sale and distribution of seeds, and misappropriation of traditional knowledge.

The third policy objective is to share, and fairly and equitably distribute, the benefits, derived from access to agriculture genetic resources and traditional knowledge. On this, a major focus is on ensuring sharing of benefits with farmers. For an arrangement of sharing and distribution of benefits, the Policy calls for a legal system, which would also form and provide resources and rights to a national institution. Such an institution has not been identified but the Policy makes it clear that all aspects of the implementation of the ITPGRFA would be regulated through a one window system.

Under this objective, the Policy also includes two other important provisions. One provision is about establishing partnership and coordination with related institutions for making a legal arrangement for mutually agreed terms, prior informed consent, and benefit sharing between resource

providers and receivers, which seems to be incorporated in view of the implementation of the national law under the CBD. The other provision is in relation to making an arrangement to prevent the negative implications of intellectual property rights for farmers' rights, which is in view of the implementation of the national law under the TRIPS Agreement.

The fourth policy objective is to contribute towards adaptation to and mitigation of climate change impacts and sustainability of ecosystems. Under this objective, the Policy bans the use of seeds embedded with terminator technology but aims to make an arrangement to adopt and implement biosafety measures for study, research, use, development and import of genetically modified organisms.

8.5.3 Bilateral and multilateral systems: access and property rights dynamics

As far as PGRFA, traditional knowledge and farmers' rights are concerned, the revised Agriculture Biodiversity Policy, 2014 is a major policy document to determine how Nepal will implement laws and programmes for access, prior informed consent and benefit sharing. In relation to this, though the Policy focusses mainly on making a legal arrangement to implement, coordinate with and benefit from the multilateral system of access and benefit sharing of the ITPGRFA, it also touches upon the need to coordinate with the bilateral system of the access and benefit sharing law under the CBD. In that context, what is more important to understand is how the coverage of the two regimes of access and benefit sharing governed by the CBD and the ITPGRFA would affect issues of PGRFA management and use, and importantly, access and property rights dynamics, including farmers' rights.

The informants from the national gene bank, the national agriculture research centre and the Ministry of Agriculture said that the government, in collaboration with Bioversity International and some national organisations, has started to prepare for the implementation of the multilateral system of access and benefit sharing and other provisions of the ITPGRFA. As all contracting parties are required to include their PGRFA falling under Annex 1 in the multilateral system, the government has mobilised the national gene

bank to collect plant germplasms and related information from different parts of Nepal for conservation as well as submission to the multilateral system. The officials of the national gene bank and the Ministry of Agriculture said that as an initial step, 3,624 varieties of different food crops and forages have been proposed for inclusion in the multilateral system. Such varieties comprise 226 crop varieties[86] – including varieties with local landraces – released, registered and denotified in Nepal under the Seed Act, 1988; 1,927 accessions[87] provided by Nepal to CGIAR; 1,403 accessions[88] provided by Nepal to foreign genebanks; and 8 forages.

It means that there is already a kind of consensus reached among the government authorities to include certain PGRFA into the protected global commons of the ITPGRFA. Some non-government organisations have, however, cautioned the government not to undertake all PGRFA as state property or under the management and control of the state. According to an informant of the non-government organisation:

> "As there is no legal mechanism in force to determine who owns what PGRFA or traditional knowledge, it is early for the government to prepare the list of varieties to be included into the multilateral system" (Interview with KICS#5).

While the CBD-compatible national law for access and benefit sharing and the TRIPS-compatible national law for plant variety protection and farmers' rights are still in draft forms, a national law pursuant to the ITPGRFA's multilateral system and farmers' rights, as the Policy itself states, is yet to be arranged. In such circumstances, there is no clarity on how to legally recognise or establish or provide property rights over PGRFA at the national level and how such property rights would affect access, prior informed consent and benefit sharing dynamics. For instance, which PGRFA are under state control, and which others are local or farmers' varieties are yet to be legally recognised, documented and established.

---

[86] Released varieties: 176; denotified varieties: 34; and registered varieties: 16. Of these, 20 varieties are local landraces.

[87] Accessions of maize, wheat, rice, finger millet, barley, chickpea, grass pea and lentil.

[88] Accessions of maize, wheat, rice, necked barley, chickpea, grass pea, rapeseed, lentil, beans and rice bean.

These property rights issues are critically important as, for example, the state has the obligation to include Annex 1 PGRFA – that are under the management and control of the state, and in public domain – into the multilateral system, but can only encourage natural and legal persons (like farmers and breeders) to include their PGRFA into the multilateral system. In this case, whether any PGRFA of Nepal would be subject to multilateral access and benefit sharing under the ITPGRFA or the bilateral access and benefit sharing under the CBD is largely affected by the property rights dynamics. Thus, before making any decision to include certain PGRFA into the multilateral system, the government needs to be clear about two things: first, property rights of PGRFA and traditional knowledge; and access, prior informed consent, benefit sharing conditions applicable to PGRFA that are owned under different property rights domains.

These issues mean that along with the implementation of related laws, while the government may decide to include Annex 1 PGRFA that are state-owned *positive exclusive commons* into the multilateral system of the ITPGRFA, the inclusion of PGRFA that are privately-owned or community-owned may be subject to prior informed consent or access agreement with private individuals or institutions or local/farming communities. For example, if a farmer privately owns a PGRFA (or a local community collectively), he or she may either chose to include that PGRFA into the multilateral system of access and benefit sharing, or keep it within his/her discretion for access only through bilaterally or mutually agreed terms of consent, use and benefit sharing.

8.6 Conclusion

Nepali farmers consider seeds the crucial gift of the creator, a common cultural heritage to be shared with the notion of trust and reciprocity, and not a commodity to be privately and exclusively owned and used. Irrespective of geography, race and culture, seeds – as a *positive inclusive commons* – are shared and used not only among farmers, but they also provide their seeds and share their knowledge with visitors, including people from government, non-government and international organisations.

However, Nepal has geared towards designing and implementing new policy and legal measures that reshape the national governance of PGRFA with implications for local, traditional practices. As the provisions of the CBD-compatible Genetic Resources Bill of 2002 suggest, regulatory principles for access, prior informed consent and benefit sharing would make a departure from the exchange and use of PGRFA within local, traditional seed system as a *positive inclusive commons* to the creation of different layers of commons: state-owned and community-owned *positive exclusive commons.* Additionally, based on the possession of physical property (like lands, forests and water resources), the Bill also seeks to establish ownership rights of private persons and institutions over genetic resources. All of these dynamics of commons and property have implications for use and exchange of PGRFA within the local seed system.

Yet, what is important to note is that Nepal has given a major focus on establishing the rights of local, indigenous and farming communities over genetic resources and traditional knowledge, keeping in view the spirit and objectives of the CBD. The same focus is also visible in the case of the TRIPS-compatible Plant Variety Protection and Farmers' Rights Bill of 2005. This Bill has provisions on plant breeders' rights as in the UPOV Convention, but at the same time, also recognises farmers' rights over breeders' rights-protected varieties. This way, the Bill uses the idea of a negative commons to enable farmers to appropriate protected varieties through the protection of the rights to save, use, exchange and sell farm-saved seeds. Similarly, the Bill enables farmers to become positive exclusive commoners of farmers' varieties which they derive from local varieties. However, in this case, it may also lead to a difficult situation if an individual farmer, based on a local variety, registers a farmers' variety as private property and not as a *positive exclusive commons*.

The revised Agriculture Biodiversity Policy of 2014 also plays a major role in reshaping the national regulation of PGRFA. The Policy calls for legal arrangements to not only protect farmers' rights, but also to implement the multilateral system of access and benefit sharing of the ITPRGFA at the national level. Thus, on the one hand, the implementation of the Policy is directed towards making farmers positive exclusive commoners of local

PGRFA and traditional knowledge, and on the other, it also aims to include Nepal's Annex 1 PGRFA under the ITPGRFA's multilateral system, that is, a protected global commons. What is lacking in this regard is, however, a legal arrangement to first identify which PGRFA are state-owned and which others are community- or farmer- or privately-owned so that it is easy to determine the conditions and processes to be followed for such an inclusion.

It is certain that Nepal cannot choose to stay out of the global systems or processes. But what Nepal can do is to generate *sui generis* policy flexibilities to advance its national and local interests, including those of local communities. In this respect, an important thing to do is to develop a *sui generis* policy and legal framework to understand that PGRFA are not merely a physical, tangible property but also an intangible, knowledge-based property. With such dual characteristics, as opposed to physical property-based traditional commons, PGRFA are not a homogenous resource but exist in different forms: local varieties, farmers' varieties, breeders' varieties, modern and high-yielding varieties, genetically engineered varieties, essentially derived varieties, etc. In that sense, what is needed is to assess the significance and role of multiple layers of commons that are applicable to different forms of PGRFA, including in relation to access, prior informed consent and benefit sharing.

These issues bring us to the last important part of the thesis in which Chapters 9 and 10 discuss the concepts, goals, objectives and impacts of the organised seed saving initiatives in Nepal. The purpose is to analyse how and why local dynamics of conservation, use and management of PGRFA and traditional knowledge are being reshaped in Nepal following the creation and expansion of community seed banks and what their implications are in relation to the formal and informal seed systems and the regulation of the PGRFA knowledge commons. Since the idea of establishing community seed banks in different regions of the country has its linkages with the global initiatives, Chapter 9 briefly analyses the contexts of the seed savers' networks of developed countries and the community seed banks of developing countries, also exploring the typology of community seed banks discussed by scholars.

Chapter 9

Global experiences of seed savers' networks and community seed banks

9.1 Introduction

Most of the discussion on seed savers' networks and community seed banks are in 'grey' literature. Similarly, most of the academic literature on these seed saving initiatives, together with 'grey' literature, are focussed on their significance and contribution to local livelihoods or environmental sustainability. There is limited focus on whether these initiatives in the developed and developing world have any similarity or difference in terms of their objectives or whether there are any linkages in relation to their creation and expansion, for example, in terms of actors and networks.

Building on 'grey' and academic literature, this chapter provides a description of a number of initiatives of seed savers' networks in developed countries and community seed banks in developing countries. It provides an overview of how and why farmers in both developed and developing countries took the initiative to form and mobilise seed savers' networks and community seed banks to regulate the use of seeds at the local level.

Specifically, the chapter seeks to analyse if these initiatives for regulation of seeds at the local level are guided by similar objectives, also discussing the typologies of community seed banks. The chapter also aims to identify the actors and networks of these initiatives, mainly to examine if the same or similar actors and networks were behind the creation and expansion of community seed banks in Nepal, something I will discuss in the next chapter.

9.2 From *ex situ* conservation to community-led conservation

Between 1850 and 1950 – also called the first era of plant exploration and collection – famous plant collectors such as Frank Meyer, Wilson Popenoe, Nikolai Vavilov and David Fairchild collected useful and rare genetic resources and preserved them in botanical gardens and germplasm

collection centres (Cohen et al., 1991; Harlan, 1992). Mainly after the 1950s, along with the rise of commercial interests in the seed business and the biotechnological progress, some countries, especially those in the North, started to put further emphasis on *ex situ* conservation. One of the major objectives was to benefit from the availability and use of genetic resources for plant breeding (Van Dooren, 2009).

Today, more than 1,750 gene banks and 2,500 botanical gardens worldwide are storing *ex situ* collections of genetic resources. In 2010 itself, the total number of accessions conserved *ex situ* worldwide reached 7.4 million, a rise of approximately 20 percent (1.4 million) from 1996[89] (FAO, 2010). With the largest collections in the Consortium of International Agriculture Research (CGIAR) centres, mostly since the 1960s, there has been substantial research in the improvement of plant breeding, as well as the development and dissemination of improved, new varieties, including through the Green Revolution.

Though a major objective of *ex situ* conservation is to create a system to back-up the genetic resources that are under extinction or that might be lost from native ecosystems, the global collections of plant germplasms have remained instrumental in promoting modern plant breeding, mainly in the interest of industrial agriculture in developed countries. Especially, public agriculture research centres and private institutions have used the *ex situ* collections to promote the Green Revolution of high-yielding varieties and to pursue a rapid growth of DNA-based modern agricultural biotechnology coupled with an extension of the intellectual property system into agriculture.

The FAO's Second Report on the State of the World's PGRFA 2010 rightly observes the influence of modern breeding as follows:

[89] As global initiatives, the Millennium Seed Bank Project of the Royal Botanic Gardens, Kew and the Svalbard Seed Vault in Norway also store *ex situ* collections. The Millennium Seed Bank Project has 67,341 and the Seed Vault has 839,805 *ex situ* collections (Eastwood et al., 2015).

> "Modern breeding has resulted in crop varieties that meet the requirements of high-input systems and strict market standards…Strong consumer demand for cheap food of uniform and predictable quality has resulted in a focus on cost-efficient production methods. As a result, over the last decade multinational food companies have gained further influence and most of the food consumed in industrialized countries is now produced beyond their national borders. This pattern of food production and consumption is also spreading to many developing countries, especially in South America and parts of Asia…" (FAO, 2010, p. 4)

Ex situ conservation techniques are considered important as an approach to address the threat of the loss of genetic resources, as well as to promote plant breeding and variety development through *ex situ* collections. However, excessive reliance on such techniques for development of the formal seed system and limited focus on *in situ* techniques might not be a good idea from conservation as well as developmental viewpoints (Hawkes et al., 2012).

This is particularly important when – as a result of continued pressures for developing and least-developed countries to shift from subsistence to commercial agriculture and informal to formal seed system – a large amount of genetic diversity and traditional knowledge has already been lost from smallholdings and *in situ* conditions. In the developing world, about 80 percent of food production still comes from farmers with smallholdings and the majority of such farmers rely on conservation and use of native, local crop varieties and seeds under traditional seed systems and *in situ* conditions[90] (FAO, 2010).

The rapid loss of native and local varieties and seeds is a concern in many areas. The regular use and exchange of such varieties and seeds by farmers are considered an important way to conserve agricultural biodiversity, sustain climate-resilient agriculture and promote organic food (Jarvis et al., 2000; Pautasso et al., 2013; Wood & Lenne, 1997).

The locally domesticated native or adapted varieties and seeds are rich in genetic diversity, demand less chemical inputs, and are easily available and

[90] http://www.fao.org/docrep/meeting/022/am646e.pdf (last accessed 27 February 2015).

affordable to farmers. The native and local plant varieties also have evolutionary potential because of regular adaptation to natural and local environmental conditions, and possess adaptive traits to respond to climate and natural disasters, for example, by emerging as flood- and drought-tolerant varieties (Naess, 2013; Sthapit et al., 2008; Villa et al., 2005; Zeven, 1998). Such seeds, as important raw materials for crop improvement, also offer public and private value for food security and future breeding as these constitute a conspicuous source of genetic variation unlike modern crop seeds which depend on a precariously narrow genetic base (Gauchan et al., 2005; Jarvis et al., 2000).

Within local seed systems or *in situ* conditions, a regular practice of farmer-to-farmer seed exchange is the basis of the evolution and development of native and local seeds. Farmers generally save, exchange and use seeds relating to their needs and preferences within farmer-to-farmer seed exchange networks (Almekinders et al., 1994; Rohrbach et al., 1997).

Since the evolution of agriculture, farmer-to-farmer seed exchange networks have been deeply rooted in customary and traditional practices to protect native and local seeds as a commonly shared resources, and not as privately-owned or -controlled resources (Lewis & Mulvany, 1997). Over time, the global and national contexts of seed use and exchange have, however, been changing. Seeds are seen more as a private commodity than a "common heritage of humankind" or a "global commons" (Halewood et al., 2013).

An organised effort to reverse the loss of native, local seeds and promote their use in farmers' fields and gardens can be seen in initiatives undertaken to form seed savers' networks in developed countries and community seed banks in developing countries. Initiated as a grassroots-level campaign since the 1970s, such seed savers' networks and seed banks are emerging as an institutional response to enhance crop genetic diversity and promote the use and exchange of native and local plant varieties in more than 40 countries.

However, the trend and practices of *ex situ* collections and on-farm use of crop varieties and seeds by such networks and banks have been rarely discussed. According to Vernooy (2012, p. 4), "no *systematic, in-depth comparative* analysis has been carried out of community gene/seed banks in

their variety of forms". According to Engels et al. (2008), there also exists a kind of confusion regarding their typology as community initiatives are popular as community seed banks as well as community gene banks. They state, "the typology of community genebanks and community seedbanks is rather confusing, and little has been published in the scientific literature" (Engels et al., 2008, p. 151).

9.3 Seed savers' networks in the developed world

Irrespective of the presence of a vibrant formal seed system for regulated seed marketing and trade, and the enforcement of intellectual property rights in agriculture, organised initiatives for conservation and exchange of local (heirloom) varieties have momentum even in developed countries like the US, Canada, Australia, the UK and other European countries.

In 1975, the first of this kind of network appeared in the US as Seed Savers Exchange, a not-for-profit organisation. With over 24,000 accessions of open-pollinated varieties, the network has more than 13,000 members. Encouraging "participatory preservation", each year this network promotes the conservation and use of thousands of open-pollinated and heirloom varieties by facilitating exchange of their seeds among its members, who are mostly farmers and gardeners (Volkening, 2006). The network claims that all varieties offered for exchange and sale in their catalogue are varieties free from genetic modification. Of particular importance is the Seed Savers Exchange's strong dedication to oppose the strategies and tactics of the agricultural biotechnology industry. In their website, the network, as one of the original signers of the Safe Seed Pledge in 1999, states:

> "Agriculture and seeds provide the basis upon which our lives depend. We must protect this foundation as a safe and genetically stable source for future generations. For the benefit of all farmers, gardeners and consumers who want an alternative, we pledge that we do not knowingly buy or sell genetically engineered seeds or plants. The mechanical transfer of genetic material outside of natural reproductive methods and between genera, families or kingdoms, poses great biological risks as well as economic, political and cultural threats…"[91].

[91] http://www.seedsavers.org/About-Us/ (last accessed 24 July 2015).

Canadian farmers and scientists dedicated to the conservation of food diversity through the protection of heritage and locally adapted seeds were the second network to initiate a similar campaign in 1984. Known as Seeds of Diversity, this network believes in People Protecting the People's Seeds and only offers for exchange and sale the varieties that are non-hybrid, non-patented and free from genetic modification. It is not a seed company but a national-level member-to-member seed exchange organisation that builds on the partnership of gardeners, farmers, seed companies, educators and researchers. One must become a member to participate in the seed exchange and access thousands of varieties of vegetables, grains, herbs, fruits and flowers saved by other members across the country. Exchange of seeds is facilitated through a members-only Seed Directory, which is published each year with information about offerings of seeds by members[92].

Australian farmers too have started a similar network. Formed as a registered charity in 1986, the Seed Savers' Network provides open-pollinated seed stock to individuals, groups and communities. It also promotes preservation gardens and seed banks for the availability and exchange of non-hybrid, open-pollinated plant varieties. The network has a mission to "free seed" and believes in helping and encouraging gardeners and farmers to share seeds and food, grow from own seeds or get or give some at local seed networks.

In the initial 20 years, the Seed Savers' Network collected and stored open-pollinated, non-hybrid seeds of native and local crops in the field of Byron Bay in northern New South Wales of Australia. By 2014, it expanded its network covering over a hundred local seed savers' groups in different parts of Australia. Since 2014, Australia's Seed Savers' Network has also opened registration for seed savers' groups in other countries of Africa, Asia and Europe. The members of the Seed Savers' Network are farmers and gardeners sharing and exchanging information and seeds. The network views local seeds as a cultural heritage and works to conserve and exchange

[92] https://www.seeds.ca/faq (last accessed 24 July 2015).

such seeds as a critical way to ensure environmental sustainability and sustainable agriculture[93].

In the UK, there not only exists the Sussex Community Seed Bank, which is a group of passionate farmers living in Glynde and the surrounding villages and towns in Sussex, but also a number of other seed savers' groups formed to protect and promote the use of open-pollinated seeds in different locations of the country[94]. According to the Sussex Community Seed Bank:

> "…it is every human being's right to be able to save their own seed, as our ancestors have done for thousands of years. This right can only be achieved through the use of open-pollinated varieties which breed true to type year after year, as nature has always done. The more commonly used F1 Hybrids do not breed true to type year after year because the seed companies retain the two parents that have produced the F1 Hybrid and consequently we cannot save that seed but have to purchase new seed every year from the seed companies[95]."

In France, a non-profit association called AgroBio Périgord[96] serves as a seed network to which seven other community-level seed networks are associated for exchange and testing of farmers' varieties among members (de Boef et al., 2013). In other European countries too such as Germany, the Netherlands and Italy, there exist a variety of groups and associations operating as seed savers of open-pollinated varieties of different types of crops (Vernooy et al., 2015).

The seed savers' networks of the developed world have also shown increased interest in partnership in the developing world. For instance, Australia's Seed Savers' Network, between 2002 and 2005, channelled small grants of AUD1,000 to AUD5,000 to support seed saving projects in countries such as Afghanistan, Brazil, Cambodia, India, Indonesia and Solomon Islands[97]. How seed savers' networks of developed countries are

---

93 http://seedsavers.net/ (last accessed 24 July 2015).

94 http://www.sussexcommunityseedbank.com/#/seed-links/4575657219 (last accessed 24 July 2015).

95 http://www.sussexcommunityseedbank.com/# (last accessed 24 July 2015).

96 http://www.planttreaty.org/sites/default/files/Submission_ACRA.pdf (last accessed 24 July 2015).

97 http://seedsavers.net/shop/home/about-seed-savers/our-global-reach/ (last accessed 24 July 2015).

related to and support the community initiatives in developing countries is surely an important issue, particularly when the developing world too has a history and practice of establishing and mobilising community seed banks.

9.4 Community seed banks in the developing world

In developing countries, community seed banks have been in existence in different sizes and structures. These banks are seen as important institutions to promote on-farm conservation of local plant varieties and traditional knowledge (Feyissa, 2000; Mazhar, 2000; Ramprasad, 2007; Vernooy et al., 2014). Community seed banks are also known or referred to as community gene banks, community seed reserves, community seed wealth centres, seed huts, agro-biodiversity resource centres, participatory learning centres, diversity field fora, village seed banks and community-based seed systems (Sthapit, 2012).

With their different names, such community seed banks are in operation in developing and least-developed countries of Africa to Latin America to South-east and South Asia, for example, in Bangladesh, Brazil, Bolivia, China, Costa Rica, Ethiopia, France, Guatemala, Honduras, India, Mali, Mexico, Nepal, Nicaragua, Peru, the Philippines, Rwanda, Senegal, Thailand, Zambia and Zimbabwe.

One of the major works that attempts to track the history of the origin and evolution of community seed banks is Vernooy et al. (2015). As the literature suggests, the oldest community seed banks came into operation in the 1970s or so. For example, the community seed bank of São Thomé in Nova Alagoa of Brazil was already found to have been conserving two types of common bean in 1974, though it expanded to cover local varieties such as of cowpea, lima bean, sorghum, pigeon pea and maize in the years ahead (FAO, 2014).

In the 1980s, the significance of initiating community seed banks to conserve and sustainably use local seeds was well recognized. The Rural Advancement Foundation International[98], which monitored the impacts of

[98] Now known as the Action Group on Erosion, Technology and Concentration (ETC Group), http://www.etcgroup.org/content/rafi-becomes-etc-group (last accessed 24 July 2015).

technologies in agriculture and corporate mergers and acquisitions related to seeds for more than 30 years, produced a Community Seed Bank Kit in 1986 (Vernooy, 2012), aimed at educating people as to why community seed banks are important and how they need to be established.

Later on, this kit was used by other organisations, for example, by the Canada-based international development agency Unitarian Service Committee of Canada (USC Canada), and the UK-based registered charity, Practical Action[99]. Based on the same kit, these organisations prepared an Action Sheet advocating the significance of protecting local crop diversity through community seed banks and the steps involved in creating community seed banks[100].

Since the late 1980s, USC Canada has been supporting the setting up of community seed banks across many countries through its Seeds of Survival Programme[101]. Along with USC Canada, there are other organisations too, as discussed hereunder, that came to the forefront to establish and mobilise community seed banks in different regions of the world. For instance, a Norway-based development agency, the Development Fund[102], has also been playing a major role in facilitating the establishment of community seed banks in different regions of the world.

In addition to the international non-government organisations, several local non-government organisations and public research organisations such as the national gene banks of developing and least-developed countries too have supported the establishment and functioning of community seed banks. Since the 1970s, due to the initiatives of such agencies and local

---

[99] Formerly known as the Intermediate Technology Development Group (ITDG), http://practicalaction.org/.

[100] www.paceproject.net

[101] Seeds of Survival (SoS) is the approach USC Canada uses to promote long-term food security for marginal farming communities in developing countries. The SoS Programme was launched in Ethiopia in 1989 to save threatened crop varieties from extinction – a real challenge given that it was a time of severe drought. See, http://usc-canada.org/what-we-do/sos/ (last accessed 12 August 2015).

[102] The Development Fund supports organisations of different regions to work with small-scale farmers in their fight against hunger and poverty, http://www.utviklingsfondet.no/en (last accessed 12 August 2015).

communities, hundreds of community seed banks, as briefly highlighted below, have come into operation in different regions of the world.

9.4.1 Community seed banks in Africa

Following the impacts of a tragic drought in Ethiopia's local agriculture, since 1989, the national gene bank of Ethiopia called the Institute of Biodiversity Conservation (IBC)[103] started to reintroduce local varieties under the Seeds of Survival Programme of USC Canada and then to support community seed banks in the 1990s. Later on, Ethio-Organic Seed Action (EOSA), a non-government organisation formed in 2003, took over the responsibility of mobilising community seed banks and enabled them to be organised as legal entities under the umbrella of so-called "conservation cooperatives" (de Boef et al., 2013).

Similarly, a non-government grassroots organisation, the Relief Society of Tigray, established community seed banks in 1988 in Tigray in northern Ethiopia during times of war. Developed as a response to hardship and famine, these community seed banks were organised at *woreda* (district) and operated at *tabia* (local) levels. From 1991, these seed banks, each governed by a seed bank committee and supported by the Development Fund, emerged not only as seed savers but also as important instruments of post war recovery (Bezabih, 2008; Thijssen et al., 2008).

In Zimbabwe, in 1998, a community seed bank was established in Uzumba Maramba Pfungwe district to restore and seize a further loss of indigenous crop varieties due to the drought of 1991/92. The functioning of this bank was later on coordinated by the Community Technology Development Trust, a people-centred non-government organisation. The Trust, with support from the Development Fund and other agencies, is also involved in the management of community seed banks in two other districts, Chiredzi and Tsholotsho, which are characterised as semi-arid regions with five times more crop diversity than in high rainfall areas[104] (Mujaju et al., 2003).

---

[103] Formerly known as the Plant Genetic Resources Centre, Ethiopia.

[104] http://www.eseap.cipotato.org/UPWARD/Publications/Agrobiodiversity/pages%20294-301%20%28Paper%2038%29.pdf (last accessed 10 August 2015).

What is interesting in the case of Zimbabwe is the presence of other types of community seed banks that primarily focus on meeting farmers' demand of open-pollinated, improved seeds released through the formal seed sector's research institutions. Through seed growers' active involvement in Seed Growers' Associations, these community seed banks only conserve a small quantity of the seeds of traditional crop varieties, and focus extensively on the production of the seeds of improved varieties for exchange and sale with their members as well as non-members of Kaoma, Mpika and Chipata areas (Nakaponda, 2010).

9.4.2 Community seed banks in Latin America

The Chile-based Centro de Educatión y Techlogia (CET), which is helping farmers to become self-sufficient by reducing their dependence on formal seed markets, works on community seed banks in a number of Latin American countries (Vernooy, 2012). In 2007, a community seed reserve called *Nueva Esperanza Concepcion Sur* was established in Honduras, and in 2010, Quilinco community seed reserve in Guatemala. Both of these were formed under the Collaborative Programme on Participatory Plant Breeding in Mesoamerica, which was launched in 2000 with support from the Development Fund to implement national projects in Costa Rica, EI Salvador, Guatemala, Honduras, Nicaragua and Cuba (de Boef et al., 2013).

In Brazil, besides the community seed bank of São Thomé, there are hundreds of community seed banks in operation. The Semi-Arid Paraíba Network (ASA/PB), formed in 1993, has helped to establish more than 800 community seed banks, involving over 800 families in 63 municipalities. ASA/PB is a network of 350 civil society organisations, which aim to strengthen the autonomy of small-scale farmers throughout the Paraíba state of Brazil (de Boef et al., 2013; FAO, 2014).

Likewise, in Peru, there exists not specifically a typical community seed bank but an interesting Potato Park (*Parque de la Papa*). The Park conserves hundreds of native potato varieties in more than 12,000 hectares of land between 3,000 and 5,000 meters above the sea level. Located in Pisaq in the Sacred Valley of Peru, the park is considered the brainchild of the Quechua-Aymara Association for Sustainable Communities (ANDES in

Spanish) and brings together more than 8,000 farmers of the six Quechua communities to collectively benefit from the conservation and use of native potato varieties[105].

9.4.3 Community seed banks in South-east Asia

The South-east Asia Regional Initiative for Community Empowerment (SEARICE), a non-government South-east Asia-based regional organisation, had supported a local non-government organisation called CONSERVE to establish a community seed bank in the Philippines in 1992 (Vernooy, 2012). SEARICE, together with the Bohol Island State University, also helped and trained local farmers to set up an organic rice-based community seed bank in Bohol in 1998[106].

Since SEARICE works with rural communities to re-establish the role of farmers in the conservation of traditional seeds and the development of new varieties, it has established centre-based and community-based seed banks to support community efforts of collection, conservation, development and utilisation of local plant genetic resources and traditional knowledge. They believe in the notion of "seed sovereignty" with a strong advocacy for the protection of farmers' rights, including farmers' access to and control over seeds[107].

Similarly, in 2000, the Thung Kong Community Seed Bank was initiated in the mountainous Nan Province in North Western Thailand. This bank works to address the challenges of insufficient seeds by conserving and promoting the use of local seeds and traditional knowledge. In order to fulfil seed requirements, this community seed bank generates support from rice research institutes, local government offices and universities.

Its activities are also integrated into the local high school curriculum. The operation of this seed bank has gone hand in hand with the establishment of a farmer field school. This school teaches local farmers about the principles

[105] http://www.parquedelapapa.org (last accessed 10 August 2015).

[106] http://searice.org.ph/2013/08/16/boholano-farmers-put-up-organic-rice-seed-bank/ (last accessed 10 August 2015).

[107] http://www.agriculturesnetwork.org/magazines/global/more-than-money/community-seed-banks (last accessed 10 August 2015).

of plant genetic resources, curatorship of traditional seeds, and methods of participatory plant breeding and integrated farming. This way, the Thung Kong Community Seed Bank not only forms the basis of initial seed supply for farmer groups across the country but also serves as an educational model for high school students (Fund, 2011).

9.4.4 Community seed banks in South Asia

Since 1994, *Unnayan Bikalper Nitinirdharoni Gobeshona* (UBINIG), a policy and action research organisation in Bangladesh, started to operationalise the idea of community seed bank as community seed wealth centres and seed huts. These seed wealth centres and seed huts were initially addressing the challenges raised by the floods and a cyclone in the late 1980s. In recent years, these have emerged as important local institutions to ensure farmers' control over their seeds and traditional knowledge, thereby protecting seed sovereignty at farmers' level (de Boef et al., 2013; Vernooy, 2012).

Being linked with a *Nayakrishi* seed network of 300,000 farmers, UBINIG's six community seed wealth centres and 26 seed huts have been promoting a philosophy of *Nayakrishi Andolan* (New Agriculture Movement). As part of this philosophy, these institutions have been conserving and regenerating seeds of local needs with no use of pesticides and no use or gradual decrease of chemical fertilisers in around 20 districts (Kelly, 2008). UBINIG argues that seeds and genetic resources are the common resources of the community and must be conserved at the household and community level (Fund, 2011; Mazhar, 2000).

In India, several non-government organisations have initiated community seed banks in different states, covering local farming households, including women farmers. In 1992, the Genetic Resource Ecology Energy Nutrition (GREEN) Foundation started community seed banks in Southern India, initially in the drier areas of the Indian states of Tamil Nadu and Karnataka. The Foundation, which also believes in seed sovereignty, has helped more than a dozen such seed banks to operate within a Community Seed Bank Network, and to separately maintain hundreds of varieties of indigenous

seeds, mainly with the involvement of women farmers[108] (Ramprasad, 2007).

In 1994, the Academy of Development Sciences also undertook a similar initiative in the Indian state of Maharashtra, primarily focussing on the conservation, multiplication, use and exchange of important indigenous rice varieties of four local districts of the Konkan region[109]. Their rice-based community seed bank has been able to store 260 rice varieties, of which 60 varieties are in high demand among local farmers (Tuxill & Nabhan, 2001).

The Deccan Development Society, a grassroots organisation working with India's voluntary associations of poor women in drought-prone areas of the Medak District of Andhra Pradesh, is another important organisation to facilitate the work of community seed banks in India. It has been helping farmers to conserve non-hybrid local seeds and promote organic food through community-level gene bank since 1996. This bank has also developed a seed distribution network with an objective of ensuring the re-emergence of local crop varieties[110]. Vandana Shiva's *Navdanya*[111], a women-centred movement for the protection of biological and cultural diversity, has also helped in setting up over 100 community seed banks across different states of India, calling for farmers' self-reliance in seed and the protection of farmers' rights through seed sovereignty (Shiva, 2015).

Similarly, there are other non-government organisations such as the Centre for Indian Knowledge System, MS Swaminathan Research Foundation and Gene Campaign which have been supporting the creation and mobilisation of a number of community seed banks in different states of India (Vernooy, 2012). Also important are the community seed banks created by the Centre for Sustainable Agriculture in 70 villages in Andhra Pradesh and 20 villages in Maharashtra of India. The Centre believes that these community seed

---

[108] http://www.greenconserve.com/content/community-seed-banks (last accessed 12 August 2015).

[109] http://base.d-p-h.info/en/fiches/premierdph/fiche-premierdph-4113.html (last accessed 12 August 2015).

[110] http://biotech-monitor.nl/4106.htm (last accessed 12 August 2015).

[111] Navdanya means "nine seeds", symbolising protection of biological and cultural diversity, and also the "new gift". See, http://www.navdanya.org/earth-democracy/seed-sovereignty) (last accessed 12 August 2015).

banks serve "to create a knowledge commons for the conservation and revival of existing varieties as well as for practices of participatory plant breeding aimed at evolving new varieties"[112] (Dafermos & Pol, 2014, p. 1).

As in the case of India, more than a hundred community seed banks are in operation in different districts and villages of Nepal (see the next chapter). In addition to these country- and local-level community seed bank initiatives, there are two other developments that directly relate to the expansion and effectiveness of community seed banks in South Asia, which is a biodiversity-rich region, largely relying on subsistence agriculture for farmers' livelihoods and food security.

First, local, community-based non-government organisations of the region have created networks and partnerships among community seed banks that are in operation in countries such as Bangladesh, India and Nepal. For example, they not only conduct field visits and organise joint workshops, but also build each other's capacity to better manage community seed banks through cross-learning under their community-based biodiversity management programmes[113]. Also interesting is the fact that a local, community-based non-government organisation in Nepal, called LIBIRD, has partnered with the Royal Government of Bhutan, "to train and build capacity on Community Seed Bank management and further strengthen and up-scale Bhutanese Seed Banks"[114]. It is also important to note that non-government organisations like LIBIRD are also in partnership with similar organisations like SEARICE of South-east Asia for cross-learning and collaboration to safeguard the rights of local communities involved in community seed banks, participatory plant breeding and other local biodiversity management activities.

Second, eight governments of the South Asian Association for Regional Cooperation (SAARC), comprising Afghanistan, Bangladesh, Bhutan,

---

[112] https://floksociety.co-ment.com/text/ZAea6mHLrqG/view/ (last accessed 16 August 2015).

[113] http://libird.org/app/projects/view.aspx?record_id=26&origin=results&QS=QS&st_4347=equalsorafter&f1_4347=today&viewby=100&union=AND&top_parent=214 (last accessed 16 August 2015).

[114] http://www.planttreaty.org/sites/default/files/Bhutan-fact%20sheet.pdf (last accessed 16 August 2015).

India, Nepal, the Maldives, Pakistan and Sri Lanka, have sought regional cooperation through the establishment of a regional-level SAARC Seed Bank.

In November 2011, South Asian governments agreed to promote cooperation for a regional seed bank by signing onto the SAARC Seed Bank Agreement. They also adopted the Framework for Material Transfer Agreement that is applicable to the operationalisation of the SAARC Seed Bank Agreement, mainly for facilitating easy movement of seed and planting materials across South Asian countries. The Agreement calls for the maintenance of a Seed Reserve under the Seed Bank, consisting of quality seeds of common varieties of rice, wheat, maize, pulses and oilseeds (Article VI)[115].

Though this Agreement is yet to enter into implementation as the Maldives has not ratified it, civil society-led policy discussions in South Asia have observed this Agreement more as a "regional seed enterprise" for cooperation on improved seeds than a regional seed bank that protects and enhances the use of local varieties. It is because the Agreement neither states anything about creating a link with community seed banks of South Asia, nor gives priority to conserve and use traditional seeds of crops important for the region. The Agreement only requires SAARC Member States to undertake planned approaches to increase the seed replacement rate at a faster rate (Article III). It basically means that the Agreement, for increasing seed replacement rate, only intends to promote cooperation for the use of improved, modern seeds supplied through the formal seed system (Adhikari, 2010).

9.5 Typologies of community seed banks

Different typologies of seed banks have been constructed. Such typologies largely depend on the location, type, size and nature of farming to the needs of conservation, use and development determined by community-specific geographical, economic, social, cultural and political contexts of a particular country or a region. Globally, community seed banks can be found "in a

[115] According to the Agreement, initially, governments would collaborate on the availability of rice, wheat, pulses and oilseeds, and gradually other crops may be considered.

diversity of forms in terms of function(s), size and scope, governance and management, physical appearance, technical aspects (e.g., seed storage facilities and techniques) and impact" (Vernooy, 2012, p. 3). Probably, the first attempt to identify a typology of community seed banks that operate across the globe was made by Lewis and Mulvany (1997). In their view, the typology of community seed banks varies according to storage methods and the institutional arrangements needed to set up and maintain the banks. They categorise seed banks into two broad categories: individual seed storage and collective seed storage.

In an individual seed storage system, seeds are retained on farm by separate individual farm households for next season. This is in fact a typical feature of the local, traditional seed system, in which farmers exercise their customary rights to save, reuse and exchange seeds within their own households. In a collective seed storage system, seed saving occurs when farmers, either self-organised or assisted by outside organisations, coordinate which seeds to secure for cultivation and/or for conservation (Lewis & Mulvany, 1997).

In addition to the classification of individual and collective seed storage systems, Lewis and Mulvany (1997), as shown in Table 9.1, have also categorised community seed banks, also including seed savers' networks, into five types. This classification is based on the criteria of type of seeds stored, and seed exchange and multiplication mechanisms. In this classification, an important issue to note is the fundamental distinction between the presence of *de facto* community seed banks and organised community seed banks. The seed banking practices of farmers are deeply rooted in traditional, cultural norms for many generations. In the case of *de facto* community seed banks, farmers themselves have been separately storing and locally multiplying seeds at the household level and exchanging them through traditional or formal and informal institutions for the purpose of ensuring seed and food security.

Table 9.1: Five types of community seed banks

Types	Nature	Features
De facto community seed banks	the sum of all seed storage in a community	• in existence for a long time • individual households • operate informally • made up of separately stored, locally multiplied, farmers' and modern varieties
Community seed exchange	organised exchange of some stored seeds from *de facto* community seed banks	• some have existed for a long time as traditional institutions, while others have formed at a later stage • operate semi-formally • made up of individually stored, locally multiplied, farmers' and modern varieties
Organised seed banks	new institutions of organised collection, storage and exchange of seeds	• individually and collectively stored • operate formally • made up of locally multiplied, modern and farmers' varieties
Seed savers' networks	new networks for organised storage and distribution of seeds	• store between individuals and groups in a wide spread of geographical locations • made up of mainly farmers' and non-commercial varieties
Ceremonial seed banks	sacred groves and reserves	• collectively managed and exchanged according to local (often religious) customs and traditions • seeds (usually vegetative) are common property resources • conservation is not the primary function but occurs as a consequence of their existence

Source: Lewis and Mulvany (1997)

However, as modern seeds like hybrids and intellectual property-protected seeds came to affect such practices, or sources of seed availability at the local level are diminished due to socio-economic and environmental factors, organised community seed banks have been created and supported by external agencies, internationally and nationally, primarily to prevent the loss of local varieties.

Over time, organised community seed banks in some countries have been, however, also emerging as a registered legal entity to expand the seed business of local, and in many cases, improved seeds of the formal seed system. Some seed banks, in other words, can act as bridge for the formal seed system. The case of community seed banks of Zimbabwe, as briefly discussed above, is an example in which seed growers of the bank engage in the production and sale of improved seeds more like a seed enterprise than in the conservation and exchange of seeds of local varieties. This then

brings us to an important issue. Are community seed banks a backup system of landraces or an evolving enterprise to offer seed production and business opportunities at the local level, or both?

In this regard, Engels et al. (2008) discuss the need to understand a fundamental distinction between a community seed bank and a community gene bank. According to them, a community seed bank is a collective seed store and exists as an "organised seedbank" for serving as a source of seed for crop production. On the other hand, a community gene bank is "an organisational unit that provides genetic diversity maintenance services to the farming communities", serving as a backup system for local seeds of different crop varieties (Engels et al., 2008). Similarly, Sthapit (2012) observes three types of community seed banks: community gene banks, community seed banks, and community gene and seed banks (Table 9.2).

Table 9.2: Typology of community seed and gene banks

Parameters	Community gene banks	Community seed banks
Goal and purpose	In situ conservation; seed and food security; community custodianship and support; access and control over resources; farmers' rights	Community-level seed and food security; seed sovereignty; community empowerment; community resilience
Function	Access to crop genetic resources	Availability of seed
Type of seed	Traditional varieties; varieties free from genetic modification	Traditional varieties; modern, improved varieties; products of participatory plant breeding; hybrid but varieties free from genetic modification
Scale of operation	Community level	Community level with networks
Governance	Local organisation	Local organisation
Sustainability	Community biodiversity management fund	Community biodiversity management fund; community-based seed production programme; community-based revolving fund
Collective actions	Yes with social responsibility of conserving rare and unique plant genetic resources	Yes
Promoted by	Non-government organisations	Non-government organisations, government and donors

Source: Sthapit (2012)

According to him, initially, external and local non-government agencies in countries like India and Nepal promoted community gene banks to prevent the loss of local varieties. Community seed banks were supported to ensure

access to quality seeds. Interestingly, he finds that a combination of these two banks is now being applied by farming communities so as to integrate farmers' seed system into local markets through an integrated set up of community seed banks (Sthapit, 2012).

It is important to highlight that Engels et al. (2008) too find situations in which hybridisation of a community seed bank and a community gene bank is visible in countries like Ethiopia. However, whether community seed banks, with a community-based seed production and marketing approach, should engage in the production and sale of improved seeds of the formal seed system is a question that merits special attention. Sthapit (2012) argues that the term "community seed bank" should not be used by any institution if it does not conserve plant genetic resources.

9.6 Conclusion

In the developed world, it is clear that seed savers' networks and groups have been organised and are in operation with their sole focus on extending networks for exchange of heirloom and open-pollinated varieties that are non-hybrid, non-patented and free from genetic modification. Evidently, one of the crucial objectives of the seed savers' networks in developed countries is to find alternatives to the state-led regulations that promote industrial agriculture. This way, the seed savers' groups are an organised network of farmers and gardeners who believe in saving and expanding farmers' choices and preferences to promote the conservation, use and exchange of the seeds of heirloom and open-pollinated varieties for sustainable agriculture and organic farming.

For these networks, seeds of their preferences and needs are the properties of an open source seed sharing and exchange network formed within their local practices of seed exchange as a common cultural heritage. However, their mission is not without complications, mainly because of the implications for seed-saving practices from restrictive seed laws and ever-expanding monopolistic outreach of intellectual property system in agriculture and seed business, for example, in Australia and Canada (Phillips, 2005, 2008; Van Dooren, 2009).

In the developing world, community seed banks have come into existence from the 1970s onwards for a variety of reasons. These include their use as a post-war recovery instrument, as a field bank of local varieties, and as an enterprise to produce, exchange and sell seeds of local and modern varieties of both informal and formal seed systems. There also exists a debate regarding the typology of community seed banks: whether they should serve only to protect and advance the use of local varieties or whether they should also engage in the production and sale of modern varieties of the formal seed system. Yet, what is importantly common between the seed savers' networks of the developed world and most of the community seed banks of the developing world is their dedication and conviction towards promoting the use and exchange of seeds as a commons, allowing members as well as non-members to produce and reproduce their seeds.

As in the case of developed countries, the countries in the South too face challenges to operationalise the idea of community seed banks and promote the conservation, use and exchange of local seeds. Most of these countries have either strengthened the formal seed system by weakening the farmers' seed system, or have implemented or are in the process of implementing intellectual property rights in agriculture.

The rising pressures from the industrial seed lobby to use modern seeds are creating additional operational challenges for those community seed banks that promote the conservation, use and exchange of local varieties and work towards the protection of farmers' rights through the seed sovereignty framework. In the words of Vanaja Ramprasad, a chief promoter of the idea of community seed banks in India:

> "The GREEN Foundation team often felt dwarfed by the opposition of the big multinationals, universities and the scientists who regarded them as reactionary, trying to take science backwards by promoting the use of traditionally used crops or varieties. We went through cycles of despair and frustration as our work was often looked at with disbelief. But our strong belief in our work made us continue" (Ramprasad, 2007, p. 21).

Chapter 10

Community seed banks in Nepal

10.1 Introduction

Seed storage and exchange, or banking, is not a new phenomenon in Nepal. As discussed in previous chapters, for generations, the so-called informal seed system – that is, local, traditional seed system – has been an integral part of Nepal's agriculture. Majority of farmers in Nepal save, exchange, reuse and sell seeds of local plant varieties at the household as well as community level. According to the typology of community seed banks of Lewis and Mulvany (1997) we discussed in Chapter 9, Nepal's local seed system that relies on self-regulatory norms and practices of seed use and exchange can be considered an example of *de facto* community seed banks.

What makes Nepal more interesting is the presence of hundreds of organised community seed banks. Starting from one organised community seed bank in the 1990s, there are now more than 100 community seed banks operating in more than 30 of the 75 districts of the country. Initially supported by international and national non-government organisations and gradually by the Department of Agriculture and other institutions, these organised community seed banks are known as *Samudayik Biu Bainks* in Nepali language. Like any monetary bank, these banks function based on deposit and lending of seeds, the collective terms of which are set and agreed by its member farmers, generally in consultation with their initiators and supporters.

This chapter explores the idea and objectives of community seed banks in Nepal, identifying actors and networks involved in their creation and expansion and linkages with similar movements in the developed and developing world. The chapter also discusses the community seed banks that are emerging to interact with formal as well as informal seed systems. Finally, the chapter, presenting a typology of community seed banks, discusses the role of seed banks in relation to the management of PGRFA knowledge commons, mainly focussing on local vs modern varieties.

10.2 Origin of the idea of community seed bank

As the first-ever organised community seed bank, a two-storey building was constructed in 1997 in the Dalchoki village of the Lalitpur district. The establishment of the Dalchoki Community Seed Bank was supported by the Nepal country office of the Ottawa-based USC Canada, as part of its Integrated Community Development Programme, a programme that had been in the district since 1991.

A difficult terrain with a risky, rough road to the district's headquarters without any public transport indicates the hardships of farmers in Dalchoki, which lies 2,200 meters above the sea level as an underdeveloped Southern hill village of the central development region. Yet, local farmers were gradually inclining to use improved, modern seeds and fertilisers of the formal seed system accessed from public entities and traders from the district, thereby leading to the erosion of local plant genetic resources and traditional knowledge.

Alarmed by such trends, USC Canada Nepal took the lead and implemented the concept of community seed banks based on a two-pronged strategic approach. According to a farmer of the bank:

> "The first strategic approach aimed at preventing the erosion of local genetic resources through documentation and storage of local seeds and traditional knowledge in the bank. The second strategic approach aimed at mobilising the bank to facilitate farmer-to-farmer exchange of stored seeds for farmers' enhanced access to and use of local seeds" (FGD#5).

With such strategic approaches, since 1994, collection of local seeds and their documentation, conservation and production in Dalchoki and other two villages – Nallu and Ghusel – were initiated, gradually expanding the work in seven other villages of the same district. Through the physical set-up, training on seed selection, collection, storage, conservation and exchange the members of the bank were empowered to collect, store and exchange seeds of local plant varieties with members and other local farmers.

10.3 Expansion of the idea of community seed bank

After a few years, but in a very systematic and organised manner, the second community seed bank was established in 2003 in the Kachorwa

village of the Bara district. It lies in the Indo-Gangetic plains of the central development region bordering India. As part of a global project on Strengthening the Scientific Basis of *In Situ* Conservation of Agriculture Biodiversity (1997-2006), this time, the idea of setting up a community seed bank in Bara was adopted by the Nepal Agriculture Research Council, an apex body for agriculture research in the country, and LIBIRD. The project was supported by Bioversity International, which, as a member of the CGIAR, works in Americas, Asia Pacific Oceania and Sub-Saharan Africa as a research-for-development organisation.

Mainly because of the shared open border with India, the Bara district was already exposed to the officially and unofficially imported modern seeds and fertilisers. It faced a major challenge of preventing the loss of local seeds and traditional knowledge. In addition, local seed traders and public entities too were promoting the seeds of the formal seed system in the district. In the focus group discussion in Bara, a farmer of the bank said:

> "The *in situ* project had surveyed the availability of more than 30 local varieties of rice in 1998, but after a few years, another survey by the same project showed a substantial decrease of more than 50 percent in the availability of those varieties in our community. A further investigation revealed that local farmers were more inclined to use modern seeds than local seeds. Evaluating these trends, the project team worked with us to mobilise local farmers' groups to set up a community seed bank and scale up the conservation initiatives for local landraces and traditional knowledge" (FGD#4).

Then, in 2006, USC Canada Nepal facilitated the setting up of its second and Nepal's third community seed bank (named as Agrobiodiversity Resource Centre) in Ranibas village of the Sindhuli district in the central development region. This was done as part of the People's Empowerment Programme, which was being implemented in the district since 2000. The idea was to institutionalise the on-farm conservation efforts and save and facilitate exchange of local crop seeds of cereals, pulses and vegetables (Shrestha et al., 2012a).

Building on the regular seed exchange initiatives that are widespread within local, traditional seed system, the Sustainable and Equitable Development

Academy (SEDA), with the support of a globally networked development organisation called ActionAid, then emerged as a major actor in promoting the community seed bank initiative in Nepal. Since 2007, SEDA has established community seed banks in the Jumla district of the mid-western development region, starting in Lamra and Talium villages.

These banks have stored seeds of more than 60 local varieties, including those of cereals and legumes. This initiative was later extended in Kartikswami, Garjyangkot and Badki villages of the same district. SEDA views that community seed banks should only store the seeds of local crops, and not those of the hybrids and improved varieties of the formal seed system[116]. The latter are often disseminated or supplied, as we discussed in Chapter 4, by the government units, national and regional agriculture research institutes, non-government development agencies and private seed entities.

Based on the lessons learned from the *in situ* project of the Bara district, between 2007 and 2009, LIBIRD played a leading role in expanding the community seed bank initiative in different regions of Nepal. With donors' assistance, they established 14 other community seed banks in different villages across the country, from the southern plain lowlands in the Terai region to the northern high hill area, and from the east to the western parts of the country.

In 2007, it supported the establishment of village-level community seed banks in Bardiya, Kailali and Kanchanpur districts; in 2008, in Kailali and Kanchanpur districts; and in 2009, in Jhapa, Sankhuwasabha, Dhading, Tanahu, Nawalparasi, Doti and Jumla districts. LIBIRD emphasises the need to promote collection, storage, regeneration, multiplication and distribution of local crop seeds; protect traditional knowledge; and strengthen farmers' local, traditional seed system.

[116] http://www.agriculturesnetwork.org/magazines/global/regional-food-systems/neglected-no-more (last accessed 10 September 2015).

10.4 Government's involvement to set up community seed banks

Following local ownership and successful results of the work of community seed banks initiated by the non-government organisations, the Ministry of Agricultural Development too started to set up community seed banks since 2009. To initiate a planned, strategic approach to create and promote community seed banks in all development regions of the country, the Ministry first prepared an "Operational Guideline on Community Seed Banks". This is also the first-ever government policy document on community seed banks.

The Guideline's main objective is to enhance access, exchange, use and management of quality seeds of modern varieties by making arrangements of production, processing and storage in a community undertaking. Though the Guideline also aims to promote conservation and use of local landraces, its major target is to introduce formal seed quality systems (seed certification, quality declared seed and truthful labeling). According to an official of the Department of Agriculture:

> "The Operational Guideline is the first-ever comprehensive policy on community seed banks in Nepal. As per the Guideline's objectives, all of the government-supported community seed banks focus on the production and dissemination of improved varieties, mainly to increase the seed replacement rate of improved seeds, which is in line with the objectives of the National Seed Policy and seed laws. The Guideline targets to initiate a joint action by farmers and regional seed testing laboratories of the government so that there is an effective arrangement for seed production, dissemination and their replacement as per the law. In the long run, we also aim to conserve local landraces" (Interview KIGS#6).

Based on the same Operational Guideline, in 2009, the Department of Agriculture established community seed banks at the village level in three districts: Dadeldhura in far-western Nepal, Sindhupalchowk in the central development region, and Okhaldunga in the eastern development region. Then in 2011, the Department extended its work with farming communities by establishing community seed banks in two other districts: Gulmi in the western development region and Jajarkot in the mid-western development

region. It also expressed its commitment to establish 10 others in other districts, covering all the development regions.

In 2011, another government entity, the Agriculture Genetic Resources Conservation Centre (the national gene bank established in 2010) also initiated a community seed bank in Simariya village of the Sunsari district in the eastern development region. Unlike the Department of Agriculture, the national gene bank seeks to mobilise a community seed bank for the purpose of promoting the use and documentation of local crop species, like a field-level gene bank. Also, the national gene bank came up with a programme to support the existing community seed banks, previously established by other organisations, mainly for the purpose of documenting and collecting the physical samples of local crop species from villages for conservation and characterisation at the capital-based gene bank.

10.5 Oxfam's initiation to set up community seed banks

In 2009, a new trend of establishing community seed banks originated from the non-government sector. It was introduced by the Kathmandu-based Nepal office of Oxfam International, a charity-based development organisation. As part of its Sustainable Livelihood and Food Security Programme, Oxfam Nepal facilitated the establishment of around 90 community seed banks at the village as well as ward[117] levels. Two districts were involved in this initiative, with 25 seed banks being established in Dadeldhura in far-western Nepal and 65 in Dailekh in mid-western Nepal. Out of these, 14 community seed banks are operating at the village level and rest of the 76 banks at the ward level.

While establishing these community seed banks, Oxfam Nepal has linked both of its village-level and ward-level seed banks with seed-producing farmer groups and village-level cooperatives. Their purpose is to promote the marketing of quality seeds and facilitate access to the relevant services and external inputs, including fertilisers. As a mobiliser of the community seed banks established by Oxfam Nepal says:

[117] Nine wards form a village (village development committee) in Nepal.

> "Oxfam Nepal undertakes a multi-stakeholder approach of engaging not only local farmers, but also village development committees, district line agencies of the government, and the private sector including local seed suppliers and traders. Our focus is primarily on the use of improved seeds for increased food production, which we call a food-security approach. This is quite similar to the approach taken by the community seed banks supported by the Department of Agriculture" (Interview with KICS#4).

10.6 Modalities to establish community seed banks

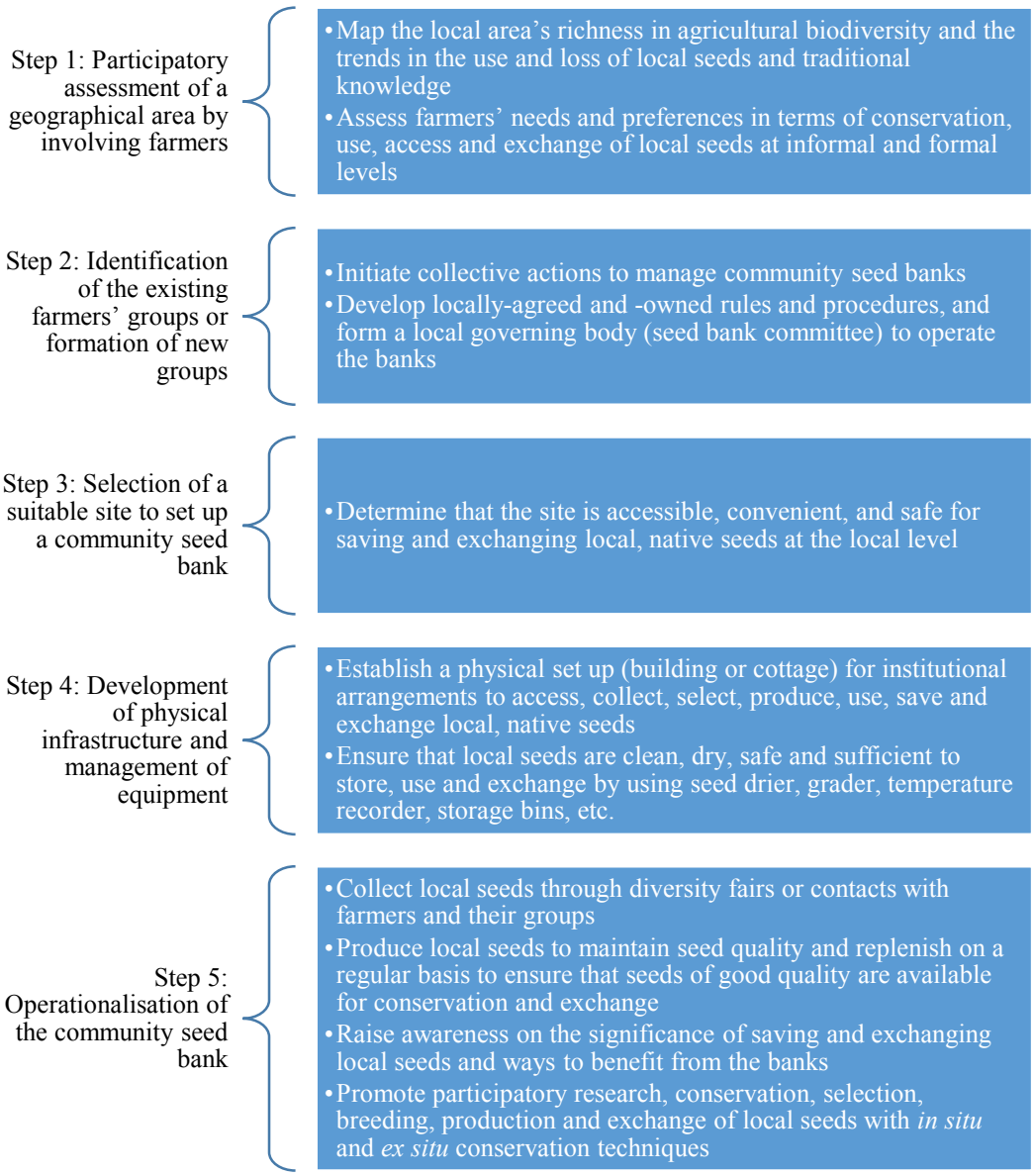
Different modalities are followed to establish community seed banks in Nepal. Such modalities depend on a range of factors, such as farmers' traditional practices of seed exchange and use, presence of farmers' groups, nature of farming, trends in the loss of local seeds and traditional knowledge, farming and food security needs, exposure to the formal seed system, location, etc.

Community seed banks were initially formed with the involvement of individual farm households that had an interest to share, conserve, use and exchange local seeds and traditional knowledge. In this process, some community seed banks were formed based on the existing farmers' groups, and others with the formation of new groups.

Generally, within a community seed bank, a seed bank committee is constituted with 7 to 11 members, including women farmers and farmers representing indigenous groups. The committee meets regularly to review operational modalities, assess the trends in conservation and exchange of seeds, and suggest the future course of action.

In the case of Nepal's first community seed bank in Dalchoki, 38 groups of farmers of Dalchoki and other villages were formed as part of the Integrated Community Development Programme being implemented by USC Canada. These groups were then familiarised with the concept of community seed banks, and were supported to document local agricultural biodiversity of the area in community biodiversity registers. Then, a physical set up for the community seed bank was provided in the form of a new concrete building with seed storage facilities in the basement. The basement remains naturally cold in all seasons.

Figure 10.1: Major steps generally followed to establish organised community seed banks



In the case of the second community seed bank in Kachorwa, the National Agriculture Research Council and LIBIRD had initially formed 22 groups of farmers as part of their global *in situ* project. Later on, the same project established a community seed bank by involving local groups of farmers. In recent years, in Kachorwa and the other 14 villages, where community seed banks have been established with support from LIBIRD, a Biodiversity Conservation and Development Committee has been formed at the level of all wards to form a village-level local institution. The mandate of this committee is not only to manage community seed banks, but also coordinate

overall farm conservation, research and breeding activities of local farmers. According to an official of LIBIRD:

> "The Biodiversity Conservation and Development Committee works closely with the government's local administration, that is, Village Development Committees. This way, the committee that we are supporting will be the appropriate local group of farmers to represent in policy making and development activities of the local government. This approach is meant to assist the government in local development and conservation activities, and at the same time, also enable local groups to work as active watchdogs and promoters of farmers' rights over seeds and traditional knowledge" (FGD#2).

Oxfam Nepal established community seed banks in a different way. At the macro level, the village-level community seed banks were established and provided with the responsibility to coordinate and network with the ward-level community seed banks. Generally, Oxfam Nepal first forms a seed producers group, establishes a seed management committee, registers the committee at the District Agriculture Development Office of the Department of Agriculture, formulates a steering committee for quality assurance, and constructs a community seed bank structure with locally available resources as far as possible. Finally, these seed banks are also networked with cooperatives formed by farmers involved in the community seed banks, mainly to link them with local markets, and formal seed actors and agencies at the village and district level.

10.7 Effectiveness of community seed banks

There is hardly any research that questions the work and effectiveness of community seed banks in Nepal. Community seed banks are considered an effective model of both *in situ* and *ex situ* conservation, an inclusive seed storage and distribution system, a fair local institution to provide access to seeds based on farmers' preferences and needs, a participatory approach to strengthen the informal seed system and link with the formal seed system, and a dynamic agency to enhance social capital and economic empowerment of local farmers. Community seed banks are also considered a locally-owned innovative mechanism to promote participatory variety selection and participatory plant breeding, and ensure the protection of

farmers' rights to seeds and traditional knowledge, for example, by establishing their ownership to PGRFA through local registration in community biodiversity registers (Maharjan et al., 2013; Shreshta, 2007; Shrestha et al., 2008; Sthapit, 2012).

A perception survey of 120 households – of which 90 households were involved in community seed banks closely working with LIBIRD and 30 not involved – establishes that such banks function locally with greater positive impacts on local seed and food security, livelihood enhancement, conservation of local PGRFA and the protection of farmers' ownership over local genetic resources (Table 10.1) (Paudel et al., 2012).

Table 10.1: Farmers' views on the effectiveness of community seed banks

	Negative (%)	No effect (%)	Positive (%)	Very positive (%)	Do not know (%)
Access to local varieties			59 (50)	37 (31)	23 (19.3)
Access to modern varieties		18 (14.8)	66 (54.5)	10 (8.2)	27 (22.3)
Support for development of new varieties			66 (55.9)	19 (16.1)	33 (27.9)
Conservation of local landraces			65 (54.6)	23 (19.3)	31 (26)
Identification of local landraces			72 (61)	10 (8.4)	36 (30.5)
Protection of ownership of local genetic resources		2 (1.6)	64 (53.7)	5 (4.2)	48 (40.3)
Strengthening of local seed system	1 (0.85)		54 (46.1)	2 (1.7)	49 (41.8)
Self-storage of seeds in households	14 (11.6)		45 (37.5)	2 (1.6)	30 (25)
Exchange of seeds with neighbours	9 (7.62)		26 (22)	5 (4.2)	30 (25.4)
Exchange of seeds with other villages	11 (8.66)		23 (18.1)	1 (0.78)	35 (27.5)

Source: Paudel et al. (2012)

Before we come to any conclusion regarding the effectiveness or significance of community seed banks, we should also understand that not all community seed banks may have similar or all of these effects. Community seed banks come in different forms and with different objectives, functions and impacts. Hence, it is important to understand how

community seed banks with different objectives and functions operate locally within Nepal's seed system.

10.8 Initial objectives: reviving traditional seed system

In Nepal, community seed banks were initially created to counterbalance the loss of local, native seeds and traditional knowledge. According to a participant of the focus group discussion in Pokhara:

> "The principal idea of initiating community seed banks in Nepal was to reduce farmers' exposure to or growing dependence on improved, modern varieties and chemical fertilisers of the formal seed system. Examples of such community seed banks are those that are found in Kachorwa, Dalchoki, Lamra and Talium villages" (FGD#2).

The focus group discussions with farmers revealed that the initial community seed banks have come into operation as an organised local-level initiative to make farmers self-reliant on local seeds, and not on hybrids and other exotic high-yielding varieties. For this purpose, the prime objective of such community seed banks is to identify, collect, document, conserve, use, multiply, exchange and sell native seeds for promoting farmer-to-farmer exchange within the traditional seed system that has existed for generations. In order to revive and strengthen the traditional seed system, such community seed banks also aim to:

- promote an active and dynamic community-managed process of on-farm maintenance of local seeds and traditional knowledge, including under-utilised and neglected crop seeds of buckwheat, sorghum and finger millet;
- create an accessible resource centre, repository and backup of local seeds and traditional knowledge;
- establish seed and food sovereignty at the local level; and
- empower farmers, including women farmers, *dalits* and indigenous people to create a sustainable seed system, and increase their adaptive capacity in agriculture and protection of the environment.

10.8.1 Identify, collect, document, conserve, use, multiply, exchange and sell local seeds

Most of the community seed banks have built upon the local seed system of identifying, collecting, documenting, conserving, using and multiplying local seeds as a common cultural heritage. Such seed banks conserve a wide range of local crops, including cereals, vegetables and pulses, expanding farmers' choices to access these varieties (Table 10.2).

Table 10.2: Conservation of local varieties by three community seed banks

Community seed banks	Varieties and crops
Dalchoki, Laitpur	17 varieties of 7 cereals, 12 varieties of 6 legumes, 6 varieties of 3 oilseed crops, and 22 varieties of 14 vegetables
Kachorwa, Bara	88 varieties of rice only, 5 varieties of sponge gourd, 2 varieties of millet (*kodo*), and 2 varieties of pigion peas (*rahar*)
Thumpakhar, Sinchupalchowk	72 varieties of cereals and vegetables

Source: Fieldwork data

The conservation and use of local seeds are promoted based on a number of factors such as agro-ecology, land type, and local socio-economic and cultural requirements. In order to identify and collect local seeds, community seed banks informally contact local farmers and farming groups, or organise diversity fairs in a village site, where farmers participate to demonstrate seeds they have been conserving in their lands. As in the case of the traditional seed system, farmers share and provide their seeds to the community seed banks without any condition.

Following the collection, community seed banks document the features of local seeds and traditional knowledge for the purpose of conservation and further use, generally in a community biodiversity register or any other register such as a Red Registry being maintained by the Kachorwa Community Seed Bank in the Bara district to track the annual trends of genetic erosion of local varieties. Community seed banks believe that these types of local registers establish knowledge about the place of origin or diversity of local varieties, and also provide information about the significance of such varieties and their owners and users.

Farmers involved in community seed banks store and display seeds in a room of their small local administrative office, usually in traditionally made earthen or straw pots, bamboo sticks and containers, jute sacks, or plastic holders with labelled information about the salient features of seeds. The stored seeds are generally planted and replenished by members to maintain and sustain the richness of plant varieties and enable the varieties to adapt to changing climatic and soil conditions.

In order to avoid duplications of varieties stored, and to assess morphological characteristics, generate passport data, and regenerate seeds, the community seed banks generally maintain diversity blocks in farmers' fields. This practice does depend on their resources to maintain such blocks. According to a farmer of the bank in Kachorwa:

> "Farmers of the banks observe and record the past and evolving traits of these seeds drawing on their economic, social, cultural and environmental values. The diversity blocks help farmers to select appropriate parent plants and a seed source for crossing and participatory plant breeding programmes" (FGD#4).

The local seeds stored through the local administration of the seed banks are exchanged with members and non-members of the same area on a loan basis, with a collectively agreed rule of returning one and half or two times the amount of seeds of the same variety after harvesting the crop. In some cases, members of the seed banks also sell seeds to generate some income for the work of community seed banks. In the words of a farmer of the bank in Bara:

> "We sell the stored/multiplied seeds outside the local area on a cost-recovery basis or to generate some fund for the operationalisation of the bank. Such sales enable us to generate incomes that we generally use in support of the mobilisation of a revolving fund (community biodiversity fund). This fund helps us in supporting the conservation activities of the bank. We also use this community fund for the purpose of providing loan to members of the banks so that they get some financial support for livelihood enhancement" (Interview with CSBM#2).

In the case of the bank in Kachorwa, farmers also said that such a loan is often with a condition that loan-receiving members agree to at least conserve one or two local varieties being maintained by the bank.

10.8.2 Promote an active and dynamic community-managed process of on-farm maintenance of local seeds

Community seed banks have evolved as local-level institutions to promote an active and dynamic community-managed process of on-farm maintenance of local, native seeds that fulfil their economic, social and cultural requirements, and meet environmental objectives. For this purpose, these banks function not only to save and exchange seeds that have economic benefits, but also those that have socio-cultural importance, and environmental features.

For example, in Bara, a native rice variety called Sathi is being conserved and used for its specific features and regular local needs of the Terai community, be they rich or poor. This rice variety is drought- and pest-resistant, and can be harvested within two months[118]. It also has a religious value since it is offered every year to goddess *Chhati Maiya* at the Chhat festival of the Madhesi community, an ethnic minority group. Similarly, local landraces such as Lajhi and Basmati have been conserved for their taste, especially to prepare rice pudding, a popular cultural dish in Nepal. Native rice varieties such as Kariya Kamod and Lalka Basmati for aromatic values, and Bathi and Nakhi Saro for their adaptability, are also being conserved by the Kachorwa Community Seed Bank.

While using local seeds, community seed banks generally follow ecological farming practices and do not use external inputs, such as chemical fertilisers and pesticides, which may affect soil fertility. They generally also assign each of their members to cultivate at least one local variety so that on-farm conservation and use of the stored seeds is maintained. Also important is the way community seed banks have been working towards the conservation and use of neglected and underutilised crops such as buckwheat, sorghum and finger millet. They collect and store the seeds of such crops in their store room, and assign members to grow and return the seeds periodically so

[118] http://himalmag.com/seeding-the-future/#sthash.MsZWtRBS.dpuf (last accessed 2 January 2016).

that their dynamic evolution is promoted in the changing environment of the local area.

10.8.3 Create an accessible resource centre through repository, backup and development of local seeds and traditional knowledge

Community seed banks operate to serve as accessible agro-biodiversity resource centres, and a repository and backup system of local seeds and traditional knowledge. They create conducive local environments to safely handle, store, regenerate and multiply local seeds, along with optimum use of traditional knowledge in all stages of conservation and use.

Local farmers are not required to make any cash payments while accessing seeds, and can return the agreed amount of seeds to the banks after their harvest. Thus, this exchange system not only provides for easy access to local seeds by members and non-members of the local area, but also enables poor farmers of the community to benefit by accessing local seeds in times of planting needs. For example, in 2008, out of all the farmers accessing the seeds of 34 local crops from the community seed bank in Dalchoki, 25 percent were relatively very poor (LIBIRD, 2010). In 2011, 70 farmers, of whom 37 were female, deposited seeds in the same bank and 21 farmers, of whom 14 were female, accessed the seeds stored by the bank (Shrestha et al., 2012b).

In cases of gradual or rapid loss of seeds, or in times of crisis or any disaster, farmers of the seed banks use their seed system to promote farmer-to-farmer exchange and use of local seeds. As a dynamic resource centre, seed banks also generate opportunities for exchange of information and expertise on *in situ* conservation among and between farmers, breeders, researchers, government officials, non-government organisations, inter-governmental bodies, and donor agencies at local, national and international levels.

Importantly seed banks work to seek opportunities for participatory variety selection and participatory plant breeding. For example, the farmers of the Kachorwa Community Seed Bank, in collaboration with technical experts and breeders from community-based research organisations and the National Agriculture Research Council, are engaged in breeding local

varieties of rice for variety enhancement and increased productivity. According to a farmer of the bank:

> "By using the positive traits such as taste and adaptation to rain-fed conditions of a rice landrace called Dushisaro and an improved rice variety BG1442, we have already developed a new variety. We have given it a name of the village itself, Kachorwa-4. We are also conducting other participatory breeding programmes for the improvement of other native rice varieties such as Mansara and Lajhi" (Interview with CSBM#2).

10.8.4 Establish seed and food sovereignty at the local level

Working towards seed and food sovereignty at the local level is one of the major objectives and functions of community seed banks. Through conserving local seeds and traditional knowledge for use and exchange among farmers, they promote availability of, access to and utilization of local seeds and foods, which also meet their socio-economic, cultural and environmental needs. Those involved in community seed banks also see their local-level initiatives as being important to establishing seed and food sovereignty at the local level. These banks empower local farmers to be self-reliant and prime deciders of which seeds to conserve and use, and what to cultivate and eat.

Through community seed banks, farmers exercise the rights of access to seeds, and ownership and control over local seed and food production systems. An example of this is the initiative taken by the farmers of the Dalchoki Community Seed Bank to officially register and establish local ownership over two local varieties of broad-leafed mustard called Dunde Rayo and Gujmuje under the Seed Act of the government of Nepal. Another example is the registration of local varieties under community biodiversity registers by most of the community seed banks initiated by LIBIRD and USC Canada Nepal. The farmers of the community seed banks believe that such registration will not only establish their ownership over local genetic resources and traditional knowledge, but will also discourage biopiracy and misappropriation of traditional knowledge.

10.8.5 Empower farmers, including women farmers, dalits and indigenous people

The managers, members, users and beneficiaries of community seed banks include women farmers, as well as the poor, *dalits* and indigenous people. Collectively, they contribute to the administration, management and overall activities of the banks. For example, farmers, including women, from ethnic minorities such as Chamar, Dushad, Hajam, Muslim, Teli and Tatma, along with Yadav, Kalawar, and Koiri, are involved in the management and functioning of the Kachorwa Community Seed Bank in Bara. Similarly, in the Dalchoki Community Seed Bank in Lalitpur, more than 45 farmers from indigenous groups, including *dalits* and women, provided seeds to the bank, and around a dozen from the same groups obtained seeds for planting between 2011 and 2012.

Community seed banks have emerged as important sites of networking amongst farmers. Through these networks farmers function as a dynamic and empowered group for on-farm conservation and use of local plant genetic resources and traditional knowledge. The empowerment of farmers of all castes and groups, including poor ones, has helped local and indigenous communities to harness their potential to further contribute to ensuring an enabling environment for sustainable local seed and food systems. Other gains include increased adaptive capacity in agriculture, and protection of the environment. For enhanced learning, they also organise or engage in regular meetings, workshops and diversity fairs at the local level, and participate in workshops, seminars, exchange visits and training at local, national and international levels.

10.9 Shifting objectives: from informality to formality

Over the past few years, there has been a significant change in the objectives of community seed banks. Along with the involvement of additional external agencies, non-government organisations, and importantly, the Department of Agriculture, the prime objective of conservation and use of local seeds and traditional knowledge has changed or expanded to focus on improved, modern seeds, including hybrids. This is being done in the name of modernisation. As a result, either most of the old community seed banks have adapted to also produce and market improved,

modern seeds of the formal seed system, or new community seed banks have come into existence with one of the following two objectives:

- conserve and use local seeds, and also produce and market improved, modern seeds; or
- produce and market improved, modern seeds.

10.9.1 Conserve and use local seeds, and also produce and market improved, modern seeds

When the first community seed bank was established in Dalchoki in 1996, the objective was to conserve local seeds and traditional knowledge to prevent genetic erosion and loss of traditional knowledge, and reduce farmers' exposure to improved, modern seeds. However, over a period of time, most community seed banks have not only been conserving and exchanging local seeds, but have also started to promote the use of improved seeds and chemical fertilisers through sales within the village and outside. The same executives and members of community seed banks are actively engaged in creating and operating profit-motivated seed enterprises such as *Hariyali Samudayik* (Green Community) Seed Company Pvt. Ltd. in Sindhupalchowk, Sustainable Agriculture Saving and Credit Cooperative Ltd. in Bara and Dalchoki Organic Agriculture Cooperative Ltd. in Lalitpur.

The first community seed bank in Dalchoki has itself started to purchase the improved seeds during the planting time and selling the same after cleaning and packaging to local farmers of the area and other districts such as Rasuwa, Sindhuli and Humla. In 2011, more than a ton of seeds, which included an improved variety of maize, *Manakamana-3,* was purchased and later on sold by the bank.

Similarly, in 2011 alone, some 15 LIBIRD-supported community seed banks of different development regions transacted 42,924 kg of improved seeds (mainly rice and wheat) from 971 users/farmers, and 2,110 kg of local seeds (mainly vegetables) from 1,839 users/farmers (Shrestha et al., 2012b). Mobilisers and members of the banks view that the community seed banks have to cater to the demands by local farmers for improved, modern seeds and chemical fertilisers, and also need to make profits for the operationalisation of their ground-level activities.

10.9.2 Produce and market improved, modern seeds

In 2009, following the establishment of community seed banks supported by the Department of Agriculture and then Oxfam Nepal, a major focus has been the production and marketing of improved, modern seeds through locally-formed seed producers groups. For example, in 2011, three community seed banks of Dadeldhura, Okhaldhunga and Sindhupalchwok districts had produced 142 metric tons of improved seeds of paddy, wheat and maize, which were purchased by local and non-local farmers, agrovets, non-government organisations and District Agriculture Development Offices (Shrestha et al., 2012b).

In the same manner, since 2009, the 90 Oxfam Nepal-established community seed banks at the village and ward levels in Dadeldhura and Dailekh districts, have come to the fore in terms of formal seed production and dissemination. In collaboration with District Administration Offices of the government, Oxfam Nepal-supported community seed banks provide source seeds of improved varieties of paddy, maize, wheat, etc. to local seed-producing farmers for the production of foundation seeds. Such seed-producing farmers then sell seeds to farmers in the village, as well as to district-level seed cooperatives and development agencies operating in other districts.

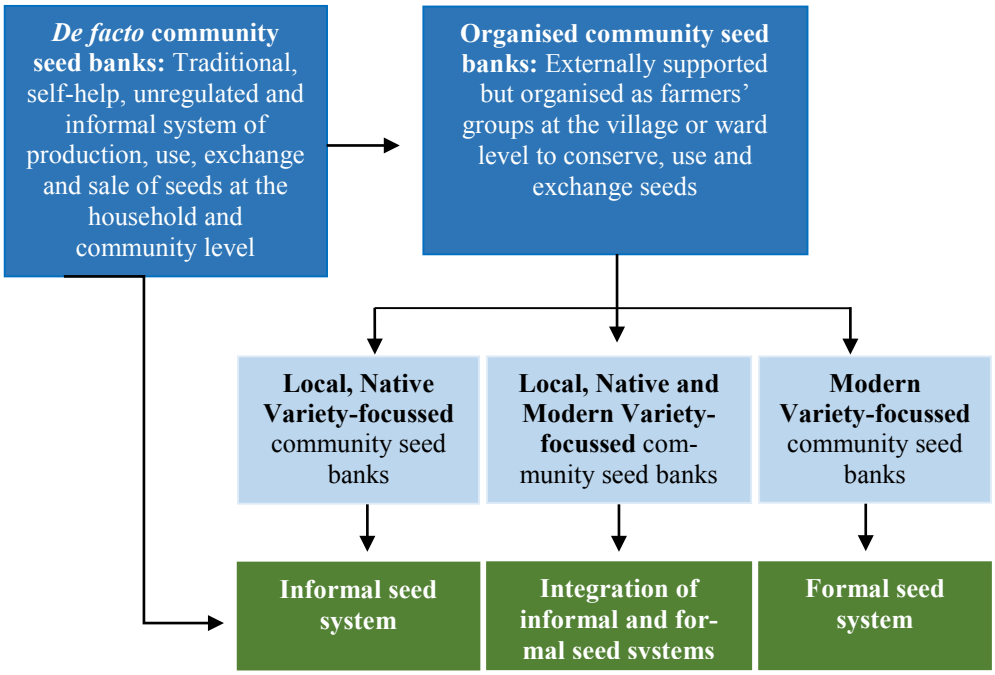
In line with the government's vision, Oxfam Nepal also considers this approach essential to improve farmers' access to quality seeds. Oxfam says, it does not neglect the significance of conserving local seeds and traditional knowledge, but addresses food security needs by increased production through the supply of improved, modern seeds.

10.10 Building a case of the typologies of community seed banks within informality and formality

Based on their objectives and functions, we can illustrate that a complex typology of community seed banks, interacting with both informal and formal seed systems, is emerging in Nepal. As we see in Figure 10.2, the local, traditional seed system, in the form of *de facto* community seed banks, remains a dominant sector of Nepal's seed system, operating through traditional, self-help, unregulated and informal system of selection,

production, use, exchange and sale of local, native seeds at the household and community level. When the local, traditional seed system started to suffer from farmers' increasing exposure to improved, modern seeds and fertilisers, or the formal seed system's outreach into farmers' fields through public and private seed entities, the idea of community seed banks was adopted from the various international experiences with such banks to establish an organised set of local, native variety-focussed community seed banks in a particular local area.

Figure 10.2: Emergence of a complex typology of community seed banks



Similar to the household- and community-level practices within the local, traditional seed system, this type of organised community seed bank manages the conservation, selection, production, use and exchange of seeds of local, native varieties. Such local, native seeds rarely qualify for release, registration, certification or formal sale and marketing under the seed law of the country, but are highly important for conservation of local genetic diversity, as well as having customary and socio-cultural value.

Some of these community seed banks have not continued to rely only on the conservation, use and exchange of local seeds. They have also started to expand their focus on the production and marketing of improved seeds of

the formal seed system through the mobilisation of local seed producers' groups, small local private seed companies, or saving and credit/agriculture cooperatives, for example in Kachorwa and Dalchoki.

Such organised community seed banks, with an integrated seed sector approach within informal and formal seed systems, can now be understood as local, native and modern variety-focussed community seed banks. These community seed banks, on the one hand, deal with the improved, formal seeds, and on the other hand, traditional, informal seeds, thereby integrating the formal and informal seed systems. Most of these improved seeds are generally sourced from released, registered or certified varieties, and some others from food security projects or programmes of non-government or government or donor organisations in local areas.

Since 2009, a new, organised set of community seed banks has also appeared in Nepal, their only focus being on the production and dissemination of the formal sector's improved seeds. These modern variety-focussed community seed banks do not give priority to saving and exchanging the seeds of local landraces. Instead the focus is on the production and local marketing of improved seeds, often in consultation and coordination with central- or district-level government units or locally-formed cooperatives.

Given these developments within the typology of community seed banks, there are some important issues to consider. First, local, native-variety focussed community seed banks are not necessarily completely disconnected from the formal seed system. In fact, some of today's open-pollinated varieties have come to their areas from the formal seed system. If such varieties adapt to local conditions and farmers prefer to use, reuse and exchange their seeds, community seed banks keep them within their portfolio for *in situ* conservation and regular use. In some cases, these seed banks also use formal varieties to cross with native varieties in their participatory plant breeding programmes.

These community seed banks, however, fear that the formal sector's high-yielding varieties are expensive, and at the same time, demand the use of chemical fertilisers and well-managed irrigation. Their fear is also from the

use of hybrids, which farmers cannot reproduce and conserve as open-pollinated seeds.

Second, local, native-variety focussed community seed banks do not consider modern-variety focussed ones as community seed banks. According to them, modern variety-focussed community seed banks are like any other local seed business operating as a formal agency to breed or multiply or market seeds in a formal seed system process. An example is the community-based seed production programmes being implemented in Nepal to produce and multiply improved seeds through seed producers groups. Local, native-variety focussed community seed banks criticise the government for developing an operational guideline that does not provide policy and financial support for their conservation efforts and only aims to create and expand modern variety-focussed community seed banks.

Third, the shift of local, native variety-focussed community seed banks to also produce and market improved seeds of the formal seed system reduces local farmers' ability and scope to conserve local, native varieties, particularly when the seeds from the formal system are hybrids or do not meet farmers' needs, or are not preferred locally due to factors such as taste, cost and socio-cultural aspects.

10.11 An analysis of the typologies of community seed banks and PGRFA knowledge commons

As we discussed in Chapter 8, Nepal's governance of PGRFA is likely to be affected largely by the international regulatory instruments governing the access, use and commercialisation of PGRFA such as the CBD, TRIPS and ITPGRFA. With the existing seed laws and draft bills on access, benefit sharing, plant variety protection and farmers' rights, Nepal is heading towards a regulatory path that departs from the state of PGRFA as a *positive inclusive commons* to a complicated scenario of multiple layers of other commons of both inclusive and exclusive nature.

De facto community seed banks, being closely integrated within the self-regulatory practices of the traditional seed system, support a vision of *positive inclusive commons*. These banks, operating within household and

community levels, openly save, exchange, reuse and sell seeds of local plant varieties without any discrimination as to race, class and geography or exclusive rights to use PGRFA. However, over time, with different objectives and a complex typology, organised community seed banks have become subject to different types of PGRFA knowledge commons.

For example, organised community seed banks that work *only* or *also* to conserve and use local, native seeds are emerging as local institutions to make local, native PGRFA a community-level *positive exclusive commons*. These community seed banks, by collecting and storing germplasms from individual farmers and households of local areas, document and register in community biodiversity registers, claiming rights over seeds and traditional knowledge. While the distribution and dissemination of physical, tangible seeds are carried out by these community seed banks for on-farm conservation and use of local seeds, community biodiversity registers enable them to register traditional knowledge, and also document landraces as local varieties, recognising the place of origin and diversity as well as the owners and rightholders of such varieties.

Specially, the community seed banks that *only* focus on local landraces and traditional knowledge have not only become the saviours of local PGRFA knowledge commons, but have also enabled local farmers to become the positive exclusive commoners of their local PGRFA. Such community seed banks, like the ones established in the Jumla district by SEDA and ActionAid, strongly believe in establishing seed and food sovereignty as a fundamental right of farmers, and are dedicated to prevent biopiracy and commercial use of the conserved and stored germplasms without their prior informed consent and benefit sharing.

Note that between 2012 and 2013, the LIBIRD-supported Kachorwa Community Seed Bank had raised concerns when a number of community seed banks were contacted by the national gene bank in order to encourage them to submit samples of their germplasms for *ex situ* conservation and characterisation. At that time, the Kachorwa Bank had asked for a formal letter and process as an assurance from the national gene bank that there would not be any misappropriation and commercialisation without the prior

informed consent of and benefit sharing with the owners and holders of local PGRFA, that is, the local farmers.

Another case in point in this regard is the initiative being taken by a coalition of more than 40 community seed banks in the country. In their national meeting held in July 2013, these 40 community seed banks not only decided to call for the development of rules and mechanisms, including a locally-agreed material transfer agreement, for the transfer of materials from one community seed bank to another community seed bank, but also from community seed banks to the national gene bank and other organisations. As community seed banks have empowered local farmers to become positive exclusive commoners of the varieties that are, for example, under *in situ* conditions and public domain, these issues and developments also have implications for the government's commitment and willingness to include Nepal's PGRFA in the multilateral system of the ITPGRFA.

However, there may be other property rights implications too, for example, in the case of those community seed banks that are involved in participatory or other plant breeding programmes. The Kachorwa Community Seed Bank has already improved and developed a native rice variety through participatory plant breeding (a few other varieties are in the pipeline). Along with the development of such varieties, the bank, together with other collaborators, has applied for registration of such varieties under the Seed Act, 1988. However, due to the silence of the existing seed law about ownership rights over the registered varieties, it is not clear what types of property rights would be given to the bank (together with other collaborators).

The same applies, as mentioned above, in the case of two local varieties of broad-leafed mustard called Dunde Rayo and Gujmuje. These have been registered for farmers of Dalchoki without any details as to the scope of ownership rights under the Seed Act. Thus, it is important to highlight that such variety development, breeding and registration initiatives of the community seed banks will surely have implications for the access, use and management of the PGRFA knowledge commons, including the rights of farmers. This will be especially true once Nepal implements the CBD-

compatible access and benefit sharing law and the TRIPS-compatible plant variety protection and farmers' rights law.

In the case of the organised community seed banks that work *only* to produce and market the improved, modern seeds of the formal seed system, it is very likely that they will become or remain at a greater risk of being the users and promoters of the seeds protected by plant breeders' rights. So far, these community seed banks are involved in the production and marketing of the seeds of open-pollinated improved varieties (and to some extent hybrids) and chemical fertilisers, just like a local seed trader or agrovet.

However, in the future, as Nepal implements plant breeders' rights, the modern variety-focussed community seed banks may also be inclined to emerge as local seed traders and users of the seeds of breeders' rights-protected plant varieties, including the chemical fertilisers required for the planting of such seeds. Note that in Chapter 7, we already discussed the strategic plan of USAID and Monsanto to sell and market hybrid seeds of maize under a pilot project proposed to be implemented together with the Ministry of Agriculture. It would not be a surprise if a similar project would be designed in the future to mobilise community seed banks in the interest of the seed industry.

10.12 Conclusion

The case of Nepal shows that community seed banks do not work in isolation but in a complex setting influenced or determined by different international, national and local dynamics of policy and practice. The international movement of seed savers' networks and community seed banks in the developed and developing world has a strong relevance, as well as influence on the origin, expansion and functions of community seed banks in Nepal.

Specifically, the mission of the seed savers' networks to promote the use and exchange of heirloom and open-pollinated varieties in opposition to the trend of the growing industrialisation of the seed sector is similar to the opposition being mounted by local, native variety-focussed community seed banks in Nepal. The same is also the approach taken by many community

seed banks around the developing world. The seed banks' objective of establishing seed and food sovereignty by empowering farmers to obtain ownership and control over local seed and food systems in the developing world, including South Asia, is also visible in the case of some community seed banks in Nepal.

However, similar to the case of a few community seed banks of the developing world, not all community seed banks in Nepal are directed towards conservation of local and native varieties. In fact, over time, as the typology in this chapter shows, different types of community seed banks have come into play with diverse objectives, functions and impacts. While some community seed banks are still conserving local varieties, some others have taken on or specialise exclusively in the production and marketing of improved seeds, just like a local seed trading enterprise. It also means that some community seed banks in Nepal are working as a field-level gene/seed bank, as well as a community-level seed production and marketing entity.

There are benefits and costs attached to this variety of seed banks and their actions for both the informal and formal seed systems. It is important to understand that the more community seed banks gradually shift towards or concentrate on the formal seed system, the greater the possibility of creating dependency of local farmers on formal seeds. This may then reduce farmers' ability to conserve agricultural biodiversity, sustain climate-resilient agriculture and promote organic food through the use and exchange of local seeds.

In the case of PGRFA knowledge commons too, the ability of a community seed bank to protect the rights of local, indigenous and farming communities from the threats of industrialised agriculture and intellectual property depends on its objectives and functions. With varied objectives and a complex typology of community seed banks, the management of PGRFA knowledge commons becomes much more contested. The danger of the contest is that seed banks that support the informal sector will become the long-term losers. While native variety-focussed community seed banks have emerged as positive exclusive commoners, establishing local registries, rules and norms for ownership, access, use and exchange of PGRFA, the

modern variety-focussed community seed banks are at a greater risk of being used by the seed industry to promote their modern seeds and inputs, including hybrids and chemical fertilisers.

Given these issues, as Nepal is moving ahead to implement its commitments under the CBD, ITPGRFA and TRIPS, it is important that related national laws, along with the Operational Guideline to support the seed banks by the government, are discussed and reviewed bringing them into a governance framework that recognises the importance of informality and allows it to flourish. This will help the government as well as non-government organisations to assess their objectives, functions and impacts, and will also enable the local farmers and their groups to prepare a roadmap for community seed banks that address their local needs and preferences.

Chapter 11

Conclusion

This thesis has examined the global, national and local trends and dynamics of seed regulations which scholars often discuss in the context of formality and informality of the seed system, commons and property notions of PGRFA and community seed banks. The thesis makes an important contribution to these three streams of scholarly writing by offering insights into how Nepal's seed regulation is being shaped and what has been the role of networks, local communities and informality.

11.1 Key results and findings

Nepal's current seed regulation has been largely influenced by global trends and fails to address local needs. The thesis shows that Nepal has been greatly influenced by global trends in its attempt to promote the formality of the seed system through a state-led seed regulation. Following the global trends described by the thesis, right from the 1960s, successive governments of all the political regimes in Nepal have endorsed and worked on a mission to initially establish and then strengthen the public sector-led formal seed system. As a result, the country's seed sector development strategy, inspired by the Green Revolution of the 1960s, always focussed on acquiring high-yielding plant varieties from CGIAR centres and other countries. Since the mid-1980s and the 1990s, the seed regulation, under the influence of the neo-liberal development paradigm and support for seed sector development from external agencies, has been focussing on the involvement of the private sector for the import of new, improved varieties like hybrids.

The thesis shows that in all of these processes, Nepal has pursued a linear regulatory model to promote the formality of the seed system, largely failing to understand, protect and promote local, customary norms and dynamics of use and exchange of native and local plant varieties. This may have further implications for the maintenance and use of local plant genetic diversity and for farmers' traditional rights to use and exchange seeds within the local seed system.

There is a greater role of traditionality, customary norms and farmer-to-farmer seed exchange networks, but the situation may change. While the state-led regulatory developments might lead one to think that Nepal's seed sector should be largely dominated by the formal seed system, the thesis reveals that so far, there is a different situation on the ground. Irrespective of the pressure from the formal seed system, the traditionality of agriculture and local, customary dynamics of seed use and exchange continue to remain the key features of farmers' seed system in Nepal.

A majority of farmers are poor, live in rural areas, hold less than 0.5 hectares of land and depend on subsistence farming for livelihoods. Most of these farmers do not rely on formal seed markets to access and use seeds, but continue to depend on farm-saved seeds and farmer-to-farmer exchange networks for seed and food security at the local level. These practices create an environment of trust, reciprocity and communication within farming households and communities. This is also reflected in the fact that farmers in Nepal do not possess any exclusive rights over seeds, and for generations, have worshipped and shared seeds of both formal and informal seed systems as a common cultural heritage. There are, however, continuous pressures for farmers to gradually rely more on formal seed markets and most of them may also do so as the interaction between formality and informality is likely to change due to the emerging regulatory dynamics.

The emerging regulatory dynamics may affect the interaction between formality and informality. Because of the notion that seeds are commonly shared resources, there exists a close interaction between the formality and informality of the seed system in Nepal. Farmers not only provide germplasms to formal seed actors for breeding and development of landraces, but they also use and exchange formal seeds if they find them adaptive to the local environment and appropriate to meet their needs and preferences in local contexts. In recent years, programmes like participatory variety selection and breeding programmes too have strengthened the interaction between formal and informal seed systems. However, the thesis suggests that the interaction between the formal and informal seed systems may change due to the following two regulatory developments.

First, the fact that the government continues to encourage the private sector to import and register improved seeds (including hybrid) of both cereal and vegetable crops under the Seed Act may significantly affect the local, customary dynamics of the use and exchange of native and local seeds. If more and more farmers come to rely on formal seed markets for varieties like hybrids that do not breed true (uniformly) in the next season, their ability to reuse and exchange farm-saved seeds will become restricted, thereby also impacting on farmer-to-farmer seed exchange networks.

Second, as the government is preparing for the introduction of national regulations to implement its global obligations concerning the management of PGRFA, new conditions for the management of the seed system may complicate farmers' practices of seed use and exchange at the local level. As the thesis argues, such new conditions have important linkages with what scholars discuss as the first and second enclosure movements.

There are implications of the first and second enclosure movements for the regulation of PGRFA. Nepal has never remained free of the effects of the first and second enclosure movements that many countries have witnessed in the course of the implementation of their seed regulations. The first enclosure movement in Nepal saw enclosures of physical, tangible resources such as lands and forests, where plant genetic diversity lies as physical resources for access and use by farmers and other actors.

The second enclosure movement, which scholars discuss as having placed intellectual property boundaries around the use and exchange of intangible resources, has led Nepal to initiate a number of legislative initiatives to design its seed regulation for establishing the rights of state, private and community actors over PGRFA. As PGRFA possess tangible as well as intangible property, these enclosure movements have implications for the governance of the seed system, including the local seed system. The thesis argues that the more Nepal moves towards a stricter property rights regime, the greater is the possibility of further restrictions on farmers' ability to continue to promote local, customary norms of the use and exchange of PGRFA within farmer-to-farmer seed networks.

There is no way out than to govern the use and management of PGRFA under different visions of commons and property. Provisions of intellectual property in the TRIPS Agreement and the UPOV Convention, and state sovereignty and the rights of local, indigenous and farming communities in the CBD and the ITPGRFA have led to complicated regimes of property rights to regulate PGRFA. Being a WTO member and a contracting party to the CBD and the ITPGFRA, Nepal is not in a position to remain away from the implementation of different notions of property and commons in this era of globalisation. However, the thesis shows that it would not be easy for Nepal to regulate the use of PGRFA as these resources, unlike physical resources discussed by commons scholars, are complex to govern because they lie somewhere between a tangible and an intangible resource.

Drawing on a typology of intellectual commons of Drahos (1996, 2006), this thesis has developed an analytical framework of four types of PGRFA knowledge commons: *positive inclusive, positive exclusive, negative inclusive* and *negative exclusive*. The thesis used this framework to explain how the international agreements are underpinned by different visions of commons and property to regulate the use and exchange of PGRFA. As we have seen, the global regulations have tended to move away from open access-based *positive inclusive commons* to the different categories of property rights-based restrictive commons of exclusive and negative nature.

In the case of Nepal, irrespective of geography, race and culture, an important finding is that farmers use and share seeds as a common heritage – that is, as a *positive inclusive commons.* Such practices are not only visible among farmers themselves, but they also openly share seeds with visitors, including people from government, non-government and international organisations. However, the elements of *positive inclusive commons* found within local, customary practices may change as Nepal begins a process of national implementation to fulfil its obligations under the CBD, TRIPS and ITPGRFA. As the provisions of the CBD-compatible Genetic Resources Bill of 2002 suggest, regulatory principles for access, prior informed consent and benefit sharing signal a departure from the exchange and use of plant genetic resources as a *positive inclusive commons*. This vision of the

commons looks to be replaced by different layers of commons, that is, state-level and community-level *positive exclusive commons.*

The regulation of PGRFA in Nepal is likely to be also influenced by the legislative initiatives undertaken for the protection of plant varieties. What is interesting to observe is that unlike the UPOV Convention, the TRIPS-compatible Plant Variety Protection and Farmers' Rights Bill of 2005 has created options of property rights for both breeders and farmers. While breeders' rights have been provided over new plant varieties, farmers' rights too have been recognised over such varieties. It is an important empirical point that the idea of a negative commons has been used in Nepal to advance the interests of local farmers, for example, by allowing them to use, reuse and exchange seeds of the breeders' rights-protected plant varieties.

The thesis argues that Nepal needs to understand and assess the implications of different visions of commons when it designs and implements its regulatory framework for the use and exchange of PGRFA. The same argument also applies when it comes to the implementation of Nepal's obligation to include certain PGRFA in the multilateral system of the ITPGRFA. The fundamental concern of Nepal should always be to seek options to provide support to the traditionality of the seed system, and not erode any possibility for farmers to promote seed use and exchange. This is what a number of community seed banks in Nepal are also doing at the local level, but with different typologies and impacts.

A complex typology of community seed banks has been emerging with diverse objectives, functions and impacts in relation to the notions of formality, informality, commons and property. As we have seen, the objective of creating community seed banks to establish seed and food sovereignty by empowering farmers to obtain ownership and control over local seed and food systems in the developing world is also visible in the case of a number of community seed banks in Nepal. However, similar to the case of a few community seed banks of the developing world, not all community seed banks in Nepal are working towards conservation of local varieties. In fact, over time, a complex typology of community seed banks has come into play with diverse objectives, functions and impacts.

Initially, the idea of creating organised community seed banks was cultivated in the 1990s to promote the use and exchange of local varieties. Over time, the very objective of protecting local varieties has, however, been changing due to their interaction with either informal, or formal, or both seed systems. The thesis argues that the more community seed banks gradually shift towards or concentrate on the formal seed system, the greater is the possibility of the loss of local genetic diversity and associated customary rights of local farmers.

With varied objectives and a complex typology of community seed banks, there are implications for the management of PGRFA knowledge commons too. For example, local and native variety-focussed community seed banks have emerged as positive exclusive commoners, enabling these banks to self-identify and exercise rights over local varieties by establishing local registries as well as rules and norms for ownership, access, use and exchange. These initiatives may help local farmers to exercise their traditional rights over seeds and traditional knowledge. However, if the formality of the seed system intensifies and incorporates intellectual property rules into its operations, there is a risk that modern variety-focussed community seed banks would be extensively used by the seed industry and other formal actors to promote modern seeds and chemical fertilisers, rather than to strengthen the farmers' seed system.

As Nepal is moving ahead to implement its commitments under the CBD, ITPGRFA and TRIPS, it is important that the existing seed regulation as well as the draft bills are discussed and reviewed in the light of the emerging regulatory trends and dynamics of formality, informality, commons, property and community seed banks. In this process, an important task would be to look for a model of a seed regulation that seeks to promote the use and exchange of local varieties and protect farmers' customary practices and rights over seeds and traditional knowledge.

11.2 Towards a networked model of seed regulation

As we discussed, a deliberately constructed linear model of seed sector development has failed to recognise that customary practices of seed use and exchange represent a historic example of self-regulation that Nepali

farmers have developed and continue to practice with their own values and rules. In this era of the globalisation of seed and intellectual property regulation, the way Nepal's seed regulation is being shaped, it is clear that a number of actors and networks underpin and/or affect the governance of the seed system, including PGRFA and community seed banks.

There is network confrontation among the strategic actors of different sectors, nationally and internationally, in regard to the regulatory domains (sites) dealing with formality, informality, property and commons. Government and private actors have been working together to the support the formality of the seed system, whereas non-government organisations and networks of local, farming and indigenous communities are working towards the protection and promotion of the informality of the seed system, including the creation of organised community seed banks.

As international actors, there are CGIAR centres and external agencies such as USAID, GTZ, FAO and many others which have played a key role in the evolution and expansion of the formal seed system. Multinational seed companies such as Monsanto are also engaged in the governance of the seed system in Nepal, seeking, for example, entry into the Nepali seed market.

In the case of the emerging regulation of PGRFA that Nepal is considering in view of global agreements too, networked activities among various actors are visible. A number of civil society actors are engaged in policy discourse to design and draft the national laws so that Nepal can fulfil its commitments under the TRIPS Agreement and capitalise on the provisions of the CBD and ITPGRFA. An important finding of the thesis is that if civil society actors and local people want to resist the logic of enclosure, they will have to use networked monitoring and resistance. As an example of meta-regulation, non-governmental organisations have been active in monitoring and influencing regulatory behaviours and steering the flow of regulatory events in relation to the protection of customary norms of seed use and exchange.

For example, civil society actors, including media, played a key role as watchdogs by launching a nationwide campaign during accession negotiations for WTO membership in 2003. Nepal had witnessed an attempt

of regulatory capture when it came under pressure to join the UPOV Convention during accession negotiations. Ultimately, the No to UPOV campaign helped the government to negotiate a *sui generis* national law that provides flexibilities to protect farmers' customary rights to save, use and exchange seeds within the local seed system.

The case of Nepal, however, shows that the outcomes of multilateral negotiations do not alone provide a conducive regulatory environment to capitalise on the flexibility and policy space provided in the WTO agreements. A classic example is the No to Monsanto campaign which was initiated by civil society organisations in 2011. This campaign exposes that countries do not only face WTO processes when it comes to preserving policy space. External actors – in this case USAID – also play a key role. For example, USAID made systematic attempts to introduce Monsanto's hybrid seeds into Nepal using a pilot project to be implemented by the Ministry of Agriculture, in addition to recommending to the government to strengthen breeders' rights in the seed law. Under the pretext of investment and technology transfer, seed associations and companies from Europe and the US also networked with the domestic private sector to argue for a strong plant variety protection law, undermining the role of informality and farmers' self-regulatory practices of seed use and exchange.

The importance of civil society organisations, as in the case of No to UPOV and No to Monsanto campaigns, lies in their capacity to act as watchdogs and gatekeepers, thereby helping to ensure that the government has support when it needs it or does not secretly do deals that affect the interests of poor and disempowered people within the country. The role of civil society organisations in protecting farmers' rights is also reflected in Nepal's preparation to implement the ITPGRFA. Such initiatives also show how networked governance has helped the strategic actors of the civil society sector to enrol and establish partnership with the government actors to design and draft seed laws and policies. The revision of the country's National Agriculture Biodiversity Policy, which now includes provisions on farmers' rights, was made possible after state and civil society actors collaborated to work together through an expert committee of the Ministry of Agriculture.

The role of third-party gatekeepers has also been instrumental in setting up and mobilising organised community seed banks across different parts of the country. These seed banks have emerged more as an institutional effort to strengthen the self-regulatory practices of seed use and exchange at the local level. However, there is a need to assess the growth and functioning of such organised community seed banks in Nepal. Due to the networked activities of the non-government organisations and the government, a complex typology of community seed banks, as we discussed earlier, is emerging interacting with both formal and informal seed systems.

Particularly, the government and non-government organisations like Oxfam need to reconsider whether their models of community seed banks, which promote the use of formal varieties for increased production, dilute the original objectives of creating such networks – that is, promoting the use and exchange of native and local varieties. If community seed banks start to merge with the networks of the formal seed system without focussing on the conservation, use and exchange of native and local varieties, there may be implications for local genetic diversity, as well as the local, customary dynamics of seed use and exchange within farmers' seed system. Such implications could be further complicated by how Nepal's regulation of PGRFA would move away from seeing these resources as open-access based *positive inclusive commons* to restrictive types of exclusive commons.

Given all these dynamics of networked activities and the failure of the existing seed laws to address local needs, it is desirable that Nepal's seed regulation draws upon a model of networked governance to address the interests of the state, the private sector, and importantly, local, indigenous and farming communities and civil society actors. The concept of networked governance, in particular, reveals the important role of third parties in protecting the interests of indigenous and farming communities. It shows how they can have a voice in regulatory outcomes, even in outcomes of the agenda that has come from global organisations like the WTO.

11.3 Significance of the research

An important theoretical contribution of this thesis is to build an argument that the categorisation of formal and informal seed systems is not

appropriate, at least when it comes to the question of the notion of informality and its implications. Note that the local, customary dynamics of seed use and exchange have already been *formally* recognised in international treaties like the ITPGRFA and the CBD. Why and to what extent then are local, customary dynamics of seed use and exchange informal?

Moreover, the notion of informality of the seed system is an issue to be reconsidered also because such a categorisation generally provides a kind of negative connotation in that recognition of the socio-cultural, economic and environmental values and self-regulatory norms of the local seed system remains neglected in seed laws. Importantly, such a notion not only leads the state-led regulation to undermine the trust, reciprocity and communication dynamics of the local seed system, but also to restrict the rights of local communities over PGRFA and traditional knowledge, for example, by disallowing farmers to use, save, exchange and sell farm-saved seeds.

Another important theoretical contribution of the thesis comes from its analysis of commons and property notions that scholars discuss in regard to enclosure movements. With a detailed analysis of their concepts and how the commons discourse developed in support of collective action and local community, the thesis highlights the limitations of the knowledge commons framework to explain PGRFA as a *new* commons. The thesis shows that the classic goods quadrant of public, private, club and common goods – often used in commons discourse – does not capture the essence of the commons notions of PGRFA. Unlike physical resources of the traditional commons discourse, it is not their overuse that is a problem since this leads to conservation and developmental benefits, but rather their underuse.

In this respect, in order to deal with the complexity of the commons notions applicable for the study of PGRFA, this thesis, as mentioned earlier, develops an analytical framework of the typology of PGRFA knowledge commons. This framework builds on a conceptual scheme of intellectual commons designed by Drahos (2006) and an analysis of Roa-Rodríguez and Van Dooren (2008). The framework used in this thesis, in particular, helps

to analyse how property rights dynamics at global, national and local levels restrict access to PGRFA with implications for their further use and exchange.

The thesis also makes an important contribution to the study of community seed banks, which is mostly limited to the discussion of their significance for the conservation and use of local genetic diversity and linkages with the informal seed system. The thesis builds a case of a typology of community seed banks categorised as *de facto* community seed banks and organised community seed banks. In this typology, while *de facto* community seed banks represent the self-regulatory norms of seed use and exchange within the farmers' seed system, organised ones have been further classified as native variety-focussed, native and modern variety-focussed, and modern variety-focussed community seed banks. The typology that has come out of this research provides a basis to analyse the implications of *de facto* and organised community seed banks based on their objectives, functions, and importantly, the varieties they use and exchange under formal and informal conditions.

Last but not least, it is important to highlight that most of the debates around the issues analysed in this thesis take place within the discourse on formality and informality of the seed system; or commons and property notions; or the significance of community seed banks. This thesis may be the first comprehensive attempt to study the implications of these three important regulatory trends and dynamics as these collectively impact local, customary dynamics of seed use and exchange and the rights of local, indigenous and farming communities in Nepal. This thesis thus provides a detailed national experience of Nepal on these trends and their implications.

In this regard, probably, a better conclusion of this thesis would be to highlight that the idea of conducting this research, as mentioned in the methodology chapter, was triggered by my participation in the Fourth Session of the Governing Body of the ITPGRFA in 2011. A resolution adopted by this Session on farmers' rights had requested all contracting parties to share their experiences on how national measures affect farmers' rights to seeds and traditional knowledge. So far, as many other contracting

parties, Nepal has not been able to prepare any account of such national experiences. This thesis may contribute towards the implementation of this Resolution agreed to by all the contracting parties of the Treaty, at least from the viewpoint of how seed regulations that affect local, customary dynamics, farmers' rights and the PGRFA knowledge commons are being shaped in Nepal.

References

Acharya, K.P. (2002). Twenty-four years of community forestry in Nepal. *International Forestry Review, 4*(2), 149-156.

Adhikari, C. B., & Bjorndal, T. (2014). Economic relationship between access to land and rural poverty in Nepal. *Applied Economics, 21*(1), 20-41.

Adhikari, J. (2006). *Land reform in Nepal: Problems and prospects*. Kathmandu: ActionAid Nepal.

Adhikari, J. (2011). Contentions and prospects of land reform in Nepal: A historical review. *New Angle: Nepal Journal of Social Science and Public Policy, 1*(1), 17-31.

Adhikari, J. (2014). Seed sovereignty: Analysing the debate on hybrid seeds and GMOs and bringing about sustainability in agricultural development. *Journal of Forest and Livelihood, 12*(1), 33-46.

Adhikari, K. (2009a). Farmers' rights: Global contexts, negotiations and strategies. *Policy Brief*. Kathmandu: South Asia Watch on Trade, Economics and Environment.

Adhikari, K. (2009b). Seeding disaster. *Himal Southasian*. Retrieved from http://old.himalmag.com/component/authors/articles/Kamalesh-Adhikari.html.

Adhikari, K. (2010). Seed banking in South Asia for protection of farmers' rights. *Policy Brief*. Kathmandu: South Asia Watch on Trade, Economics and Environment.

Adhikari, K. (2013). Tentacled tactics. *The Kathmandu Post*. Retrieved from http://kathmandupost.ekantipur.com/printedition/news/2014-01-21/tentacled-tactics-258416.html.

Adhikari, R. (2005). Emerging issues relating to conflicts between TRIPS and biodiversity: Development implications for South Asia. *South Asian Yearbook of Trade and Development*. New Delhi: Centre for Trade and Development.

Adhikari, R., & Adhikari, K. (Eds.) (2003). *Farmers' rights to livelihood in the Hindu-Kush Himalayas*. Kathmandu: South Asia Watch on Trade, Economics and Environment.

Adhikari, R., & Adhikari, K. (2004). UPOV: Faulty agreement and coercive practices. In R. Adhikari & K. Adhikari (Eds.), *Evolving sui generis options for the Hindu-Kush Himalayas*. Kathmandu: South Asia Watch on Trade, Economics and Environment.

Adhikari, R., Belbase, N., & Ghale, Y. (2000). *Seed of monopoly: Impact of TRIPs Agreement on Nepal*. Kathmandu: Forum for Protection of Public Interest.

Adhikari, R., & Dahal, N. (2004). LDCs accession to the WTO: Learning from the cases of Nepal, Cambodia and Vanuatu. Retrieved from www.un-ngls.org/orf/SAWTEE.doc

Agrawal, A., Chhatre, A., & Hardin, R. (2008). Changing governance of the world's forests. *Science, 320*(5882), 1460-1462.

Agrawal, A., & Ostrom, E. (2001). Collective action, property rights, and decentralization in resource use in India and Nepal. *Politics & Society, 29*(4), 485-514.

Allard, R. W. (1999). *Principles of plant breeding*: New York: John Wiley & Sons, Inc.

Almekinders, C. (2000). The importance of informal seed sector and its relation with the legislative framework. Paper presented at GTZ-Eschborn, 4-5 July.

Almekinders, C. (2001). Increasing the resilience of the farmers' seed system through linkage with the formal sector. In L. Sperling (Ed.), *Targeted seed aid and seed-system interventions: Strengthening small-farmer seed systems in east and central Afrcia.*Proceedings of a workshop held in Kampala, Uganda, 21-24 June.

Almekinders, C., Louwaars, N., & De Bruijn, G. (1994). Local seed systems and their importance for an improved seed supply in developing countries. *Euphytica, 78*(3), 207-216.

Andersen, R. (2005). *The history of farmers' rights: A guide to central documents and literature*. FNI Report. Oslo: Fridtjof Nansen Institute.

Andersen, R. (2006). Realising farmers' rights under the International Treaty on Plant Genetic Resources for Food and Agriculture, summary of findings from the Farmers' Rights Project (Phase 1). FNI Report. Oslo: Fridtjof Nansen Institute.

Andersen, R. (2008). *Governing agrobiodiversity: Plant genetics and developing countries.* Hampshire: Ashgate Publishing Limited.

Andersen, R. (2007). *Governing agrobiodiversity: International regimes, plant genetics and developing countries.* Oslo: Department of Political Science, Faculty of Social Sciences, University of Oslo.

Andersen, R., & Winge, T. (2013). *Realising farmers' rights to crop genetic resources: Success stories and best practices.* New York: Routledge.

Andersen, R., Winge, T., & Torheim, B. B. (2011). Report of the global consultations on farmers' rights. FNI Report. Oslo: Fridtjof Nansen Institute.

Antons, C., & Hilty, R. M. (2015). Introduction: IP and the Asia-Pacific 'Spaghetti Bowl'of free trade agreements. In C. Antons & R.M. Hilty (Eds.), *Intellectual property and free trade agreements in the Asia-Pacific region.* Berlin: Springer.

Aoki, K. (1998). Neocolonialism, anticommons property, and biopiracy in the (not-so-brave) new world order of international intellectual property protection. *Indiana Journal of Global Legal Studies*, *6*(1), 11-58.

Aoki, K., & Luvai, K. (2007). Reclaiming common heritage treatment in the international plant genetic resources regime complex. *Michigan State Law Review*, *2007*(1), 35.

Aw-Hassan, A., Mazid, A., & Salahieh, H. (2008). The role of informal farmer-to-farmer seed distribution in diffusion of new barley varieties in Syria. *Experimental Agriculture, 44*(03), 413-431.

Ayres, I., & Braithwaite, J. (1991). Tripartism: Regulatory capture and empowerment. *Law & Social Inquiry, 16*(3), 435-496.

Bajracharya, D. (1983). Deforestation in the food/fuel context: Historical and political perspectives from Nepal. *Mountain Research and Development*, *3*(3), 227-240.

Bala Ravi, S. (2004). *Manual on Farmers' Rights*. Chennai: MS Swaminathan Research Foundation.

Banerjee, S. B. (2003). Who sustains whose development? Sustainable development and the reinvention of nature. *Organization Studies, 24*(1), 143-180.

Bangasser, P. E. (2000). *The ILO and the informal sector: An institutional history.* Geneva: International Labour Organization.

Baniya, B. K., Tiwari, R. K., Chaudhary, P., Shrestha, S. K., & Tiwari, P. R. (2005). Planting materials seed systems of finger millet, rice and taro in Jumla, Kaski and Bara Districts of Nepal. *Nepal Agriculture Research Journal, 6*, 39-48.

Bellinger, G., Castro, D., & Mills, A. (2004). Data, information, knowledge, and wisdom. Retrieved from http://geoffreyanderson.net/capstone/export/37/trunk/research/ackoffDiscussion.pdf

Bezabih, M. (2008). Agrobiodiversity conservation under an imperfect seed system: The role of community seed banking schemes. *Agricultural Economics, 38*(1), 77-87.

Bhandari, R., & Linghorn, A. (2012). The four pillars of successful land reform: Can revolutionary Nepal stand up? *Himalayan Journal of Development and Democracy, 6*(2), 1-20

Bhatt, M. (2013). *Presentation on the multilateral system of the ITPGRFA: Nepal's agenda*. Paper presented at the workshop on Nepal's preparation for the Fifth Session of the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), Kathmandu.

Björkman, B., & Hansson, S. O. (2006). Bodily rights and property rights. *Journal of medical ethics, 32*(4), 209-214.

Blakeney, M. (1996). *Trade related aspects of intellectual property rights: A concise guide to the TRIPs Agreement.* London: Sweet & Maxwell.

Boeke, J. H. (1943). *Economies and economic policy in dual societies*. Tjeenk Willink: Haarlem.

Boeke, J. H. (1953). *Economics and economic policy of dual societies as exemplified by Indonesia*: New York: AMS Press.

Borowiak, C. (2004). Farmers' rights: Intellectual property regimes and the struggle over seeds. *Politics & Society, 32*(4), 511-543.

Bourdieu, P. (1998). *Praktische Vernunft: Zur Theorie des Handelns*: Suhrkamp.

Boyle, J. (2003). The second enclosure movement and the construction of the public domain. *Law and contemporary problems*, 66(1/2), 33-74.

Brahmi, P., Saxena, S., & Dhillon, B. (2004). The Protection of Plant Varieties and Farmers' Rights Act of India. *Current Science-Bangalore, 86*(3), 392-398.

Braithwaite, J. (2008). *Regulatory capitalism: How it works, ideas for making it work better.* Northampton, MA: Edward Elgar Publishing.

Braithwaite, J., Coglianese, C., & Levi-Faur, D. (2007). Can regulation and governance make a difference? *Regulation & Governance, 1*(1), 1-7.

Braithwaite, J., & Drahos, P. (2000). *Global Business Regulation*. Cambridge: Cambridge University Press.

Bromley, D. W. (1989). Property relations and economic development: The other land reform. *World development, 17*(6), 867-877.

Brown, G., & Swierzbinski, J. (1988). Optimal genetic resources in the context of asymmetric public goods. In V.K. Smith (Ed.), *Environmental resources and applied welfare economics: Essays in honour of John V. Krutilla.* Washington, DC: Resources for the Future.

Brush, S. B. (2013). Agrobiodiversity and the law: Regulating genetic resources, food security and cultural diversity. *The Journal of Peasant Studies, 40*(2), 447-449.

Burris, S., Drahos, P., & Shearing, C. (2005). Nodal governance. *Australian Journal of Legal Philosophy, 30*(2005), 30-58.

Castells, M. (2000). Materials for an exploratory theory of the network society. *The British journal of sociology, 51*(1), 5-24.

CBS. (1972). *National sample census of agriculture 1971/1972*. Kathmandu: Central Bureau of Statistics, Government of Nepal.

CBS. (1985). *National sample census of agriculture 1981/1982*. Kathmandu: Central Bureau of Statistics, Government of Nepal.

CBS. (1993). *National sample census of agriculture 1991/1992*. Kathmandu: Central Bureau of Statistics, Government of Nepal.

CBS. (1996). *Nepal living standards survey 1995/96*. Kathmandu: Central Bureau of Statistics, Government of Nepal.

CBS. (2003). *National sample census of agriculture 2001/2002*. Kathmandu: Central Bureau of Statistics, Government of Nepal.

CBS. (2004). *Nepal living standards survey 2003/2004*. Kathmandu: Central Bureau of Statistics, Government of Nepal.

CBS. (2011). *Nepal living standards survey 2010/2011*. Kathmandu: Central Bureau of Statistics, Government of Nepal.

CBS. (2013). *National sample census of agriculture 2011/2012*. Kathmandu: Central Bureau of Statistics, Government of Nepal.

CGRFA. (2008). *Country report on the state of plant genetic resources for food and agriculture: Nepal*. Retrieved from http://www.fao.org/docrep/013/i1500e/Nepal.pdf

Chen, M. A. (2005). *Rethinking the informal economy: Linkages with the formal economy and the formal regulatory environment.* Working Paper, United Nations University, World Institute for Development Economics Research.

Chhetri, N., Chaudhary, P., Tiwari, P. R., & Yadaw, R. B. (2012). Institutional and technological innovation: Understanding agricultural adaptation to climate change in Nepal. *Applied Geography, 33*, 142-150.

Ciriacy-Wantrup, S. V., & Bishop, R. C. (1975). Common property as a concept in natural resources policy. *Natural Resources Journal, 15*, 713.

Cleveland, D. A., Daniela, S., & Smith, S. E. (2000). A biological framework for understanding farmers' plant breeding. *Economic Botany, 54*(3), 377-394.

Coglianese, C., & Mendelson, E. (2010). Meta-regulation and self-regulation. Public Law Research Paper No. 12-11, University of Pennsylvania Law School.

Cohen, J. I., Williams, J. T., Plucknett, D. L., & Shands, H. (1991). Ex situ conservation of plant genetic resources: Global development and environmental concerns. *Science(Washington), 253*(5022), 866-872.

Cooper, J., Lipper, L., & Zilberman, D. (2006). *Agricultural biodiversity and biotechnology in economic development* (1st ed.). Dordrecht: Springer-Verlag New York Inc.

Cooper, M. (2006). Access to the knowledge commons in the digital age. *Consumer Policy Review, 16*(3), 105.

Cooter, R., & Ulen, T. (1988). Law & economics. Boston: Pearson/Addison-Wesley.

Cornes, R. (1996). *The theory of externalities, public goods, and club goods (2nd ed.).* Cambridge: Cambridge University Press.

Correa, C. M. (1995). Sovereign and property rights over plant genetic resources. *Agriculture and Human Values, 12*(4), 58-79.

Correa, C. M. (2000). *Intellectual property rights, the WTO and developing countries: The TRIPS agreement and policy options.* London: Zed books.

Correa, C. M. (2002). *Implications of the Doha Declaration on the TRIPS agreement and public health.* Geneva: World Health Organization.

Correa, C. M. (2013a). *ITPGRFA: Options to promote the wider application of Article 6.11 of the SMTA and to enhance benefit-sharing. Legal opinion*. Retrieved from www.evb.ch/cm_data/ITPGRFA_Legal_opinion_Final_130731.pdf

Correa, C. M. (2013b). Plant genetic resources under the management and control of the contracting parties and in the public domain. In M. Halewood, I. L. Noriega, & S. Louafi (Eds.), *Crop genetic resources as a global commons: Challenges in international law and governance* (pp. 177). New York: Routledge.

Correa, C. M. (2014). Multilateral agreements and policy opportunities. In M. Cimoli, G. Dosi, K.E. Maskus, R.L. Okediji, J.H. Reichman, & J.E. Stiglitz (Eds.), *Intellectual property rights: Legal and economic challenges for development* (pp.417-438). Oxford: Oxford Unviersity Press.

Correa, C. M. (2015). Plant variety protection in developing countries: A tool for designing a sui generis plant variety protection system: An alternative to UPOV 1991. Association for Plant Breeding for the Benefit of Society (APBREBES). Retrieved from https://www.evb.ch/fileadmin/files/documents/Saatgut/PlantVariety_English_complete.pdf.

Corson, C., & MacDonald, K. I. (2012). Enclosing the global commons: The convention on biological diversity and green grabbing. *Journal of Peasant Studies, 39*(2), 263-283.

Cox, T. (1990). Land rights and ethnic conflict in Nepal. *Economic and political weekly*, *25*(24/25), 1318-1320.

Crawford, A. (2006). Networked governance and the post-regulatory state? Steering, rowing and anchoring the provision of policing and security. *Theoretical criminology, 10*(4), 449-479.

Cribbet, J. E. (1986). Concepts in transition: The search for a new definition of property. *University of Illinois Law Review, 1986*(1), 1.

Cromwell, E., Friis-Hansen, E., & Turner, M. (1992). *The seed sector in developing countries: A framework for performance analysis*. Working Paper 65. London: Overseas Development Institute.

Cromwell, E., Wiggins, S., & Wentzel, S. (1993). *Sowing beyond the state: NGOs and seed supply in developing countries*. London: Overseas Development Institute.

Cunningham, R. (2014). *Information environmentalism: A governance framework for intellectual property rights*. Cheltenham: Edward Elgar Publishing.

Dafermos, G., & Pol, J. L. V. (2014). *The open agri-food system of Ecuador: A commons-based transition towards sustainability and equity to reach a Buen Vivir for all*. Retrieved from http://floksociety.org/docs/Ingles/2/2.1.pdf

Davenport, T. H., & Prusak, L. (1998). *Working knowledge: How organizations manage what they know.* Boston: Harvard Business School Press.

David, P. A. (2001). *Tragedy of the public knowledge "Commons"?: Global science, intellectual property and the digital technology boomerang.* UNU-MERIT Research Memoranda. UNU-MERIT.

de Boef, W. S., Subedi, A., Peroni, N., Thijssen, M., & O'Keeffe, E. (2013). *Community biodiversity management: Promoting resilience and the conservation of plant genetic resources.* New York: Routledge.

Demsetz, H. (1967). Toward a theory of property rights. *The American Economic Review*, *57*(2), 347-359.

Development Fund. (2011). *Banking for the future: Savings, security and seeds*. Oslo: The Development Fund

Dhar, B. (2002). *Sui generis systems for plant variety protection*: *Options under TRIPS*. Geneva: Quaker United Nations Office.

Douglas, J. E. (1980). *Successful seed programs: A planning and management guide*. Boulder: Westview Press.

Drahos, P. (1996). *A philosophy of intellectual property* (Vol. 223). Aldershot: Dartmouth.

Drahos, P. (1999). Intellectual property and human rights. *Intellectual Property Quarterly*, 349-371.

Drahos, P. (2001). BITs and BIPs. *The Journal of World Intellectual Property, 4*(6), 791-808.

Drahos, P. (2006). A defence of the intellectual commons. *Consumer Policy Review, 16*(3), 101.

Drahos, P. (2007). Four lessons for developing countries from the trade negotiations over access to medicines. *Liverpool Law Review, 28*(1), 11-39.

Drahos, P., & Braithwaite, J. (2001). The globalisation of regulation. *Journal of Political Philosophy, 9*(1), 103-128.

Drahos, P., & Braithwaite, J. (2002). *Information feudalism: Who owns the knowledge economy?* London: Earthscan.

Drahos, P., & Frankel, S. (2012). *Indigenous people's innovation: Intellectual property pathways to development*. Canberra: ANU E Press.

Dutfield, G. (2014). *Intellectual property, biogenetic resources, and traditional knowledge.* London: Earthscan.

Eastwood, R. J., Cody, S., T Westengen, O., & Bothmer, R. (2015). Conservation roles of the millennium seed bank and the svalbard global seed vault. In R. Redden, S.S. Yadav, N. Maxted, E. Dulloo, L. Guarino, & P. Smith (Eds.), *Crop Wild Relatives and Climate Change* (pp. 173-186). Hoboken: Wiley-Blackwell.

Edwards, V. M., & Steins, N. A. (1998). Developing an analytical framework for multiple-use commons. *Journal of Theoretical Politics, 10*(3), 347-383.

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of management review, 14*(4), 532-550.

El-Said, M. (2005). The road from TRIPS-Minus, to TRIPS, to TRIPS-Plus. *The Journal of World Intellectual Property, 8*(1), 53-65.

Engels, J. M., Polreich, S., & Dulloo, M. E. (2008). Role of community gene/seedbanks in the conservation and use of crop genetic resources in Ethiopia (pp.149-159). In M. H. Thijsen, Z. Bishaw, A. Beshir, & W.S. de Boef (Eds.), *Farmers' seeds and varieties: Supporting informal seed supply in Ethiopia*. Wageningen: Wageningen International.

Esquinas-Alcázar, J. (2005). Protecting crop genetic diversity for food security: Political, ethical and technical challenges. *Nature Reviews Genetics, 6*(12), 946-953.

Etwire, P. M., Atokple, I. D., Buah, S. S., Abdulai, A. L., Karikari, A. S., & Asungre, P. (2013). Analysis of the seed system in Ghana. *International Journal of Advance Agricultural Research, 1*(1), 7-13.

Etzold, B., Keck, M., Bohle, H.-G., & Zingel, W.-P. (2009). Informality as agency–negotiating food security in Dhaka. *Die Erde, 140*(1), 3-24.

Evans, P. (2005). The new commons vs. the second enclosure movement: Comments on an emerging agenda for development research. *Studies in Comparative International Development, 40*(2), 85-94.

FAO. (2010). *The second report on the state of the world's plant genetic resources for food and agriculture*. Rome: FAO.

FAO. (2014). *Community seed banks: Junior farmer field and life school - Facilitator's guide*. Rome: FAO

Faso, B., Rep, C. A., d'Ivoire, C., Rep, D., & Guinea, E. (2004). PVP in the South: Caving in to UPOV. Retrieved from https://www.grain.org/es/article/entries/3525-pvp-in-the-south-caving-in-to-upov

Feeny, D., Berkes, F., McCay, B. J., & Acheson, J. M. (1990). The tragedy of the commons: Twenty-two years later. *Human ecology, 18*(1), 1-19.

Feige, E. L. (1990). Defining and estimating underground and informal economies: The new institutional economics approach. *World development, 18*(7), 989-1002.

Feyissa, R. (2000). Community seed banks and seed exchange in Ethiopia: A farmer-led approach (pp. 142-148). In E. Friis-Hansen, & B. Sthapit (Eds.)*, Participatory approaches to the conservation and use of plant genetic resources.*Rome: International Plant Genetic Resources Institute.

Fisher, A. C. (1988). Key aspects of species extinction: Habitat loss and overexploitation (pp. 59-69). In V.K. Smith (Ed.), *Environmental resources and applied welfare economics: Essays in honor of John V. Krutilla.* Washington, DC: Ressources for the Future.

Fisher, R. J. (1995). *Collaborative management of forests for conservation and development*: IUCN-The World Conservation Union. Retrieved from http://www.mekonginfo.org/assets/midocs/0003347-environment-collaborative-management-of-forests-for-conservation-and-development.pdf

Footer, M. E. (2000). Intellectual property and agrobiodiversity: Towards private ownership of the genetic commons. *Yearbook of international environmental law, 10*(1), 48-81.

Ford, N., Wilson, D., Chaves, G. C., Lotrowska, M., & Kijtiwatchakul, K. (2007). Sustaining access to antiretroviral therapy in the less-developed world: lessons from Brazil and Thailand. *AIDS (London, England), 21 Suppl 4*(Suppl 4), S21-S29.

Forrest, C., & Halbert, M (Eds.). (2009). *A field guide to the information commons.* Toronto: The Scarecrow Press, Inc.

Forsyth, M. (2013). The developmental ramifications of Vanuatu's intellectual property commitments on joining the World Trade Organization. *Pacific Studies, 36*(1), 157-172.

Fowler, C. (1994). *Unnatural selection: Technology, politics, and plant evolution* (Vol. 6). Yverdon: Gordon and Breach.

Fowler, C. (2004). Accessing genetic resources: International law establishes multilateral system. *Genetic resources and crop evolution, 51*(6), 609-620.

Fowler, C., & Hodgkin, T. (2004). Plant genetic resources for food and agriculture: Assessing global availability. *Annual Review of Environmental Resources, 29*, 143-179.

Freeman, D. M., Sampath, R., & Young, R. (1990). Designing local irrigation organizations for linking water demand with supply (pp. 111-140). In R.K. Sampath, & R.A. Young (Eds.), *Social, economic and institutional issues in Third World irrigation management.* Boulder: Westview Press.

Fuglie, K. O., & Toole, A. A. (2014). The evolving institutional structure of public and private agricultural research. *American Journal of Agricultural Economics*, *96*(3), 862.

Gallagher, P., Low, P., & Stoler, A. L. (2005). *Managing the challenges of WTO participation: 45 case studies.* Cambridge: Cambridge University Press.

Gauchan, D., Baniya, B., Upadhyay, M., Subedi, A., & Sthapit, B. (2003). Current policy situation, issues and gaps in plant genetic resources for food and agriculture policy in Nepal. In R. Adhikari & K. Adhikari (Eds.), *Farmers' Rights to Livelihood in the Hindu-Kush Himalayas*. Kathmandu: South Asia Watch on Trade, Economics and Environment.

Gauchan, D., Smale, M., Maxted, N., Cole, M., Sthapit, B. R., Jarvis, D. I., & Upadhyay, M.P. (2005). On-farm conservation of crop genetic diversity: Examining farmers' and breeders' choice of rice varieties in Nepal (pp. 17-27). In B.R. Sthapit, M.P. Upadhyay, P.K. Shrestha, & D.I Jarvis (Eds.), *On-farm conservation of agricultural biodiversity in Nepal: Volume II: Managing diversity and promoting its benefits*. Proceedings of the second national workshop, Nagarkot, 25-27 August, 2004. Rome: International Plant Genetic Resources Institute.

Gauchan, D., & Upadhyay, M. (2006). *ITPGRFA: Prospects and challenges for Nepal*. Kathmandu: Pro Public and SAWTEE.

Gautam, A., Shivakoti, G., & Webb, E. (2004). A review of forest policies, institutions, and changes in the resource condition in Nepal. *International Forestry Review, 6*(2), 136-148.

Gautam, U., Agrawal, N. K., & Subedi, R. (1992). Nepal: Managing large surface irrigation projects: A participatory review. Study Document NEP/89/006. Kathmandu: Department of Irrigation and Consolidated Management Services Ltd.

Gerxhani, K. (2004). The informal sector in developed and less developed countries: A literature survey. *Public choice, 120*(3-4), 267-300.

Gladis, T., & Hammer, K. (2000). The relevance of plant genetic resources in plant breeding. In E. Groeneveld & P. Glodek (Eds.), Animal breeding and animal genetic resources: Proceedings of workshop 7 on sustainable animal production, organized by the Institute for Animal Science and Animal Behaviour, Federal Agricultural Research Centre (FAL), Mariensee, and the Institut für Tierzucht und Haustiergenetik der Georg-August-Universität, Göttingen, Hannover, 17-18 July 2000.

Goss, A. K. (2007). Codifying a commons: Copyright, copyleft, and the creative commons project. *Chicago-Kent Law Review, 82*(2), 963.

Graner, E. (1997). Political ecology of community forestry in Nepal. Saarbrücken, Ford Lauderdale. (=Freiburger Studien zur Geographischen Entwicklungsforschung Bd.14)

Green, D. P., Shapiro, I., & Shapiro, I. (1994). *Pathologies of rational choice theory: A critique of applications in political science*: Cambridge: Cambridge University Press.

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research (pp. 105-117). In N.K. Denzin & Y.S. Lincoln (Eds.), *Handbook of qualitative research.* London: Sage.

Guha-Khasnobis, B., Kanbur, R., & Ostrom, E. (2007). *Linking the formal and informal economy: Concepts and policies.* Oxford: Oxford University Press.

Guha-Khasnobis, B., Kanbur, S. R., & Ostrom, E. (2006). *Beyond formality and informality*. New York: Cornell University.

Gulati, C. (2001). Tragedy of the commons in plant genetic resources: The need for a new international regime centered around an international biotechnology patent office. *Yale Human Rights and Development Journal, 4*(1), 63-107.

Gunningham, N., Phillipson, M., & Grabosky, P. (1999). Harnessing third parties as surrogate regulators, achieving environmental outcomes by alternative means. *Business Strategy and the Environment*, *8*(4), 211-224.

Gunningham, N., & Rees, J. (1997). Industry self-regulation: An institutional perspective. *Law & Policy, 19*(4), 363-414.

Guthman, J. (1997). Representing crisis: The theory of himalayan environmental degradation and the project of development in post-Rana Nepal. *Development and Change, 28*(1), 45-69.

Halewood, M. (2013). What kind of goods are plant genetic resources for food and agriculture? Towards the identification and development of a new global commons. *International Journal of the Commons, 7*(2), 278-312.

Halewood, M. (2014). International efforts to pool and conserve crop genetic resources in times of radical legal change. In M. Cimoli, G. Dosi, K.E. Maskus, R.L. Okediji, J.H. Reichman, & J.E. Stiglitz (Eds.), *Intellectual*

property rights: Legal and economic challenges for development (pp. 288-322). Oxford: Oxford Unviersity Press.

Halewood, M., Noriega, I. L., & Louafi, S. (Eds.). (2013). *Crop genetic resources as a global commons: challenges in international law and governance*. New York: Routledge.

Hammer, K., Arrowsmith, N., & Gladis, T. (2003). Agrobiodiversity with emphasis on plant genetic resources. *Naturwissenschaften, 90*(6), 241-250.

Hardin, G. (1968). The tragedy of the commons. *Science, 162*(3859), 1243-1248.

Harlan, J. (1992). Origins and processes of domestication (pp. 159-175). In G.B. Chapman (Ed.), *Grass evolution and domestication*. Cambridge: Cambridge University Press.

Harlan, J. R. (1975). *Crops and man.* Madison: American Society of Agronomy.

Harris, J. R., & Todaro, M. P. (1970). Migration, unemployment and development: A two-sector analysis. *The American Economic Review*, *60*(1), 126-142.

Hart, K. (1973). Informal income opportunities and urban employment in Ghana. *The Journal of Modern African Studies, 11*(01), 61-89.

Hart, K. (1985). The informal economy. *Cambridge Anthropology*, *10*(2), 54-58.

Hawkes, J. G., Maxted, N., & Ford-Lloyd, B. V. (2012). *The ex situ conservation of plant genetic resources.* Dordrecht: Springer Science & Business Media.

Heller, M. A. (1998). The tragedy of the anticommons: Property in the transition from Marx to markets. *Harvard Law Review*, *111*(3), 621-688.

Heller, M. A., & Eisenberg, R. S. (1998). Can patents deter innovation? The anticommons in biomedical research. S*cience, 280*(5364), 698-701.

Herdt, R. W. (1999). Enclosing the global plant genetic commons. Paper presented at the China Centre for Economic Research Conference at Peking University on 24 May 1999.

Hess, C. (2008). Mapping the new commons. Paper presented at "Governing shared resources: Connecting local experience to global challenges", the 12th biennial conference of the International Association for the Study of the Commons, University of Gloucestershire, Cheltenham, 14-18 July 2008.

Hoekman, B. (2005). Operationalizing the concept of policy space in the WTO: Beyond special and differential treatment. *Journal of International Economic Law, 8*(2), 405-424.

Hope, J. (2009). *Biobazaar: the open source revolution and biotechnology*: Boston: Harvard University Press.

Hubicki, S., & Sherman, B. (2005). Killing fields: Intellectual property and genetic use restriction technologies. *University of New South Wales Law Journal, 28*(3), 740-757.

Husnah, N., Ali, M. S. S., Salman, D., Hijjang, P., Djufry, F., & Amrawaty, A. A. (2015). Merging indigenous and modern knowledge in agricultural development. *International Journal of Agriculture System, 2*(2), 141-151.

Hussmanns, R. (2004). Measuring the informal economy: From employment in the informal sector to informal employment. Working Paper No. 53. Geneva: International Labour Office.

Jackson, L. E., Pascual, U., & Hodgkin, T. (2007). Utilizing and conserving agrobiodiversity in agricultural landscapes. *Agriculture, Ecosystems & Environment, 121*(3), 196-210.

Jarvis, D. I., Myer, L., Klemick, H., Guarino, L., Smale, M., Brown, A. H. D., Sadiki, M., Sthapit, B., & Hodgkin, T. (2000). *A training guide for in situ conservation on-farm: Version 1*. Rome: International Plant Genetic Resources Institute.

Jones, R., Audi, P., & Tripp, R. (2001). The role of informal seed systems in disseminating modern varieties. The example of pigeonpea from a semi-arid area of Kenya. *Experimental Agriculture, 37*(04), 539-548.

Joshi, K. D. (2000). Strengthening the farmers' seed system in Nepal. *Biotechnology and Development Monitor, 42*, 15-17.

Joshi, K. D., Conroy, C., & Witcombe, J. R. (2012). Agriculture, seed, and innovation in Nepal: Industry and policy issues for the future. *Project Paper*, December. Washington, DC: International Food Policy Research Institute.

Kelly, A. (2008). Growing discontent. *The Guardian,* 20 February. Retrieved from http://sites.miis.edu/comparativeeducation/files/2013/01/Growing-discontent.pdf

Keohane, R. O., & Ostrom, E. (Eds.). (1994). *Local commons and global interdependence.* London: Sage.

Khanal, D. R., Rajkarnikar, P. R., Acharya, K. P., & Upreti, D. R. (2005). *Understanding reforms in Nepal: Political economy and institutional perspective.* Kathmandu: Institute for Policy Research and Development.

Khatoon, S. (2013). Nature of bilateral FTA's: The case study of US Israel, US Jordan and US Bahrain FTAs. *International Journal of Business Insights & Transformation, 6*(2), 110-121.

Kloppenburg, J. (2014). Re-purposing the master's tools: The open source seed initiative and the struggle for seed sovereignty. *Journal of Peasant Studies, 41*(6), 1225-1246.

Kloppenburg, J. R. (2005). *First the seed: The political economy of plant biotechnology*. Madison: University of Wisconsin Press.

Lam, W. F. (1999). *Governing irrigation systems in Nepal: Institutions, infrastructure, and collective action.* San Francisco: ICS Press Institute for Contemporary Studies.

Larson, B. A., & Bromley, D. W. (1990). Property rights, externalities, and resource degradation: Locating the tragedy. *Journal of Development Economics, 33*(2), 235-262.

Phillips, C. (2005). Cultivating practices: Saving seed as green citizenship? *Environments Journal, 33*(3), 37-49.

Lawson, C. (2009). Intellectual property and the material transfer agreement under the International Treaty on Plant Genetic Resources for Food and Agriculture. *EIPR: European Intellectual Property Review*, *31*(5), 244.

Le Buanec, B. (2005). Plant genetic resources and freedom to operate. *Euphytica, 146*(1-2), 1-8.

Le Prestre, P. G. (2002). *Governing global biodiversity: The evolution and implementation of the convention on biological diversity.* Aldershot: Ashgate.

Lewis, V., & Mulvany, P. M. (1997). A typology of community seed banks. Retrieved from http://www.sustainablelivingsystems.org/communityseedbanks.pdf

Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *The Manchester School, 22*(2), 139-191.

Leys, C. (1973). Interpreting African underdevelopment: Reflections on the ILO report on employment, incomes and equality in Kenya. *African Affairs*, *72*(289), 419-429.

LIBIRD. (2010). Review of community seed bank initiatives to strengthen local seed system for on-farm agriculture biodiversity management in Dalchowki VDC, Lalitpur. Evaluation Report. Pokhara: USC Canada Asia.

Lipper, L., Anderson, C. L., & Dalton, T. J. (2010). *Seed trade in rural markets: Implications for crop diversity and agricultural development.* New York: Routledge, Earthscan.

Lomnitz, L. A. (1988). Informal exchange networks in formal systems: A theoretical model. *American Anthropologist, 90*(1), 42-55.

Louwaars, N. (2006). Controls over plant genetic resources: A double-edged sword. *Nature Reviews Genetics, 7*(4), 241-241.

Louwaars, N. P., & de Boef, W. S. (2012). Integrated seed sector development in Africa: A conceptual framework for creating coherence between practices, programs, and policies. *Journal of Crop Improvement, 26*(1), 39-59.

Louwaars, N. P., de Boef, W. S., & Edeme, J. (2013). Integrated seed sector development in Africa: A basis for seed policy and law. *Journal of Crop Improvement, 27*(2), 186-214.

Maharjan, S. K., Gurung, A. R., & Sthapit, B. (2013). Enhancing on-farm conservation of agro-biodiversity through community seed bank: An experience of western Nepal. *Journal of Agriculture and Environment, 12*, 132-139.

Malla, Y. (2001). Changing policies and the persistence of patron-client relations in Nepal: Stakeholders' responses to changes in forest policies. *Environmental History*, *6*(2)*,* 287-307.

Malla, Y. B. (2000). Impact of community forestry policy on rural livelihoods and food security in Nepal. *Unasylva (English ed.), 51*(202), 37-45.

Maredia, M., & Howard, J. (1997). Facilitating seed sector transformation in Africa: Key findings from the literature. Policy Synthesis No. 33, Department of Agricultural Economics, Michigan State University.

Matthews, D. (2002). *Globalising intellectual property rights: The TRIPs Agreement*. New York: Routledge.

Matthews, D. (2004). WTO decision on implementation of paragraph 6 of the Doha declaration on the TRIPs agreement and public health: A solution to the access to essential medicines problem? *Journal of International Economic Law, 7*(1), 73-107.

Matthews, D. (2011). *Intellectual property, human rights and development: The role of NGOs and social movements.* Cheltenham: Edward Elgar Publishing.

Mazhar, F. (2000). Seed conservation and management: Participatory approaches of Nayakrishi seed network in Bangladesh. In E. Friis-Hansen, & B. Sthapit (Eds.)*, Participatory approaches to the conservation and use of plant genetic resources.*Rome: International Plant Genetic Resources Institute.

McCay, B. J., & Acheson, J. M. (1990). *The question of the commons: The culture and ecology of communal resources.* Tucson: University of Arizona Press.

McCay, B. J., & Jentoft, S. (1998). Market or community failure? Critical perspectives on common property research. *Human Organization, 57*(1), 21-29.

McGuire, S., & Sperling, L. (2013). Making seed systems more resilient to stress. *Global Environmental Change, 23*(3), 644-653.

Meinzen-Dick, R. S., & Di Gregorio, M. (2004). Collective action and property rights for sustainable development. Working Paper. Washington, DC: International Food Policy Research Institute.

Metz, J. J. (1995). Development in Nepal: Investment in the status quo. *GeoJournal, 35*(2), 175-184.

MOA. (1983). *Seed program development strategy: The seed production and input storage project*. Kathmandu: Ministry of Agriculture, Government of Nepal.

MOAD. (2013a). *National seed vision 2013-2025*. Lalitpur: Seed Quality Control Centre, Ministry of Agricultural Development, Government of Nepal.

MOAD. (2013b). *Statistical information on Nepalese agriculture 2012/2013*. Kathmandu: Ministry of Agricultural Development, Government of Nepal.

MOF. (2015). *Economic survey: Fiscal year 2014/15*. Kathmandu: Ministry of Finance, Government of Nepal.

MOFSC. (2002). *Nepal biodiversity strategy*. Kathmandu: Ministry of Forest and Soil Conservation, Government of Nepal.

Mooney, P. R. (1979). *Seeds of the earth: A public or private resource.* Ottawa: Canadian Council for International Co-operation.

Mujaju, C., Zinhanga, F., & Rusike, E. (2003). Community seed banks for semi-arid agriculture in Zimbabwe (pp. 294-301). In CIP-UPWARD, *Conservation and sustainable use of agricultural biodiversity: A sourcebook (Vol. 2)*. Los Banos, Laguna: International Potato Center-Users' Perspectives with Agricultural Research and Development.

Mulvany, P. (2005). Corporate control over seeds: Limiting access and farmers' rights. *IDS Bulletin, 36,* 68-73.

Naess, L. O. (2013). The role of local knowledge in adaptation to climate change. *Wiley Interdisciplinary Reviews: Climate Change, 4*(2), 99-106.

Nair, M. (2011). GATT, TRIPS, WTO and CBD: Relevance to agriculture. *Journal of Intellectual Property Rights, 16*(2), 176-182.

Nakaponda, B. (2010). Final report: Community seed banks in SHADF areas of Kaoma, Mpika and Chipata. Oslo: Development Fund.

Neeson, J. M. (1996). *Commoners: Common right, enclosure and social change in England, 1700-1820.* Cambridge: Cambridge University Press.

Nightingale, A. J. (2002). Participating or just sitting in? The dynamics of gender and caste in community forestry. *Journal of Forest and Livelihood, 2*(1), 17-24.

North, D. C. (1992). *Institutionen, institutioneller Wandel und Wirtschaftsleistung* (Vol. 76): Mohr siebeck.

Oberthür, S., & Rosendal, G. K. (2013). *Global governance of genetic resources: Access and benefit sharing after the Nagoya Protocol.* New York: Routledge.

Ohlgart, S. M. (2002). Terminator gene: Intellectual property rights vs. the farmers' common law right to save seed. *Drake Journal of Agricultural Law, 7*, 473-478.

Olson, M. (1965). *The logic of collective action: Public goods and the theory of group.* Boston: Harvard University Press Cambridge.

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge: Cambridge University Press.

Ostrom, E. (2000). Reformulating the commons. *Swiss Political Science Review, 6*(1), 29-52.

Ostrom, E. (2003). How types of goods and property rights jointly affect collective action. *Journal of Theoretical Politics, 15*(3), 239-270.

Ostrom, E. (2014). Do institutions for collective action evolve? *Journal of Bioeconomics, 16*(1), 3-30.

Ostrom, E., Burger, J., Field, C. B., Norgaard, R. B., & Policansky, D. (1999). Revisiting the commons: Local lessons, global challenges. *Science, 284*(5412), 278-282.

Ostrom, E., & Gardner, R. (1993). Coping with asymmetries in the commons: Self-governing irrigation systems can work. *The Journal of Economic Perspectives*, *7*(4), 93-112.

Ostrom, E., & Hess, C. (2007). *Understanding knowledge as a commons: From theory to practice.* Cambridge: MIT Press.

Ostrom, E., & Schlager, E. (1996). The formation of property rights (pp. 127-156). In S. Hanna, C. Folke, & K.G. Maler (Eds.), *Rights to nature: Ecological, economic, cultural, and political principles of institutions for the environment.* Washington, DC: Iceland Press.

Pandey, A., Bisht, I., Bhat, K., & Mehta, P. (2011). Role of informal seed system in promoting landrace diversity and their on-farm conservation: A case study of rice in Indian Himalayas. *Genetic resources and crop evolution, 58*(8), 1213-1224.

Parker, C. (2007). Meta-regulation: Legal accountability for corporate social responsibility. In D. McBarnet, A. Voiculescu, & T. Campbell (Eds.), *The new corporate accountability: Corporate social responsibility and the law*. Cambridge: Cambridge University Press.

Parker, C., Scott, C., Lacey, N., & Braithwaite, J. (2004). *Regulating law*. Oxford: Oxford University Press.

Paudel, B., Adhikari, K., Shrestha, P., & Tamang, B. B. (2012). Innovative mechanisms for putting farmers' rights into practice. In M. Ruiz, & R. Vernooy (Eds.), *The custodians of biodiversity: Sharing access to and benefits of genetic resources*. New York: Earthscan.

Pautasso, M., Aistara, G., Barnaud, A., Caillon, S., Clouvel, P., Coomes, O. T., . . . Döring, T. (2013). Seed exchange networks for agrobiodiversity conservation: A review. *Agronomy for Sustainable Development, 33*(1), 151-175.

Phillips, C. (2008). Canada's evolving seed regime: Relations of industry, state, and seed savers. *Environments, 36*(1), 5.

Pinstrup-Andersen, P., & Watson II, D. D. (2011). *Food policy for developing countries: The role of government in global, national, and local food systems*. New York: Cornell University Press.

Pistorius, R. J., & van Wijk, J. (1999). The exploitation of plant genetic information: Political strategies in crop development. Wallingford: CABI Publishing.

Pokharel, R. K., & Suvedi, M. (2007). Indicators for measuring the success of Nepal's community forestry program: A local perspective. *Human Ecology Review, 14*(1), 68.

Polanyi, K. (1944). *The great transformation: The political and economic origins of our time.* Boston: Beacon Press.

Polanyi, M. (2012). *Personal knowledge: Towards a post-critical philosophy*. Chicago: University of Chicago Press.

Porta, R. L., & Shleifer, A. (2014). Informality and development. NBER Working Paper No. 20205.

Posey, D. A., & Dutfield, G. (1996). *Beyond intellectual property: Toward traditional resource rights for indigenous peoples and local communities*. Ottawa: International Development Research Centre.

Poudel, D., Sthapit, B., & Shrestha, P. (2015). An analysis of social seed network and its contribution to on-farm conservation of crop genetic diversity in Nepal. *International Journal of Biodiversity, 2015*.

Pradhan, P. (1990). Farmer-managed irrigation systems in Nepal. Paper presented at a seminar, 27 June 1990, Kathmandu, Nepal.

Prasad, R., Bagde, U., & Varma, A. (2012). An overview of intellectual property rights in relation to agricultural biotechnology. *African Journal of Biotechnology, 11*(73), 13746-13752.

Pyakuryal, K., & Suvedi, M. (2000). Understanding Nepal's development: Context, interventions and people's aspirations. Department of Agriculture and Natural Resources, Education and Communication Systems, Michigan State University.

Ramanjaneyulu, G., & Rajashekar, G. (2013). Open source seed network. Paper presented at the National Conference on Agro-biodiversity Management for Sustainable Development, India.

Ramanjaneyulu, G., Rajshekar, G., & Rani, K. R. (2015). From community seed banks to community seed enterprises. In Ronnie Vernooy, Pitambar Shrestha, & Bhuwon Sthapit (Eds.), *Community seed banks: Origins, evolution and prospects*. London: Taylor & Francis Ltd.

Ramprasad, V. (2007). Community seed banks for maintaining genetic diversity. *LEISA, 23*(2), 20.

Rana, R. B., Garforth, C. J., Sthapit, B. R., & Jarvis, D. I. (2011). Farmers' rice seed selection and supply system in Nepal: Understanding a critical process for conserving crop diversity. *International Journal of AgriScience, 1*(5), 258-274.

Raney, T., & Pingali, P. (2005). Private research and public goods: Implications of biotechnology for biodiversity. In J. Cooper, L. Marie Lipper, & D. Zilberman (Eds.), *Agricultural biodiversity and biotechnology in economic development* (pp. 39-59). Berlin: Springer.

Ranis, G. (2004). Arthur Lewis's contribution to development thinking and policy. *The Manchester School, 72*(6), 712-723.

Raustiala, K., & Victor, D. G. (2004). The regime complex for plant genetic resources. *International organization, 58*(2), 277-309.

Regmi, M. C. (1976). *Landownership in Nepal.* California: University of California Press.

Regmi, M. C. (1999). *A study in Nepali economic history 1768-1846*. Delhi: Adroit Publishers.

Rhodes, R. A. W. (1996). The new governance: Governing without government. *Political Studies, 44*(4), 652-667.

Roa-Rodríguez, C., & Van Dooren, T. (2008). Shifting common spaces of plant genetic resources in the international regulation of property. *The Journal of World Intellectual Property, 11*(3), 176-202.

Robbe, E. (1954). *Report to the Government of Nepal on forestry*. Rome: Food and Agriculture Organisation.

Rohrbach, D. D., Bishaw, Z., & van Gastel, A. (1997). *Alternative strategies for smallholder seed supply: Proceedings of an international conference on options for strengthening national and regional seed systems in Africa and West Asia, 10-14 March 1997*. Harare, Zimbabwe: International Crops Research Institute for the Semi-arid Tropics.

Ruiz, M., & Vernooy, R. (2012). *The custodians of biodiversity: Sharing access to and benefits of genetic resources*. London: Routledge.

Safrin, S. (2004). Hyperownership in a time of biotechnological promise: The international conflict to control the building blocks of life. *American Journal of International Law*, *98,* 641-685.

Santilli, J. (2012). *Agrobiodiversity and the law: Regulating genetic resources, food security and cultural diversity*. London: Routledge.

Sapkota, S., Regmi, P., Pandey, S., Tripathi, B., & Sah, S. (2013). Prospects and constraints of formal rice seed systems in Nepal. *Agronomy Journal of Nepal, 2*, 157-167.

Schlager, E., & Ostrom, E. (1992). Property-rights regimes and natural resources: A conceptual analysis. *Land Economics*, *68*(3), 249-262.

Schroeder, R. F. (1985). Himalayan subsistence systems: Indigenous agriculture in rural Nepal. *Mountain Research and Development*, *5*(1)*,* 31-44.

Kloppenburg, J. R. (Ed.). (1988). *Seeds and sovereignty: The use and control of plant genetic resources*. London: Duke University Press.

Sedjo, R. A. (1992). Property rights, genetic resources, and biotechnological change. *Journal of Law and Economics*, *35*(1)*,* 199-213.

Sharma, S. R., Upreti, B. R., & Müller-Böker, U. (2014). Negotiating access to land in Nepal. *Journal of Contemporary Asia, 44*(3), 521-539.

Shiva, V. (1993). Farmers' rights, biodiversity and international treaties. *Economic and Political Weekly*, *28*(14)*,* 555-560.

Shiva, V. (1997). *The enclosure and recovery of the commons*. New Delhi: Research Foundation for Science, Technology, and Ecology.

Shiva, V. (2015). Limiting corporate power and cultivating interdependence: A strategic plan for the environment. *Tikkun, 30*(2), 26-27.

Shrestha, P. (2007). Community seed bank: Good practices for on-farm conservation of agricultural biodiversity. On-farm management of agricultural biodiversity in Nepal: Lessons learned, Proceedings of a national symposium, Kathmandu (pp. 112-120).

Shrestha, C. B., & Wulff, E. (2007). *Seed sector country profile - Nepal, Volume I: Overview of seed supply systems and seed health issues.* Copenhagen: University of Copenhagen.

Shrestha, D., Khanal, Y., Khatiwada, M., & Baral, R. P. (2012a). Agrobiodiversity resource centre: The cooperative managed community seed bank of Ranibas, Sindhuli. In P. Shrestha, R. Vernooy, & P. Chaudhary (Eds.), *Community seed banks in Nepal: Past, present, future. Proceedings of a national workshop, 14-15 June 2012, Pokhara, Nepal*. Pokhara: Local Initiatives for Biodiversity, Research and Development.

Shrestha, P. (1998). Gene, gender and generation: Role of traditional seed supply systems in the maintenance of agrobiodiversity in Nepal. *Managing agrobiodiversity: Farmers' changing perspectives and institutional responses in the HKH Region* (pp. 143-152). Kathmandu: International Centre for Integrated Mountain Development.

Shrestha, P., Sthapit, B., Shrestha, P., Upadbyay, M., Yadav, M., Thijssen, M. H., . . . de Boef, W. S. (2008). Community seed banks: Experiences from Nepal. *Farmers, seeds and varieties: Supporting informal seed supply in Ethiopia* (pp. 103-108). Wageningen: Wageningen International.

Shrestha, P., Sthapit, S., & Poudel, I. (2012b). Community seed banks: A local solution to increase access to quality and diversity of seeds. In P. Shrestha, R. Vernooy, & P. Chaudhary (Eds.), *Community seed banks in Nepal: Past, present, future. Proceedings of a national workshop, 14-15 June 2012, Pokhara, Nepal*. Pokhara: Local Initiatives for Biodiversity, Research and Development.

Shrestha, P., Vernooy, R., & Chaudhary, P. (Eds.). (2013). *Community seed banks in Nepal: Past, present, future. Proceedings of a national workshop, 14-15 June 2012, Pokhara, Nepal*. Pokhara: Local Initiatives for Biodiversity, Research and Development.

Sindzingre, A. (2006). The relevance of the concepts of formality and informality: A theoretical appraisal. *Linking the formal and informal economy: Concepts and policies* (pp. 58-74). Oxford: Oxford University Press.

Sperling, L., Boettiger, S., & Barker, I. (2013). Integrating seed systems. Retrieved from http://seedsystem.org/wp-content/uploads/2014/03/Integrating-Seed-Systems-.pdf

Sperling, L., & Cooper, H. (2003). Understanding seed systems and strengthening seed security. Background paper for a workshop, 26-28 May 2003, Food and Agriculture Organisation, Rome.

Sperling, L., Osborn, T. C., & Cooper, H. D. (2004). *Towards effective and sustainable seed relief activities: Report of the workshop on effective and sustainable seed relief activities*. Rome: Food and Agriculture Organisation.

SQCC. (2013). *National seed vision 2013-2025: Seed sector development strategy*. Lalitpur: Seed Quality Control Centre, Ministry of Agricultural Development, Government of Nepal.

Srinivas, K. R. (2006). Intellectual property rights and bio commons: Open source and beyond. *International Social Science Journal, 58*(188), 319-334.

Srivastava, N. L. (2008). Major turns in planned development of Nepal. *Journal of Nepalese Business Studies, 5*(1), 1-15.

Stein, D., & Suykens, B. (2014). Land disputes and settlement mechanisms in Nepal's Terai. Justice and Security Research Programme Paper 12a, Background Paper, London.

Steins, N. A., & Edwards, V. M. (1999). Collective action in common-pool resource management: The contribution of a social constructivist perspective to existing theory. *Society & Natural Resources, 12*(6), 539-557.

Sthapit, B. (2012). Emerging theory and practice: Community seed banks, seed system resilience and food security. In P. Shrestha, R. Vernooy, & P. Chaudhary (Eds.), *Community seed banks in Nepal: Past, present, future. Proceedings of a national workshop, 14-15 June 2012, Pokhara, Nepal*. Pokhara: Local Initiatives for Biodiversity, Research and Development.

Sthapit, B., Rana, R., Eyzaguirre, P., & Jarvis, D. (2008). The value of plant genetic diversity to resource-poor farmers in Nepal and Vietnam. *International Journal of Agricultural Sustainability, 6*(2), 148-166.

Sthapit, B., & Shah, R. P. (2001). *Strengthening crop research and farmer seed system.* Paper presented at the Proceedings of the Third National Seed Seminar, Kathmandu.

Stiglitz, J. E. (1999). Knowledge as a global public good. *Global public goods: International cooperation in the 21st century, 308*, 308-325.

Stoker, G. (2006). Public value management a new narrative for networked governance? *The American Review of Public Administration, 36*(1), 41-57.

Suslow, T., Thomas, B., & Bradford, K. (2002). Biotechnology provides new tools for plant breeding. *Agricultural Biotechnology in California Series*, 1-19.

Swanson, T. (2013). Global action for biodiversity conservation: An international framework for implementing the Convention on Biological Diversity. London: *Earthscan*.

Tansey, G., & Rajotte, T. (2008). *The future control of food: A guide to international negotiations and rules on intellectual property, biodiversity and food security*. London: Earthscan.

Ten Kate, K., & Laird, S. A. (2000). Biodiversity and business: Coming to terms with the 'grand bargain'. *International Affairs, 76*(2), 241-264.

Thijssen, M. H., Bishaw, Z., Beshir, A., & De Boef, W. (2008). *Farmers, seeds and varieties: Supporting informal seed supply in Ethiopia.* Wageningen, The Netherlands: Wageningen International.

Thomas, Z. (2005). Common heritage to common concern. *The Journal of World Intellectual Property, 8*(3), 241-270.

Travis, H. (2000). Pirates of the information infrastructure: Blackstonian copyright and the First Amendment. *Berk. Tech. LJ, 15*, 777-864.

Tripp, R. (2002). Seed regulatory reform: An overview. *Journal of New Seeds, 4*(1-2), 103-115.

Truman, H. S. (1999). Inaugural Address: January 20, 1949. Retrieved from https://www.trumanlibrary.org/whistlestop/50yr_archive/inagural20jan1949.htm

Tuomi, I. (1999). Data is more than knowledge: Implications of the reversed knowledge hierarchy for knowledge management and organizational memory. Paper presented at the 32nd Hawaii International Conference on Systems Sciences.

Tuxill, J. D., & Nabhan, G. P. (2001). *People, plants, and protected areas: A guide to in situ management*. Sterling, VA: Earthscan.

Upreti, B. R., & Upreti, Y. G. (2002). Factors leading to agro-biodiversity loss in developing countries: The case of Nepal. *Biodiversity & Conservation, 11*(9), 1607-1621.

Van Dooren, T. (2009). Banking seed: Use and value in the conservation of agricultural diversity. *Science as Culture, 18*(4), 373-395.

Van Laerhoven, F., & Ostrom, E. (2007). Traditions and trends in the study of the commons. *International Journal of the Commons, 1*(1), 3-28.

Varughese, G., & Ostrom, E. (2001). The contested role of heterogeneity in collective action: Some evidence from community forestry in Nepal. *World Development, 29*(5), 747-765.

Vernooy, R. (2012). In the hands of many: A review of community gene/seed banks around the world. In P. Shrestha, R. Vernooy, & P. Chaudhary (Eds.), *Community seed banks in Nepal: Past, present, future. Proceedings of a national workshop, 14-15 June 2012, Pokhara, Nepal*. Pokhara: Local Initiatives for Biodiversity, Research and Development.

Vernooy, R., Shrestha, P., & Sthapit, B. (Eds.) (2015). *Community seed banks: Origins, evolution and prospects*. London: Earthscan.

Vernooy, R., Sthapit, B., Galluzzi, G., & Shrestha, P. (2014). The multiple functions and services of community seedbanks. *Resources, 3*(4), 636-656.

Villa, T. C. C., Maxted, N., Scholten, M., & Ford-Lloyd, B. (2005). Defining and identifying crop landraces. *Plant genetic resources: Characterization and utilization, 3*(3), 373-384.

Vivas-Eugui, D. (2003). *Regional and bilateral agreements and a TRIPS-plus world: The Free Trade Area of the Americas (FTAA)*. Geneva: Quaker United Nations Office.

Volkening, T. (2006). Seed savers exchange. *Journal of Agricultural & Food Information, 7*(2-3), 3-15.

Weber, S., & Bussell, J. (2005). Will information technology reshape the North-South asymmetry of power in the global political economy? *Studies in Comparative International Development, 40*(2), 62-84.

Wood, D., & Lenne, J. M. (1997). The conservation of agrobiodiversity on-farm: Questioning the emerging paradigm. *Biodiversity & Conservation, 6*(1), 109-129.

WTO. (2003). Working party on the accession of Nepal: Report of the working party on the accession of the Kingdom of Nepal to the World Trade Organization. Retrieved from https://docs.wto.org

Yin, R. (2013). *Case study research: Design and methods*. Thousand Oaks, California: Sage Publications.

Young, O. R. (1982). *Resource regimes: Natural resources and social institutions.* Berkeley: University of California Press.

Yu, P. K. (2007). The international enclosure movement. *Indiana Law Journal, 82*(4), 827-907.

Zeven, A. C. (1998). Landraces: A review of definitions and classifications. *Euphytica, 104*(2), 127-139.