Paristhitiki sewa: a critical analysis of ecosystem services discourse in Nepal

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Dedication

This thesis is dedicated to my late grandfather Mr. Chiranjibi Prasad Chaudhary
who always believed in education and inspired me to grow intellectually.
I miss you dearly, baba.

[Cover photo: Mai Pokhari - a holy pond *[photo: Sunita Chaudhary]]*

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Publications and contributions

This PhD thesis by publication is in the form of a series of papers that are either published, accepted or under review in peer reviewed journals. The core findings of the chapters are the stand-alone papers, but these are linked with other chapters and contribute to the overall aim of the thesis. This section provides a brief overview of the list of publications, and co-authors with their specific contributions. The following four papers are the core findings of this research and form the results chapters of the thesis:

Paper I: Chapter 3

Chaudhary, S., McGregor, A., Houston, D., and Chettri, N. (2015). The evolution of ecosystem services: A time series and discourse-centred analysis, *Environmental Science and Policy*, 54, 25-34. DOI: https://doi.org/10.1016/j.envsci.2015.04.025

Paper II: Chapter 4

Chaudhary, S., and McGregor, A. (accepted), *Paristhiki sewa*: a critical analysis of global ecosystem services discourse in Nepal, *Land Use Policy*

Paper III: Chapter 5

Chaudhary, S., McGregor, A., Houston, D., and Chettri, N., (2017). Environmental justice and ecosystem services: a disaggregated analysis of community access to forest benefits in Nepal, *Ecosystem Services,* 29 (A), 99-115. DOI: https://doi.org/10.1016/j.ecoser.2017.10.020

Paper IV: Chapter 6

Chaudhary, S., McGregor, A., Houston, D., and Chettri, N., (under review). Spiritual enrichment and ecological protection?: a multi-scale analysis of cultural ecosystem services at the Mai Pokhari, a Ramsar site of Nepal. *Conservation and Society.*

Contributors and contributions

The stand-alone chapters are articles published (chapter 3 and chapter 5), under review (chapter 6) and accepted (chapter 4) in the journals. The papers are co-authored with a team of supervisors (see Table 1).

Table 1: List of contributors

Principal Supervisor	Dr. Andrew McGregor Associate Professor, Department of Geography and Planning Macquarie University, Sydney Australia
Associate Supervisor	Dr. Donna Houston Senior Lecturer, Department of Geography and Planning Macquarie University, Sydney Australia
Adjunct Supervisor	Dr. Nakul Chettri Senior Biodiversity Specialist International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal

The table below summarises the contributions made by each respective contributor.

Table 2: Specifying contributions of each contributor

	Paper I	**Paper II**	**Paper III**	**Paper IV**
Conception and design	Chaudhary 90% McGregor 10%	Chaudhary 90% McGregor 7% Houston 3%	Chaudhary 90% McGregor 7% Houston 3%	Chaudhary 90% McGregor 10%
Planning and Implementation	Chaudhary 100%	Chaudhary 100%	Chaudhary 100%	Chaudhary 100%
Data collection and analysis	Chaudhary 98% Chettri 2%	Chaudhary 98% Chettri 2%	Chaudhary 98% Chettri 2%	Chaudhary 98% Chettri 2%
Writing the article	Chaudhary 90% McGregor 10%	Chaudhary 90% McGregor 10%	Chaudhary 90% McGregor 10%	Chaudhary 90% McGregor 10%
Overall responsibility	Chaudhary 100%	Chaudhary 100%	Chaudhary 100%	Chaudhary 100%

Abstract

In response to a call for science and policy action on global environmental decline, the Millennium Ecosystem Assessment (MEA) was conducted in 2005 to develop a global knowledge base on the consequences of ecosystems degradation. The MEA (2005), involving more than 1400 experts across the globe, reported a drastic decline in the Earth's ecosystems, and highlighted how human-nature linkages are endangering ecosystem functions that are critical for human development. The benefits humans derive from ecosystems for their wellbeing and development were termed 'ecosystem services'. The 'ecosystem services' concept has since become one of the most popular frameworks for understanding human-nature systems. This has resulted in several research and policy initiatives including the formation of an Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), a multilateral science-policy interface to assess the state of Earth's ecosystems and inform decision-making. Today, more than 126 countries are members of IPBES and different organisations from global to local are adopting the concept within their environmental governance and management initiatives.

This thesis explores the concept of ecosystem services in the context of Nepal, a country that supports IPBES and is in the process of integrating these core concepts into policy. The thesis is theoretically framed by political ecology, an approach that explores how human-environment dynamics are shaped through politics, institutions, justice and power. A political ecology framework brings a critical social science lens to ecosystem services via an exploration of the science and politics behind the emergence of the 'ecosystem services' concept. This provides further understanding of the social and political realm shaping ecosystem services discourse and the implications of global discourse at national and local contexts. The thesis aims to investigate the evolution of ecosystem services as a globalising discourse and analyse frictions that emerge when encountering Nepal. As such, the thesis examines impacts, in terms of policy uptake, and potential, in how it may be taken up in the future and the risks and opportunities inherent in how the discourse is applied. To achieve this aim, the thesis focuses on four issues raised in the literature: i) the multidisciplinary nature of ecosystem services, ii) a lack of understanding about how ecosystem services is being integrated into national scale policies and planning, iii) environmental justice and ecosystem services at the community scale, and iv) and the lack of attention devoted to cultural ecosystem services.

The political ecology framing of ecosystems services provides a multifaceted and relational approach to understanding the emergence and evolution of the concept. The concept originating

in the United States, as an economic and ecological response to ecosystem degradation, rapidly expanded into a diverse range of disciplinary perspective shaping research, policy and practices in multiple countries. Despite its growing popularity, ecosystem services is dominated by economic and ecological approaches. This has resulted in a lack of attention being devoted to human, culture and justice dimensions. In Nepal, the ecosystem services concept is increasingly being integrated into environmental policies, potentially changing understandings of human-nature interactions and influencing how these interactions are managed locally.

The thesis findings indicate that international actors are disproportionately influencing the concept in Nepal, with particular emphasis being placed on valuation through 'payment for ecosystem services'. Focusing on a case study of the Mai Pokhari Ramsar site, the research shows that valuation studies may result in greater levels of injustice unless disaggregated research is conducted to analyse the contributions of ecosystem services to human wellbeing. Access to ecosystem services is differentiated by social category with uneven distributive outcomes of benefits, participation and recognition. Further findings indicate that ecosystem service policy and approaches at national and international levels struggle to appreciate cultural services, particularly spirituality and sense of place, that are considered more important at the local scale.

Drawing on these critical insights of how and why ecosystem services discourse evolved the way it did, the appropriateness of the current articulation, and various issues that are arising in Nepal, the thesis makes a case for a more relational and comprehensive approach to policy development. The thesis discusses the risks and opportunities produced through global-national-local encounters of ecosystem services discourse in Nepal. As such, the thesis makes a contribution by advancing knowledge about ecosystem services and justice, revealing how important local cultural values are ignored at national and global scales. The thesis emphasises the importance of social science and mixed-methods analyses of ecosystem services and the particular value the political ecology research can bring.

Keywords: ecosystem services, political ecology, access, discourse, cultural values, Nepal

Statement of Candidate

I certify that the work in this thesis, entitled '*Paristhitiki sewa: a critical analysis of ecosystem services discourse in Nepal*', has not previously been submitted for a degree nor has it been submitted as part of the requirements for a degree to any other university or institution other than Macquarie University.

I also certify that the thesis is an original piece of research conducted between 2013 and 2017, and it has been written by me. Any help and assistance that I have received in my research work and the preparation of the thesis itself have been appropriately acknowledged.

In addition, I certify that the sources of information used, and the extent to which the work of others has been utilised, are also acknowledged in the thesis.

This thesis draws on information from household surveys, focus group discussions, in-depth interviews (both face-to-face, and virtual Skype/phone) and published materials. The research presented in this thesis was approved by Macquarie University Human Research Ethics Review Committee, with the approval reference number: 5201400957.

Sunita Chaudhary

Student number: 43071589
Date: 30 August 2017

Preface

A river cuts through rock, not because of its power, but because of its persistence.

Jim N. Watkins

My passion for conservation stems from my family, in particular my father who worked as a Professor at the Institute of Forestry in Nepal educating undergraduate and graduate students about forestry for more than forty years. As a result of his leadership in a forestry university, I was born amidst a forest landscape and grew up interacting with nature. Raised in a subtropical mountain forest area, my love and respect for nature has been strong since childhood. I still rejoice in remembering that childhood hiking in the mountain forests, signing songs with the birds, swimming in the rivers nearby, as well as playing hide and seek with deer and monkeys. However, I did not know my bond with nature would become a profession until I started undergraduate studies in Forestry. With good grades in high school, it was assumed that I would choose either medicine or engineering - the most demanding professions, but expensive pursuits in Nepal. Against their expectations and given my interests in nature, my father suggested I choose forestry and guided me in my endeavors. I was trained as a technical forester and my specific interests on big fauna inspired me to join organisations such as World Wildlife Fund and Convention on Migratory Species focusing on the Royal Bengal tiger and Ganges river dolphin. It was not until my Masters in Management of Protected Areas, when I realised the roles people play in managing nature. My interest in exploring this role, incorporating social, economic or political perspectives, emerged.

My interest was strengthened during my work at the Mountain Forum Secretariat - a global network of professionals and practitioners advocating for conservation and development of mountains and its people based in Kathmandu, Nepal. The network was advocating for the 'need to integrate social and political issues' for sustainable mountain development. One of the approaches was advocacy through publications. One of my responsibilities, as an Associate Program Officer, was to select the best case studies across the mountain regions for the quarterly bulletin of the Secretariat including a special issue on 'Payments for Environmental Services'. It was the first time I came across the term 'ecosystem services' in 2009. I became interested in the topic, which looked promising as a new way of conservation and a platform to integrate social, economical and ecological disciplines together. As most of the selected case study entries for the bulletin were focused on valuation and market-based approaches for sustainable mountain development, I wanted to learn about those approaches that would help me to gain knowledge on economics of conservation. I attended training in 'Economic Tools for Conservation' in the

U.S.A. At the training, famous environmental economists and ecologists including Professor Gretchen Daily from Stanford University – one of the pioneers of 'ecosystem services' gave lectures on the need to integrate the concept of 'ecosystem services' in decision-making and implementing the concept on the ground. My enthusiasm for the topic 'ecosystem services' and interest to link with social and economic issues rose tremendously.

My enthusiasm was also backed up by my work at International Centre for Integrated Mountain Development (ICIMOD), where I was assisting different research projects focused on ecosystems management including 'ecosystem services'. I really enjoyed my work there where we had a chance to get involved in research, interact with people on the ground and advocate for evidence-based policy. My knowledge on 'ecosystem services' continued to gradually develop. However, I was struggling to understand environmental issues through a social and political lens. The struggle also stemmed from my keen interest in developing critical thinking skills. Somewhere in the back of my mind, I wanted to be a critical thinker by building up my capacity to analyse issues critically through different social, political and economic lens. As I was trained to focus more on ecological aspects, I was reluctant to think from people's perspective. This curiosity and reluctance forced me acquire new knowledge – resulting in applying for a doctorate degree. At the PhD level, I was sure I wanted to focus on 'ecosystem services' but had a very foggy plan to link with development issues. I wanted to do something that would improve my critical thinking by understanding the social and political issues to challenge my reductionist thinking often bounded by frameworks or tools.

My interest in focusing on social and political issues is also shaped by my identity. I belong to a *tharu* community, one of the indigenous ethnic communities of Nepal, which are primarily involved in farming but are typically less educated. The community is regarded as a "backward society" for their low economic status, limited education and their lack of representation in government systems. I am one of the privileged few from my underprivileged society that had access to education. With my grandfather and father involved in education sector, I benefited from the opportunity that education awards. However, this is not the case for the majority of the people in my society. There is a silent but constant demand to educate the society, especially women, and bring them into the development mainstream through education. Perhaps not directly, but this has indirectly forced me to educate myself, acquire new knowledge and contribute to the society – this was one of my motivations to apply for a higher degree and learn about social issues embedded in the development agenda.

While reflecting on personal and professional experiences, I would like to reflect on one of the circumstances during my PhD that struck me to position myself as a feminist. I started my PhD enthusiastically, as everyone does, with lots of motivation but also with a heavy heart. Leaving a two-year-old daughter back in Nepal, I was emotionally weak and fragile, but that did not bring me down. I made the choice to continue my education, despite missing the support of my family. Instead, the separation from my daughter motivated me to work hard, and she eventually joined me later on. However, in the very first month, one of my colleagues made a comment that was so hurtful it has stayed with me until the end of this journey and may stay with me forever. One of my male colleagues compared me with another male colleague and gave this comment:

> *Your male friend (x) will produce 'papers' during his PhD but you will produce 'babies' during your PhD.*

This sounded very simple but that hurt me so badly that it forced me to think about my positionality as a woman and a mother. I continued my PhD journey with that comment in mind and upon reflection it forced me to think deeply about women's roles in research and conservation. This doctoral journey is a culmination of both my professional and personal life experiences, and is reflected throughout the thesis.

My varied interests, backed up by my identity, personal and professional experiences, and my conversations with supervisors during my PhD forced me to think outside the box and approach the research project from different perspectives. This took me to the field of political ecology. However, the approach I took to analyse issues is often governed by quantitative thinking shaped by my educational background and experience. With this junction, I approach this research from an interdisciplinary perspective mixing both quantitative and qualitative approaches focusing on ecosystem services. I apply *post-structural political ecology* to answers some of my concerns about 'ecosystem services', and its influences at national and local scales in the thesis. I am thankful to each and everyone, including the diverse set of circumstances that motivated me to choose this path. My purpose over the past three years of learning, struggling to lead, and acquiring new knowledge is for betterment of both human and non-human beings. This thesis is an effort to share my learning.

Sunita Chaudhary, August 2017

Acknowledgment

My PhD thesis is a collective effort and the journey has been inspiring, challenging, filled with learning and even at times fun because of the support of many people who helped and supported me throughout my doctoral research.

I am truly privileged to have had the support of my supervisors to conduct interdisciplinary research and their time, guidance and encouragement: Andrew McGregor, Donna Houston and Nakul Chettri. My Principal Supervisor, Associate Professor Andrew McGregor, not only introduced me to Macquarie University but helped me to conceptualise my ideas, nurtured the project and guided me until the end. He is a great human being and a truly amazing supervisor who always supported my ideas, guided me tirelessly, and helped me to finish on time. I have benefitted greatly from his supervision and his critical but constructive suggestions. I have always wished to become a critical thinker and he has helped me to be one by pushing me to think beyond my comfort zone. I am also grateful to my Associate Supervisor, Dr. Donna Houston, who always guided my thinking through constructive conversations and her wealth of theoretical knowledge. Because of her guidance, I started to enjoy academic reading that I found difficult before. I am equally grateful to my Adjunct Supervisor, Dr. Nakul Chettri, whom I knew before beginning my PhD journey. He encouraged me to start this doctoral journey and supported me throughout until the end. I have greatly benefitted from his guidance and his personal and professional networks during my fieldwork in Nepal, and from his constructive feedback and suggestions on the thesis. Thank you also for guiding my career.

This thesis would not have been possible without the contributions of the research participants. Respecting the community's values, I pay a great respect to the *Mai Pokhari* – a holy pond and its surroundings – for nurturing my mind during the fieldwork. I am grateful to each and every participant in this research, who believed in me, shared their stories and feelings, and treated me as their own. I thank Mr. Nim Dorji Dai for hosting my field stay, and Dr. Rajesh Rai, Mr. Laxmi Bhatta and Mr. Kamal Raj Rai for putting me in touch with the local community. I especially thank Mr. Hira Kahji Ghale of the Namsaling Community Development Centre (NCDC), who arranged my fieldwork in Nepal and provided local administrative support, and Ms. Pragya Dhakal, Ms. Ashmina Dhakal, Ms. Sunita Limbu and Mr. Akshay Chaudhary for their untiring help in collecting the data during the harsh winter season in those mountain villages. I am equally thankful to the staff of the District Forest Office of Illam, Mr. Sagar Rimal (District Forest Officer 2014) and Mr. Ram Mandal, for their time, for providing all the secondary data, and for arranging meetings with key informants of the study area.

I am greatly indebted to my family. Thanks to their support I have always handled the tough times in my life with ease. My parents have always been a great inspiration. I thank my Dad, who wove the principles of hard work and honesty into the core of my life principles. To my mother: I think my Mom will be the happiest person in this world to see me completing my PhD. Although she always wished to study, she could not as she married at the very young age of twelve and had to compromise her dreams. I grew up seeing in her eyes her longing to study. It is a great privilege to live her dreams, which would not have been possible without her support. I am equally indebted to my husband, Dr. Jainendra Kumar Chaudhary. Words would not be enough to thank him for his understanding and generosity. He is an amazing person who has constantly supported me with his love, care and belief in me. With his trust, I began this journey when our little daughter was two years old, and have survived the journey. I thank my little angel, Lavanya, for bearing all my PhD tantrums and being with me – a great motivation of my journey. I am also thankful to other family members for believing in me, supporting and guiding me: sister Prabha, brother-in-law Pradeep Tharu, brother Gyanendra, sister-in-law and friend Ivee Cruz, brother Sailendra and my nieces Pranish, Prayan and Chirayu. I am equally thankful to my father-in-law, Padma Narayan Chaudhary, and mother-in-law, Hari Devi, who believed in me and allowed me to cross so many social boundaries. They have been especially encouraging and supportive of my PhD journey.

My thanks also go to the Department of Geography and Planning at Macquarie University, with particular thanks to Ms. Farhana Haque whose administrative help and friendly manner made this journey a pleasant one. Other members of the department: Professor Richie Howitt, Associate Professor Sandie Suchet-Pearson, Dr. Fiona Miller and Associate Professor Kristian Ruming directly and indirectly supported my work and professional development. The journey would not have been fun without many colleagues and friends in the department: Nicole McNamara, Liz Morgan, Minna Hsu, Rini Astuti, Md. Rabiul Islam, Kate McCauley, Ashraful Alam, Dauglas Wafula, Yi-Shiuan Chen, Naavcha Tugjamba, Zahra Nasreen, Sabiha Yeasmin Rosy, Tasmin Dilworth, Sufia Khanom, and Lara Mottee - thank you for being a part of this incredible experience. I also thank my friends who shared their laughter and made my life happier: Deepa Pradhan, Xiaoteng Zhou, Lang Wang, Linqi Wu, Kirsten Cowley, Somesh Das, Shivan GC, Nirajan Rawat and Pabitra Jha. Edy Suardiyana and Kanchan Joshi helped me analyse the quantitative data. My special thanks go to Dr. Claire Colyer and Ms. Ivee Cruz for editing and proofreading my thesis and enhancing the final product of the thesis – highly appreciated.

My work and academic development benefited enormously from opportunities to meet and work with academics based in other institutions. I am especially grateful to Professor Bill Adams, Department of Geography, University of Cambridge, for hosting me as a researcher, providing feedback on the paper, and giving me an opportunity to be a part of the Political Ecology Group at Cambridge. I thank Dr. Bhaskar Vira for his suggestions and feedback and my friends Ms. Anca Serban, Ms. Karen Wong and Ms. Riamsara Kurakanon Knapp for making my visit to Cambridge joyful. I learned a lot about 'Ecosystem Services' during an International Summer School in Peyresq, France. I thank each and everyone at the school for sharing their knowledge. My special thanks go to Dr. Kalemani Jo Mulongoy for his guidance and support throughout the journey. Last but not least, I thank Macquarie University for granting me a Research Excellence Scholarship for providing me an opportunity to contribute to science and live my dreams.

I may have missed many more who contributed to this thesis directly and indirectly but hope they will forgive my forgetfulness, and continue to keep me as their own.

Glossary

BCN	Bird Conservation Nepal
Bhari	A local unit of measuring fuelwood, fodder and litter
CBD	Convention on Biological Diversity
CBS	Central Bureau of Statistics
CEPF	Critical Ecosystems Partnership Fund
CF	Community Forestry
CFUG	Community Forest User group
CFUG	Community Forests Users Group
CICES	Common International
NGO	Non Governmental Organization
CoP	Conference of the Parties
DDC	District Development Committee
DFO	District Forest Office
DNPWC	Department of National Parks and Wildlife Conservation
DoF	Department of Forests
ES	Ecosystem Services
ESP	Ecosystem Services Partnership
ESPA	Ecosystem Services for Poverty Reduction
FAO	Food and Agriculture Organization
FUG	Forests Users Group
GDP	Gross Domestic Product

Ghunde	Local bamboo
Guru	Teacher
ICIMOD	International Centre for Integrated Mountain Development
ICSU	International Council for Science
IMoSEB	International Mechanism of Scientific Expertise on Biodiversity
INGO	International Non-Governmental Organisation
IPBES	Intergovernmental Panel on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
IWMI	International Water Management Institute
KLCDI	Kangchenjunga Landscape Conservation and Development Initiative
KSCDI	Kailash Sacred Conservation and Development Initiative
Mai Pokhari	Mother Pond
MDG	Millennium Development Goals
MEA	Millennium Ecosystem Assessment
MoFSC	Ministry of Forests and Soil Conservation
NAPA	National Adaptation Program of Action
NBS	National Biodiversity Strategy
NBSAP	National Biodiversity Strategy and Action Plan
NCDC	Namsaling Community Development Centre
Non-human	*Creatures that are not human beings*
NPWCA	National Parks and Wildlife Conservation Act
NTFPs	Non-Timber Forest Products

PANI	Program for Aquatic Natural Resources Improvement
Paristhiki sewa	Ecosystem services
PES	Payment for Ecosystem Services
RCS	Ramsar Convention Secretariat
REDD	Reduced Emissions from Deforestation and forest Degradation
SANDEE	South Asian Network for Development and Environmental Economics
SBSTTA	Subsidiary Body on Scientific Technical and Technological Advice
SCBD	Secretariat of Convention on Biological Diversity
SCEP	Study of Critical Environmental Problems
SD	Science Direct
SEA	Strategic Environmental Assessment
SLAP	Snow Leopard Action Plan
TAL	Terai Arc Landscape
TEEB	The Economics of Ecosystems and Biodiversity
TMI	The Mountain Institute
SHL	Sacred Himalayan Landscape
TNC	The Nature Conservancy
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
VDC	Village Development Committee

WECS	Water and Energy Commission Secretariat
WHO	World Health Organization
WoK	Web of Knowledge
WWF	World Wildlife Fund

Chapter 1: Introduction

There is much research and policy momentum surrounding 'ecosystem services' - the benefits humans derive from ecosystems for their wellbeing (MEA, 2005), across nations (Fisher et al., 2009). The thesis considers 'ecosystem services' as a discourse (Kull et al., 2015) that is unfolding from global to national and local scales and influencing environmental governance. As such, the thesis investigates *the evolution of ecosystem services as a globalising discourse and analyse the frictions that emerge encountering particular locations at national and local scales*. I address this objective through the lens of political ecology that explores the complex relations between nature and society, through a careful analysis of politics, institutions, justice, access and control and its implications for conservation and development (Watts, 2000). I particularly adopt post-structural political ecology drawing insights from scale, discourse and justice to analyse the human-nature interactions promoted by the global ecosystem services concept at global, national and local scales with a case study in Nepal.

Post-structural political ecology is an approach that explores how environmental problems and knowledge are discursively constructed (Neumann, 2009a). The approach deconstructs ideas and knowledge by investigating the visible and invisible realms and linking place-specific conditions to different scales and processes (Neumann, 2005). It particularly focuses on politically aware scientific knowledge that is contextualised geographically, culturally and historically (Forsyth, 2003). It analyses the multiple identities and positionalities, situated knowledge, and complexities in social and ecological relations of power (Neumann, 2005). This thesis adopts this approach for understanding how the global ecosystem services discourse is constructed, and being adopted across scales in Nepal. As such, the thesis provides critical insights into the consequences produced by the global ecosystem services discourse through its encounter at national and local scales. This in turn provides insights on how the global discourse as a strategy of environmental governance is followed, articulated and likely to produce risks and opportunities for ecosystems management in Nepal.

It is necessary to establish the concept of ecosystem services. In what follows, section 1.1 introduces the concept as a background and discusses the dominant ways of interpreting the concept in section 1.3 by highlighting the critiques and research gaps and hence rationalising the aims of the thesis in section 1.4. Section 1.5 discusses the political ecology approach and briefly introduces discourse, environmental justice and scale as the key concepts to address the thesis aims. I conclude the chapter by providing an overall outline of the thesis in section 1.6.

1.1. Ecosystem services – The development of the concept

> *"Our heedless and destructive acts enter into the vast cycles of the earth and in time return to bring hazard to ourselves"*
>
> Rachael Carson (1962)

Rachael Carson's *Silent Spring* drew widespread attention to human interconnectedness with ecosystems and the disastrous consequence of ecosystem degradation on human and non-human life. The message of the book, released in 1962 and reaching a wide audience across the world, emphasised the visible and invisible threats humans pose to the ecosystems and human health. The book ignited environmental movements and inspired policy and practice oriented towards a cleaner environment to support the human and non-human world. Environmental movements, backed up by other influential books like *The Limits to Growth* (1972), warned about the consequences of ecosystem degradation on society and environment, thus inspiring environmental regulations and actions (Montague and Pellerano, 2014). The formation of the United States Environmental Protection Agency (US EPA) in 1970 was an early institutional response aimed at halting environmental degradation. The environmental movements which made the world aware of the threats human pose to the environment are still relevant today, inspiring global action to halt degradation.

In 2001, Kofi Annan claimed:

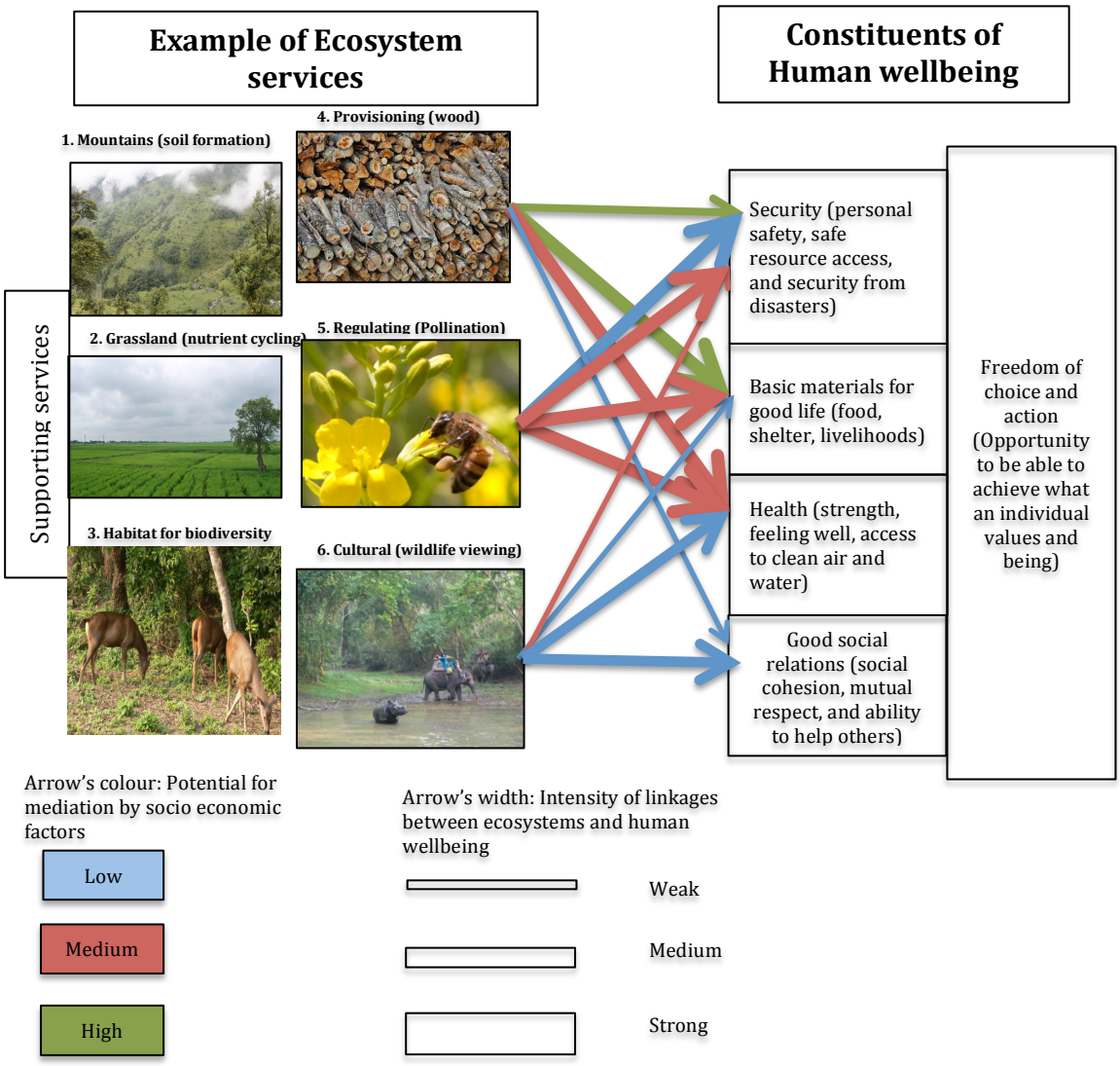
> *"Unpleasant ecological surprises lie ahead but the start of the new century could not be a more opportune time to commit ourselves, people as well as government, to a new epoch of conservation and stewardship."*
>
> Kofi Annan (2000)

This perspective has underpinned some of the major global policy responses to global environmental degradation, such as the Bruntland Commission (1983) and Rio Earth Summit (1992) and resulted in the establishment of global conventions like the Convention on Biological Diversity (CBD), Convention on Wetlands of International Importance (Ramsar Convention) and others. One of the most recent practical responses to global environmental degradation is the Millennium Ecosystem Assessment (MEA 2005), which was initiated to halt ongoing global environmental degradation. The MEA was conducted to develop a global knowledge base on the consequences of ecosystems degradation for improved decision-making on conservation and sustainable development (MEA, 2005). More than 1400 experts across the world were involved in producing a state-of-the-art review on trends in global ecosystems

change. The assessment reported a drastic alteration of Earth's ecosystems by humans in the previous 50 years as a result of multiple drivers of change, including unplanned changes in land use, chemical pollution, landslide and soil erosion, and overharvesting of resources. Approximately 60% of the services provided by Earth's ecosystems were estimated to have been altered and degraded (MEA, 2005). Along with this alarming data, the assessment highlighted the strong linkages between humans and ecosystems (MEA, 2005) and crystalized the concept of 'ecosystem services' (Mulder et al., 2015). This concept has been used to highlight how human actions and inactions are degrading and could further destroy Earth's ecosystems, whilst also reminding us of the importance of ecosystems and ecosystem services for human growth and development.

The idea that humans depend on ecosystems for sustaining human life is not new and can be traced back several millennia (Lele et al., 2013). However, the contemporary idea of human dependence on ecosystems first emerged in the 1970s as 'environmental services' and later again in the 1980s as 'ecosystem services' (Mauerhofer et al., 2015, Mooney and Ehrlich, 1997). It gained an increased momentum in academia after influential publications on ecosystem services by Daily (1997) and Costanza et al. (1997) and has since become one of the most prominent terms in environment debate (Mauerhofer, 2017). Daily (1997, pg 2) defines ecosystem services 'as the conditions and processes through which natural ecosystems, and species which make them, sustain and fulfil human life'. The MEA (2005) defines ecosystem services as the 'benefits human obtain from ecosystems for their wellbeing'. The services from ecosystems can be direct benefits (such as water, timber, food), indirect benefits (such as regulating air, nutrients), intangible benefits (such as experiencing nature in the wild), and the benefits of knowing that people may have the option to benefit in the future (Stoeckl et al., 2011). These benefits have been categorised in a number of ways, for example, the use of benefits (Bateman et al., 2010), descriptions of benefits (Moberg and Folke, 1999), and ecosystem functions (De Groot et al., 2002). Building on these categories, the Millennium Ecosystem Assessment (2005) identified four different categories of ecosystem services: provisioning, regulating, cultural and supporting services (see Figure 1).

Figure 1: Showing the contributions of ecosystem services to different constituents of human wellbeing



Source: Adapted from MEA (2005). Photos 1, 2, 3, 4, and 6: Sunita Chaudhary; Photo 5: ICIMOD, 2012

Provisioning services are the products obtained directly from ecosystems such as food and fibre, fuel, genetic resources from plants and animals, medicines, freshwater and ornamental resources. Regulating services are the benefits obtained through the regulation of ecosystem processes such as air quality maintenance, water and climate regulation, water purification, pollination, erosion control and others. Cultural services are the non-material benefits humans obtain from ecosystems through spiritual enrichment, reflection recreation and aesthetic experiences such as spiritual values, cultural diversity, traditional knowledge, ecotourism, sense of place and others. Supporting services are the necessary foundations for producing all the other provisioning, regulating and cultural services, such as soil formation, nutrient cycling, and

provision of habitats (MEA, 2005). These categorised services are regarded essential to support different constituents of human wellbeing and development (see Figure 1).

The MEA (2005) classification of ecosystem services was the first attempt to categorise services into four categories. This classification was later modified. For instance, The Economics of Ecosystems and Biodiversity (TEEB), a global initiative that aims to mainstream the economic values of nature into decision making, introduced 'habitat services' instead of 'supporting services' and considers biodiversity and natural processes as natural capital in its classification system (TEEB, 2010). Similarly, the Common International Classification of Ecosystem Services (CICES) also removed 'supporting services' in its classification system and considers only provisioning, regulating and cultural services (La Notte et al., 2017). In this thesis, I refer to CICES 2011 classification system (Haines-Young and Potschin, 2011), which is the modified version of MEA (2005) and the most widely used classification system applied in both science and policy (La Notte et al., 2017).

With four categories of ecosystem services, MEA (2005) shows how the categorised ecosystem services contribute to different components of wellbeing (see Figure 1) and identifies security, basic material, health, good social relations, and freedom of choice and action as the essential components of wellbeing. 'Security' means safety for individuals and their property. 'Basic materials' are shelter, food, water, energy, income, assets and access to goods that are required for subsistence living (MEA, 2005). 'Health' is related to a feeling of strength, being nourished and having access to adequate air and water. The last element 'freedom of choice and action' emphasises the right of every individual to make choices and actions and the good social relations important for human wellbeing (MEA, 2005).

The linkages between types of services and components of wellbeing have been widely accepted, with the concept of ecosystem services growing exponentially in research and policy discussion after the release of the MEA report (Delgado and Marín, 2016). For example, the Economics of Ecosystems and Biodiversity (TEEB) was formed in 2007, in response to a proposal by G8 (+5)[1] Ministers, to study the economics of global biodiversity loss (TEEB, 2010). Further, in 2012, an Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) was established with over 126 countries as members, to assess the state of Earth's ecosystems, biodiversity and its services for human development (IPBES, 2017). The

[1] G8 (+5) refers to the group of G8 nations (Canada, France, Germany, Italy, Japan, United Kingdom and the United States), and five nations with emerging economies (Brazil, China, India, Mexico and South Africa) (Shukdev, 2010).

CBD explicitly advocates for valuation of ecosystem services for better ecosystems conservation (CBD, 2016). Given these multilateral initiatives it seems the concept of ecosystem services is here to stay, providing an internationally accepted framework for understanding complex human-nature systems (Carpenter et al., 2009, Jetzkowitz et al., 2017).

However, alongside its increasing acceptance and influence, the framework has attracted criticism. The framework simplifies the complex relationships between ecological functions and the services arising out of ecosystems (Bennett et al., 2009), as well as underplays complex socio-ecological systems. As a consequence some view the concept too broad to be applied on the ground (Van Hecken and Bastiaensen, 2010). Perhaps more importantly, the concept is critiqued for avoiding crucial contextual, social, and political factors regarded important in constructing ecosystem services knowledge (Barnaud and Antona, 2014), and further, that any claim or knowledge produced reflects the perceptions and interests of actors involved in producing that knowledge in a given social and political context. In this regard, Barnaud and Antona (2014) argue that ecosystem services do not exist *per se* but are socially constructed – highlighting the importance of the social, political and contextual factors involved in producing the knowledge of ecosystem services. These important geographic factors are often ignored in ecosystem services discourse, which is criticised for being dominated by reductionist ecological and economic thinking (Dempsey and Robertson, 2012). It is argued that the concept is taken for granted by different actors without questioning how dominant ideas, principles and understandings underpin and shape the ecosystem services concept (Barnaud and Antona, 2014). The lack of critical attention to the dominant ideas, values and assumptions underlying the concept has led critical geographers to contest the concept.

1.2. Approaching ecosystem services

Following on from these critiques, I approach ecosystem services as a globalising discourse (Kull et al., 2015) that is unfolding from global to national and local scales and influencing environmental governance in place-specific ways. The thesis investigates how the ecosystem services discourse evolved and the issues it poses to environmental governance and human-nature relations at different scales. Critical geographers have recommended that the concept be deconstructed to understand how the concept has been shaped, and to analyse how it is being mobilised and the consequences of this (Kull et al., 2015). I am therefore interested in how the concept evolved, how it is defined, shaped and institutionalised, who is engaging with it and with what sort of consequences. To pursue this objective, I draw on elements of political ecology, a multidisciplinary area of study that focuses on human-nature relations.

Political ecology analyses the relationships between political, economic and social structures, institutions and environments, and environmental resources (Robbins, 2005). It focuses on the importance of discourse and power in the construction of environmental narratives and the material consequences of and contributions to these narratives (Forsyth, 2003). As such, political ecology is an ideal lens to analyse the science and politics behind the emergence of the ecosystem services concept. The approach is important as it is interested in scale – looking at how global discourses manifest at national and local contexts (Rocheleau, 2008). The approach also helps to understand local scale struggles and intra-community dynamics by exploring the implications of environmental initiatives on local communities and the associated social justice issues (Forsyth, 2003). Political ecology is closely linked to environmental justice research as it examines the social and political costs and benefits of environmental interventions within heterogeneous communities and through this helps identify the root causes of what is not visible or may not be obvious (Chitewere et al., 2017, Peluso, 1994). Hence the analytical tools and concepts of political ecology can help to clarify the social and political realm shaping ecosystem services discourse and the implications of global discourse at national and local contexts (Kull et al., 2015). Environmental justice, discourse and scale are three analytical concepts drawn from political ecology that will be used to address the aims of this research.

Drawing on these analytical concepts, I hope to provide critical insights into how ecosystem services discourse has been shaped and institutionalised over time and the issues that arise at different scales from this globalising articulation of the concept. By doing so, I join other geographers and political ecologists who provide critical insights into the tensions and consequences produced when globalising processes encounter local political ecologies (Tsing, 2005). Informed by the post-structural political ecology, this thesis provides insights into how the global ecosystem services discourse, as a strategy of environmental governance is pursued, followed and contested at national and local scales.

There have been several calls to engage with the ecosystem services concept from a critical perspective (Barnaud and Antona, 2014, Dempsey and Robertson, 2012) and critical engagement with the concept is increasing (Chaudhary et al., 2015, chapter 3). Barnaud and Antona (2014), for example, deconstruct the foundations of ecosystem services and analyse the uncertainties and controversies surrounding the concept. They strongly recommend that human geographers engage with the concept to further analyse and highlight the complex social interdependencies involved. Similarly, Kull et al. (2015) analyse the construction and application of the ecosystem services concept and conclude that different actors apply the concept in diverse ways, reflecting their different interests. They emphasise the importance of

analysing how the concept is taken up in different contexts. The thesis responds by analysing the issues ecosystem services raises in the context of Nepal. Nepal is embracing the ecosystem services sconcept in research, science-policy dialogues, and policy formulation. The term 'ecosystem services' has been translated as '*Paristhitiki sewa'* (*paristhitiki* - ecosystem, *sewa* - services). The focus of this thesis is on the frictions and consequences emerging from this globalising encounter – the influence, tensions, resistance, acceptance and contradictions arising as the discourse takes hold in Nepal.

1.3. Research Gaps

Having outlined my approach to ecosystem services, I now address some of the research gaps that emerge when approaching ecosystem services as a discourse. In section 1.4, I will introduce my research aims and questions that are oriented to respond to these gaps. The rationale for choosing political ecology is discussed further in section 1.5, with a brief discussion of the key concepts that inform the research. The chapter ends with an outline of the thesis chapters.

1.3.1 Approaching ecosystem services as a multidisciplinary concept

Ecosystem services has attracted attention from a diversity of disciplines (Nicholson et al., 2009). Started with a simple metaphor to make humans aware of their relations with nature (Norgaard, 2010), the multidisciplinary engagement of the concept is now regarded as a 'catch-all' concept (Nahlik et al., 2012), a 'boundary object' drawing in various academic disciplines, perspectives and approaches (Abson et al., 2014). The concept is now an accepted idea within the broader scientific and political environmental management community and fulfills varied interests (Abson et al., 2014). As a result, multiple meanings and values are associated with it (Kull et al., 2015).

Economic interests have been very influential in the evolution of the discourse. This view in the ecological economics discipline was initiated when Costanza et al. (1997) estimated the monetary value of global ecosystem services. The paper was highly influential, and led to several policy initiatives (Gómez-Baggethun et al., 2010). The establishment of TEEB in 2010 is an example which aims to calculate economic values of biodiversity and ecosystem services and mainstream those values into decision-making at all levels from local to global (TEEB, 2010). The rationale behind the economic valuation is to make society in general, and policy makers in particular, aware of the financial value of the services ecosystems provide, and how

the misallocation or degradation of those ecosystems will bring financial burdens while also degrading people's wellbeing (Turnhout et al., 2013).

Another dominant influence within ecosystem services discourse is associated with ecology. Ecologists attempt to analyse ecosystem health in terms of ecological indicators such as species diversity, abundance, functions and others (Kremen, 2005). This approach links ecosystem services with biodiversity from a biophysical perspective that argues for the provisions of ecosystem services through better management of biodiversity (Jax and Heink, 2015). Similarly, socio-cultural values are considered important in capturing the diversity of meanings and people's perspective of ecosystems based on their context and needs (Hicks and Cinner, 2014). These values are considered important in managing ecosystems sustainably and maintaining the flow of services (Scholte et al., 2015). There is a risk however that socio-cultural values may be marginalised within the ecological and economic thinking that dominates ecosystem services (Chan et al., 2012).

In this regard, scholars argue that the multidisciplinary engagement of ecosystem services is bringing people together for a common goal, but also creating confusion (Norgaard, 2010, Schröter et al., 2014). Confusion is not only limited to definition and classification of the concept (Haines-Young and Potschi, 2009), but also in discipline and theme-specific methods and its application, and often through opposing interests (Norgaard, 2010). For instance, TEEB classification and its specific valuation methods are often used for economic valuation studies, while MEA (2005) and CICES (2010) are used for other ecosystem services research. Now, questions arise how the multitude of disciplines has shaped research and policy since the conception of the 'ecosystem services' idea, and what kinds of concerns and confusion are arising through multidisciplinary engagement. I address this concern in this thesis as *research objective 1 (see section 2),* where I trace the rapid growth of ecosystem services across multiple academic disciplines.

1.3.2 Ecosystem services as a western discourse

The ecosystem services concept introduced by the scientific community from the western world is viewed as a technocratic and western-centric discourse (Schröter et al., 2014). This technocratic western-centric discourse, dominated by economic and ecological thinking, is tied up with the notions of individualism and autonomy central to capitalism (Dempsey and Robertson, 2012, Mann, 2009). Dempsey (2016) further argues that the interest, whether political, social or economic, is the form of relation between the nature and humans in discourse. This reductionist approach is blamed for marginalising the diverse and complex

connections of human-nature relations, universalising the human-nature relation across the developed and developing nations. In this regard, Dempsey (2016) calls on critical scholars to engage with ecosystem services discourse to identify the risks and opportunities it poses. It has been strongly argued that the growth of ecosystem services science should move beyond the western world and recognise different visions and approaches to the concept in developing nations (Schröter et al., 2014). It is important to know how the discourse is being interpreted, incorporated and resisted in different settings across different geographies, including those of developing nations.

It is particularly important to know how the concept is influencing policy and practice in environmental management in developing nations, as much of the world's biological resources are located in developing countries (Fisher and Christopher, 2007). People in developing nations tend to have greater dependency on ecosystems and their services to meet their basic needs (MEA, 2005) and are likely to face the impacts of degradation more rapidly and severely (Christie et al., 2012, CBD, 2010). As the rationale behind the development of the ecosystem services concept in the western scientific community was to reduce degradation, especially in developing nations with high biodiversity (Norgaard, 2010), developing an understanding of how the concept is unfolding in developing nations and shaping conservation and human wellbeing is important. I take Nepal as my case study to explore how the ecosystem services discourse is being interpreted by this developing nation. I address this concern in this thesis under *research objective 2* (see section 2*).*

1.3.3 Ecosystem services discourse and 'aggregation'

The ecosystem services discourse promotes the idea of 'aggregation', which has become a rule. The value of ecosystems, whether economic, social or cultural, is aggregated, rationalising conservation and development outcomes (Daw et al., 2011). Economic valuation provides an aggregated figure to show the monetary worth of ecosystems. Costanza et al. (1997), for instance, calculated USD$18 trillion as the monetary value of global ecosystem services to highlight the importance of slowing degradation. Similarly, the ecological indicators used to communicate biological values are the often aggregated information of diverse and often complex ecosystems functions and processes (Müller and Burkhard, 2012). This is particularly problematic when the valuation of ecosystem services concept promotes the 'aggregated contributions' of ecosystems to 'aggregate' human wellbeing (Daw et al., 2011). This means the concept focuses on undifferentiated populations, assuming that everyone in a society benefits from ecosystems in a similar manner (Hicks, 2013), and neglecting the social

heterogeneity of society where class, caste, wealth and other factors shape access to benefits (Few, 2013). By aggregating populations, the marginalised and disadvantaged groups of society and their preferences can be overlooked, despite being extremely important in the pursuit of human wellbeing and development (Dawson and Martin, 2015).

The idea of aggregation of populations has been strongly criticised in recognition that different populations have different capacity to access benefits from the same set of resources (Sen, 1984). The lack of recognition of differentiated populations and their values and preferences in decision-making often lead to claims of injustice (Martin et al., 2014). Aggregation of populations often overlooks the 'winners and losers' and the process and mechanisms influencing the distribution of and access to ecosystem services (Daw et al., 2011). In this regard, questions of justice and equity that focus on the distribution of costs and benefits, participation of the marginalised, and the recognition of different cultural values are important not only for human wellbeing but also for conservation (Martin et al., 2015). Failure to consider justice issues would potentially result in failure to achieve the conservation and development outcomes promoted by the ecosystem services concept (Lele et al., 2013). Scholars therefore strongly advocate disaggregating populations and analysing claims of injustice in the distribution of ecosystem services for just conservation and development outcomes (Horcea-Milcu et al., 2016, Bull et al., 2016, Martin et al., 2015, Daw et al., 2011, Sikor et al., 2014). I address this concern in this thesis through *research objective 3* (see section 2).

1.3.4 The importance of cultural ecosystem services

Ecosystem services discourse focuses on both tangible and intangible benefits of ecosystems categorised into four categories: provisioning, regulating, supporting and cultural services (MEA, 2005). As provisioning, regulating and supporting services can be quantified through well-established economic and ecological methods, these services are often and readily incorporated into ecosystem services research and project initiatives (Bunse et al., 2015). The intangible benefits gained from ecosystems such as relaxation, education or cognitive development – also known as cultural services (MEA, 2005) – have been regarded as life-enriching and life-affirming contributions to human wellbeing. They have been regarded as significantly important for ecosystem planning and management (Satterfield et al., 2013). Human interaction with nature inspires deep attachment to ecosystems and support for ecosystem protection (Daniel et al., 2012).

Despite contributions to wellbeing and conservation, the whole realm of cultural services is less explored. Cultural services are insufficiently studied (Chan et al., 2012), however, compared

with provisioning and regulating services and the contributions of cultural services to human wellbeing are not well addressed and are not included to support decision-making processes in ecosystem management (Dou et al., 2017). One of the major reasons is the intangibility and subjective nature of cultural services, which makes it hard to assign a particular value to the cultural benefits of ecosystems (Dou et al., 2017). Although some cultural services such as tourism, recreation and aesthetic experience that can be linked to economic values are explored, other services such as spirituality or emotional attachment present a challenge to valuation (Small et al., 2017). The limited research on intangible benefits is obstructing the practical decision-making of ecosystem management (Blicharska et al., 2017). But more importantly, cultural services are marginalised because of over-emphasis on economic and ecological values that are dominant in ecosystem services discourse. As a result, cultural services are usually excluded from economic and ecological calculations when decisions are made (Hirons et al., 2016). Such injustices are further triggered by unequal power in ecosystem management as the governance of the socio-ecological system is often rooted in the disconnect between those who culturally value ecosystems and those who have authority in governing the environment (Hirons et al., 2016). If ecosystem services discourse is to be implemented on the ground, it is important to emphasise cultural services and include them in the decision-making of conservation and development. I address this concern in my thesis through *research objective 4* (see section 2). The overall research aim and specific objectives are detailed in Section 2.

1.4. Research aims

As discussed in the outline of the major themes of this work above (section 1), this thesis aims to investigate the evolution of ecosystem services as a globalising discourse and the frictions that emerge when considering Nepal as a case study. This thesis reports cross-scale research that examines how ecosystem services has evolved as a global concept and the challenges it poses when articulated at national and local scales in Nepal. I address this aim with the following specific objectives:

Objective 1: Explore the evolution of ecosystem services discourse and its rapid growth across academic disciplines

I address this objective by tracing the evolution of ecosystem services as a multidisciplinary concept. I track how different disciplines are engaging and approaching the concept through a systematic literature review, and consider how this engagement is shaping the ecosystem services discourse over time. This objective is addressed in chapter 3.

Objective 2: Analyse how global ecosystem services discourse is being interpreted at the national scale in Nepal and its implications on ecosystem governance

I address this objective by analysing the extent of integration of the ecosystem services concept in Nepalese policies, the actors involved and their interests/priorities in promoting and integrating the concept, and the challenges emerging at the national scale. This provides insights into how the discourse is being received and reworked in a non-Western context. The objective is addressed in chapter 4.

Objective 3: Analyse how ecosystem services are accessed by disaggregated populations (based on caste, income and gender) and explore the associated justice issues that emerge through a community scale case study in Nepal

This objective focuses on 'disaggregation' and environmental justice. Ecosystem services discourse tends to aggregate values and human wellbeing, thereby obscuring issues of environmental justice. Here, I aim to show how disaggregated analysis is vital to identify and balance 'losers and winners' within ecosystem services and improve the wellbeing of the marginalised (Hicks, 2013). This objective is addressed in chapter 5.

Objective 4: Explore cultural ecosystem services at the community scale and their recognition at higher geographical scales of decision-making.

I adopt cross-scale analysis to address this objective by focusing on local community cultural values and analyse whether the local cultural values are integrated or not in national and global policy-making. This is important as ecosystem services discourse emphasises the ecological and economic values of provisioning and regulating services, often marginalising the intangible benefits of ecosystems.

The thesis applies a political ecology approach, employing discourse, justice and scale concepts to investigate how the ecosystem services discourse evolved and is beginning to influence, or may influence environmental management at different scales. The objectives are explored in four empirical chapters, which are four stand-alone journal articles (two published, one accepted and one under review) but each is linked to the others and contributes to the overall research aim of the thesis.

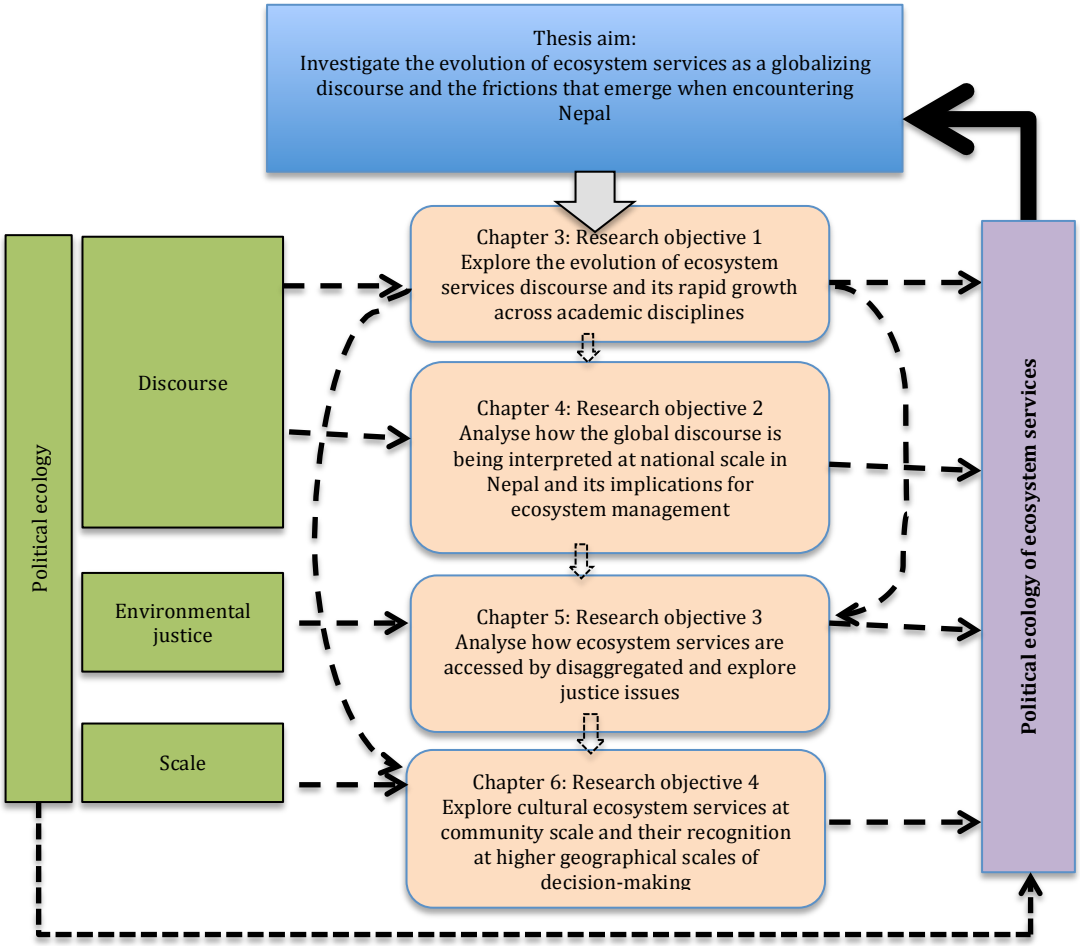
1.5. Applying a political ecology lens to ecosystem services

I have addressed the research objectives through the lens of political ecology, an approach that explores human-nature phenomena at various scales. It focuses on the 'science' of the subject matter as well as on the 'agency of ideas and actions' of social, economic and discursive power across scales (Kull et al., 2015). In simple terms, this approach focuses on the influence of structures and institutions on the environment and vice versa (Chitewere et al., 2017, Robbins, 2005). It defines the environment as an arena where different social actors with asymmetrical power compete for access to and control over resources (Bryant and Bailey, 1997). Political ecologists investigate differences in access defined by gender, caste, class and other social relations (Nightingale, 2003). It draws together the geographic (such as the impact of global corporations on local ecosystem degradation), cultural ecology (people's interactions with the local environment) and political economy considerations (unequal access to wealth and power) to analyse human-nature relationships (Robbins, 2005). The interdisciplinary nature of this approach provides a critical way of analysing the impacts of various structures on environment (Chitewere et al., 2017).

The political ecology approach to ecosystem services discourse is important, as the discourse promotes the idea of human-nature interactions. The ecosystem services concept is regarded as 'social' relating to the production of services by the 'efforts of humans' (Lele et al., 2013). That is, it considers the active role of ecosystems in terms of generating services through ecological processes and functions, as well as the role of humans in terms of extracting benefits from ecosystems that shape their wellbeing. The concept, highlighting both 'humans' and 'nature' and their inter-relations, is socially and culturally constructed (Barnaud and Antona, 2014). In this regard, the political ecology helps to deconstruct the nature-human dualism and unravel the dominant articulation of the ecosystem services concept (Kull et al., 2015). The rapidly evolving ecosystem services discourse tends to engage multiple actors from many disciplines. With increasing engagement across multiple disciplines and given the importance of social, institutional and political interests, the need to approach ecosystem services research through political ecology is becoming central (Barnaud and Antona, 2014, Dempsey and Robertson, 2012, Kull et al., 2015). It provides a critical perspective to understand the varied views and interests of people from different geographies that influence and shape the ecosystem services discourse. Barnaud and Antona (2014), therefore, strongly argue to approach ecosystem services science through political ecology.

I am particularly interested in post-structural political ecology (see Figure 2), which emphasises the role of knowledge, power and discourse on the analysis of environmental issues and construction of environmental narratives (Forsyth, 2003).

Figure 2: Conceptual framework of the thesis



Post-structural political ecology considers political origin and institutionalisation of environmental knowledge, acknowledging the role of discourse (Forsyth, 2008). It focuses upon unequal power relations in and among societies and how these affect ecosystems in the context of global discourses and national policies (Robbins, 2005). While exploring the effects, the approach teases out the justice and injustice issues for just conservation and development outcomes. Political ecologists not only look at struggle and injustice at local scales but go beyond the local and global to cross-scale analysis to understand the consequences of global-local encounters (Forsyth, 2008). It challenges the environmental determinism and dominant articulation of discourse by using empirically rich grounded data and examples. I apply discourse, justice, and scale to deconstruct the globalisation of ecosystem services and critically analyse the issues that arise when a global westernising discourse encounters the particular socioecological dynamics of Nepal (Figure 2). Each concept is explained in more detail below.

1.5.1 Discourse

There are many different approaches to discourse analysis. For some, discourse is an expression of ideas in speech and writing, and associated practices produced by actors structuring actions, social behaviour and institutions (Mills, 2004, Griggs et al., 2017). Discourse covers all forms of spoken interaction, formal and informal, and written text of all kinds (Griggs et al., 2017). Hajer (1995) defines environmental discourses as being comprised of 'a group of actors sharing the usage of a particular set of story lines over a period of time (p.302), which often occupy a significant role in policy-making processes (Hajer, 1995). Bäckstrand and Lovbrand (2006) define discourse as 'things that get normalised and treated as commonsense, which often legitimises the authority and power of particular organisations'. Discourse analysis, then, helps to identify how certain ideas and concepts gain legitimacy over others.

There are different approaches to discourse analysis. Some focus on practices that normalise particular things as 'truths' and analyse how those 'truths' operate in day-to-day practice (Rutherford, 2007), while others focus on narratives, coalitions and stories (Hajer, 1995) and/or on the actors engaged in practices contesting and arguing for particular interests and beliefs (Benford and Snow, 2000). Braun (2002), for instance, examined the various social and political practices through which Canada's forests were given meaning and made the site of intense political and ideological struggles. Discourse analyses can also further deconstruct the societal institutions and technologies of power enacted through language practices and systems of meaning which prioritise structures over agencies and show how discourses – as a disciplining force – shape subjects, identities and interests (Foucault, 1998). For instance, Agrawal (2005) traces the transformations in environmental thought and practice of conservation in India by analysing power, knowledge, institutional arrangements and human subjectivities. Discourse analysis has grown in popularity in forestry and environmental sectors to describe different modes of governance, values, assumptions and perspectives (Kleinschmit et al., 2009).

I adopt a discourse-centred approach to explore the evolution of the ecosystem services concept (research objective 1) and to analyse the advancement of global ecosystem services discourse at the national scale in Nepal (research objective 2). I have undertaken a systematic approach to discourse analysis combining quantitative and qualitative methods to analyse how certain ideas of ecosystem services become normalised and how different actors have contributed to and shape those ideas. I draw den Besten et al. (2014) discursive-institutional approach, which seeks to analyse how ideas becomes institutionalised in plans, regulations and guidelines, while

also defining and redefining, and hence (re)shaping, human interactions. In adopting his approach, I have analysed the role and influence of different actors, their ideas, subject areas and institutional initiatives in normalising or contesting certain ideas of ecosystem services over time. Here, den Besten et al. (2014) discursive institutional spiral was especially useful in demonstrating the dynamic process of institutionalisation of discourse and the subsequent opening up of discourses for contestation and development as a response. The spiral helps to show how discourses evolve through actor agency. With institutionalisation, the spiral narrows to include and exclude certain ideas in policy-making.

For *research objective 2,* I identify how national scale actors are responding and reinterpreting the global discourse of ecosystem services. In doing so, I have provided insights on the extent of the advancement of the discourse in policy and how it has influenced or has the potential to influence ecosystem governance in Nepal. A further detailed discussion of discourse is provided in the methods section (chapter 2).

1.5.2 Scale

Scale, an important concept in political ecology, provides another analytical lens throughout this thesis. In particular, I draw on the concept to explore *cultural services at the community scale and their recognition at higher geographical scales of decision-making (research objective 4).* Scale, focusing on the specific interactions between power, agency and levels in socio-ecological politics and networks (Neumann, 2009b), is useful for analysing the cross-scale dynamics of ecosystem services discourse (Fisher et al., 2013). In this thesis, I focus on geographical scale and consider three prominent scales – local, national and global – which are institutionally defined hierarchical levels of governance connected through formal and informal power and influence (Maciejewski et al., 2015). This approach helped to develop understanding of the varied interests of multiple actors at different scales and their articulations in policy and practices (Hein et al., 2006).

Further, I adopted a cross-scale approach to analyse these interests and practices, from local to national to global levels. A 'cross-scale' approach, according to Scholes et al. (2013), is a form of multi-scale study which explicitly pays attention to the issue of 'how scales (local, national, international) interact'. Focusing on one scale might not provide a detailed understanding of the interactions and processes at larger or at small scales. For instance, the impacts of global-scale policies on local fishers and/or local national parks. As social and natural systems are influenced by the broader global or national political and economic systems, a cross-scale analysis is important to understand the socio-natural systems and the influences of global

systems. In this regard, Scholes et al. (2013) argues that cross-scale analyses are connected to one another and cannot be conducted independently. As such cross-scale analysis can provide more robust findings and deeper insights into problems, processes of problematisation, causes and possible solutions (MEA, 2005).

1.5.3 Environmental justice

As political ecology explicitly focuses on justice and advances our understanding of intra-community dynamics (Fischer et al., 2013), I adopted an environmental justice framework to *analyse how ecosystem services are accessed by heterogeneous populations and explore the justice issues that emerge (research objective 3)*. This framework is useful for analysing factors that mediate access to and distribution of ecosystem services in a society (Fisher et al., 2013). The framework aids our understanding of unequal distribution of 'goods and bads' among divided populations (Pellow and Brulle, 2005), counter-point to economic and ecological approaches which dominate the discourse, and helps to unravel the root causes of specific problems (Chitewere et al., 2017). Justice is considered important for ecosystem services management as it provides insights into the trade-offs between ecosystems services and the stakeholders involved (Daw et al., 2011). In this regard, Sikor (2013) argues that justice is critically important for ecosystem services governance as interventions affect the outcomes for both people and ecosystems, and the outcomes in turn influence interventions. If interventions are environmentally just, the outcomes are more likely to be just for both humans and non-humans.

This thesis, following Sikor (2013), considers justice in terms of participation in and recognition of identity and values in decision-making processes, and fair distribution of costs and benefits. In this regard, following Martin et al. (2015), and Schlosberg (2004), I adopt a framework of three main pillars of justice: distribution, participation and recognition. As equitable access to ecosystems and their services is important, not only for securing livelihoods but also for security especially for marginalised groups in developing nations, the impacts of distribution of benefits and costs is central to natural resources management (Sikor et al., 2014). The thesis focuses on 'participation' to explore whether the needs and interests of different social groups are recognised and they have opportunities to participate in decision-making processes. The thesis further focuses on 'recognition' to explore injustices, which are often the result of 'misrecognition' – the lack of recognition and avoidance of issues related to social characteristics such as caste, class, gender, income or culture (Fraser, 2000). The thesis aims to provide insights on how ecosystem services policies and initiatives must utilise forms of

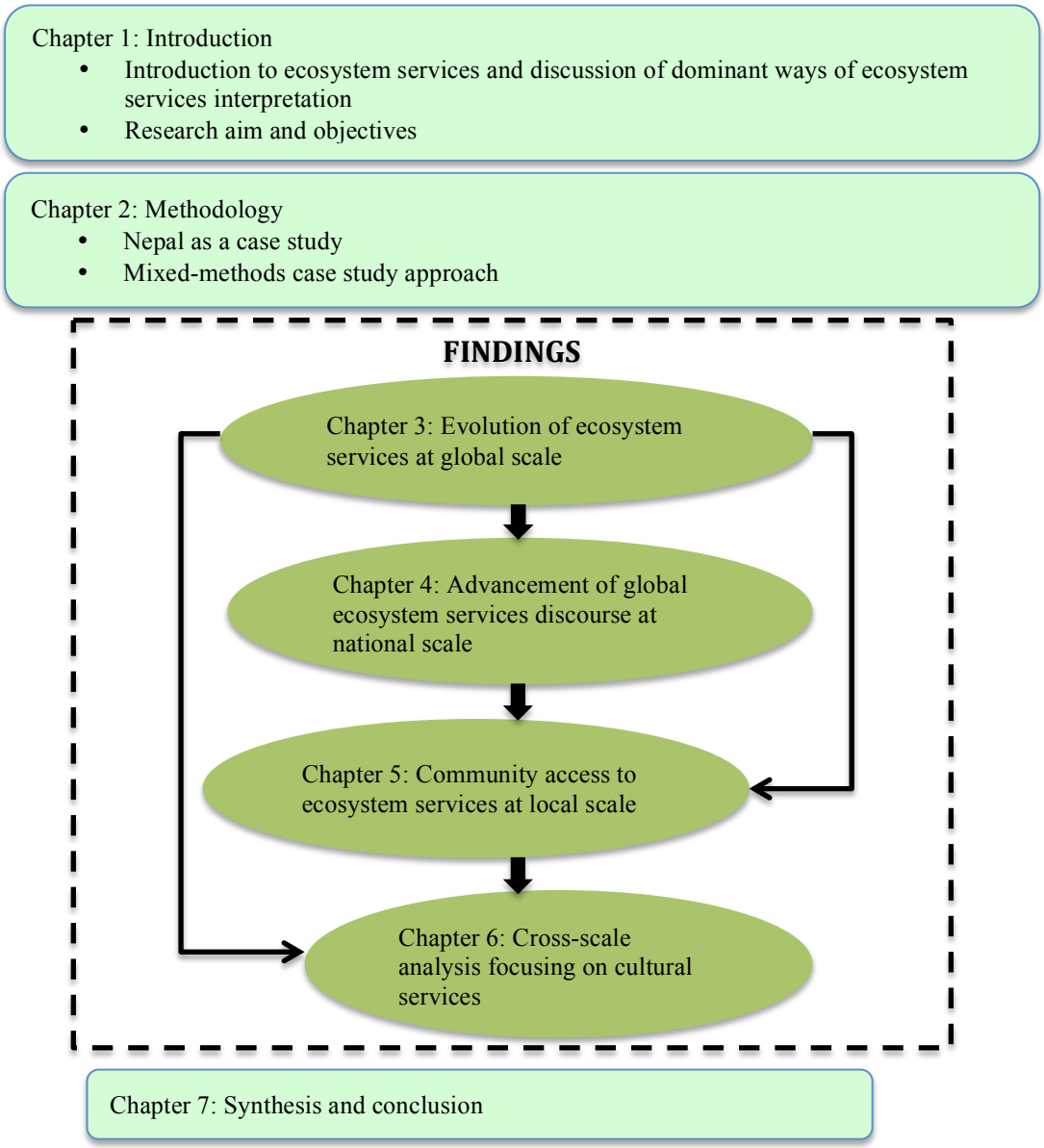
disaggregated analysis if they are to pursue and achieve just outcomes in heterogeneous societies.

1.6. Chapter outline

This thesis, by publication, is presented as a series of chapters formatted for publication in peer-reviewed journals. The seven chapters are linked by brief connecting pages that highlight key points within the empirical (findings) chapters (see Figure 3). In **chapter two**, I describe the context and methods employed in the research to address the research objectives. After a brief overview of methods, in **chapter three** I address *objective 1* with a systematic literature review of ecosystem services, published in *Environmental Science and Policy*. The literature review traces the rapid growth of ecosystem services across disciplines and amongst organisations working at the boundary of science and policy. As an evolving discourse, I track the evolution of ecosystem services across key institutional frames from 1997 until 2013. The review also provides an overview of critiques and gaps in the global ecosystem services discourse, providing a baseline for the subsequent chapters.

Chapter four considers the national scale, tracking the advancement of ecosystem services discourse in policy and analysing its influence in ecosystem governance in Nepal, thus addressing *objective 2*. Along with a literature review (both academic and non-academic), in-depth interviews were conducted to track this progression. The chapter focuses on the influence of actors and their interests in shaping the discourse and influencing human-nature interactions. The paper is accepted in *Land Use Policy.*

Figure 3: Structure of thesis



In **chapter five,** published in *Ecosystem Services*, I explore *objective 3*. This chapter criticises the notion of 'aggregated wellbeing' and adopts a 'disaggregated' approach to explore the patterns and process of access to ecosystem services across society through the lens of environmental justice. Here, the research findings through household surveys, key informant interviews and focus group discussions are used to demonstrate how access to natural services are differentiated according to social categories, with misrecognition and uneven participation and distributive outcomes, leading to claims of injustice.

Chapter six addresses *objective 4*. In this chapter, I first identify intangible benefits at community scale and then adopt a cross-scalar approach to analyse whether or not those locally-valued cultural services are recognised at national and global scale policy-making, and

the consequences at community scale when institutionalised into policy. This is discussed in relation to well established political ecology critiques of fortress conservation. Chapter six is currently under review by *Conservation and Society.*

In **chapter seven**, the four papers (chapters three, four, five and six) are synthesised in a final conclusion chapter. Each of the four groups of findings are discussed in terms of providing critical insights into the implications for Nepal of the global ecosystem services discourse. The overall research aim of the thesis and its contribution to addressing the research problem is discussed further in this chapter. I discuss the implications of this research in terms of theory, policy and practice and conclude this chapter by emphasising the importance of social science and mixed-methods analysis of ecosystem services and the particular value of political ecology research offering my suggestions and recommendations for future research.

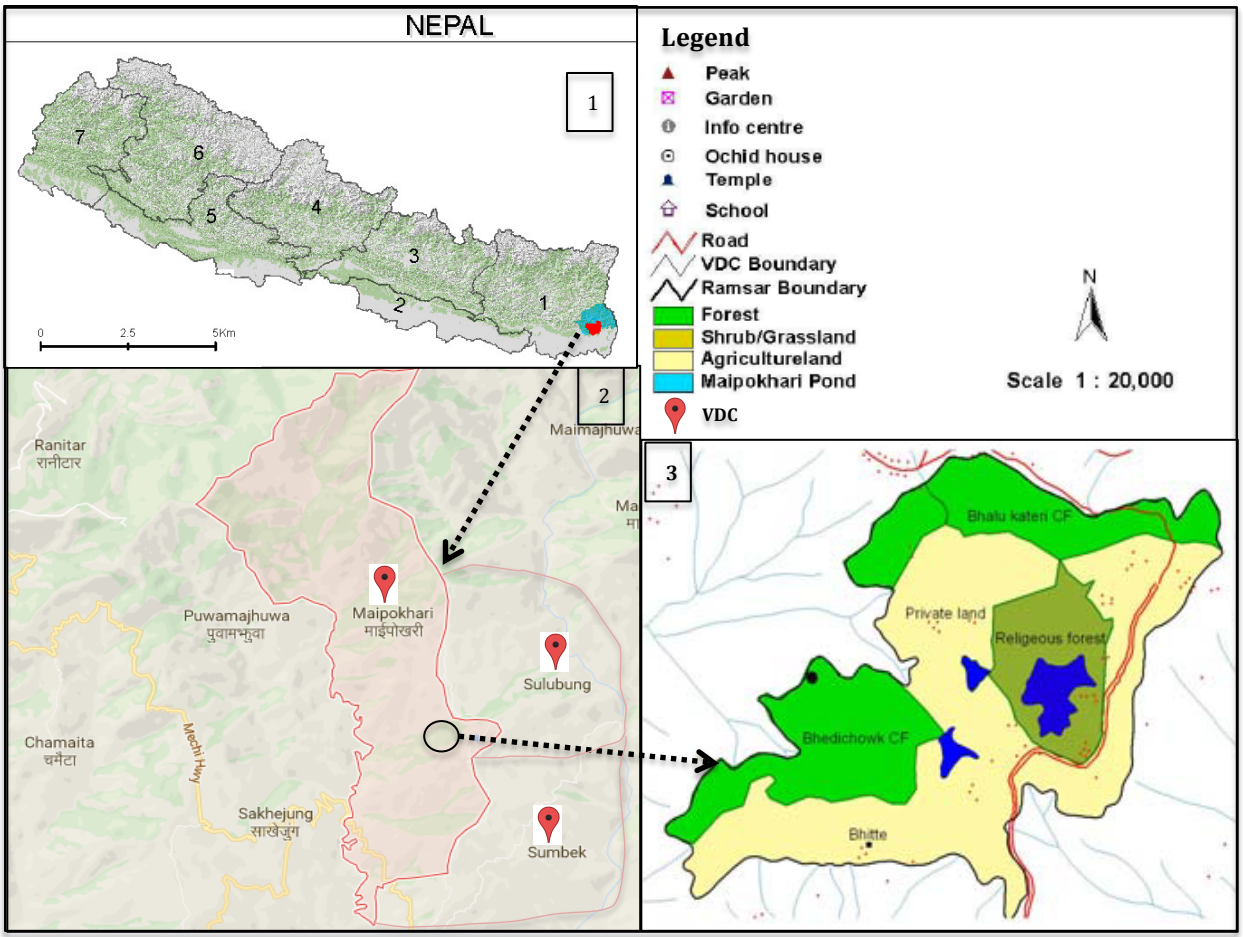
Chapter 2: Study area and Methods

This chapter is divided into two sections: The first introduces the context in which the research was conducted, including a brief historical analysis of the policies affecting ecosystem management and governance in Nepal; the second section describes the methods employed to address the aims and objectives of the research project.

2.1. Environmental governance issues in Nepal

Nepal is a mountainous country of 26 million people, situated on the southern slopes of the Central Himalayas of South Asia. It has an area of 147,181 square kilometres (HMGN/MFSC, 2002) (see Figure 4).

Figure 4: Location map of the study area



Source: Map 1 - GoN, 2016; Map 3: GoN, 2008 (Map 1: Map of forests in Nepal with province boundary; Map 2: Location of three villages development committee (Maipokhari, Sulubung, and Sumbek); Map 3: Location map of the core territory of Mai Pokhari Ramsar site showing two community forests, holy pond and a Religious forest).

The country is geographically diverse, with alluvial plains in the South at an elevation starting from 70 metres above sea level rising to the peak of Mount Everest at 8,848 metres in the North (GoN, 2014). This diverse geography hosts diverse ecosystems. The major land covers are forest (40%), agriculture (30%), bare areas (11%), snow (8%), grassland (8%), and shrubs (3%) (Uddin et al., 2015). These support a rich biodiversity of 118 different ecosystem types, providing habitat to 208 species of mammals (Jnawali et al., 2011), 867 species of birds (BCN and DNPWC, 2011), 6500 species of flowering plants (of which 284 are endemic), 123 species of reptiles, and 117 species of amphibians (GoN, 2014). Ecosystem governance particularly concentrates on forests, the major biodiverse land cover of the country. Forest resources provide not only the basis of subsistence living for many people, but are also important contributors to the local and national economies and to development in Nepal. Agriculture and livestock, the major occupations of the country, are intricately linked with forests (MÅREN et al., 2013).

In the last century, a range of policies and approaches have been adopted, but struggled to achieve sustainable ecosystem management (Gautam et al., 2004) (see Figure 5). In 1957, the government enforced the *Private Forest Nationalisation Act* (see Figure 5). Under the act, forests were mostly managed under the network of local feudal lords backed up by the government. The state creating a techno-bureaucracy that excluded local people (Malla, 2000) and served the interests of ruling elites. They encouraged local people to convert hill forests into agriculture to generate tax. Large expanses of forests were also cleared to meet the timber demands of India (Blaikie et al., 2002). In the late 1950s, Himalayan degradation became a major concern leading to intense landslides, soil erosion, flooding and decreases in soil fertility. Despite the establishment of a Ministry of Forests and Soil Conservation (MoFSC) and enactment of further protection legislation during the 1960s (*Forest Act 1961* and *Forest Protection – Special Provisional Act 1967*), forest degradation continued. The degradation was linked with rapid population growth of subsistence mountain communities and their overdependence on forests for food and fuelwood - leading to denuded hills, catastrophic soil erosion, landslides, and flooding across the country (Ives, 1989). This period was referred to as the Himalayan environmental crisis era, or the *Theory of Himalayan Degradation* (Ojha et al., 2009c, Eckholm, 1976, Gilmour and Fisher, 1991). The degradation portrayed the local mountain communities as a major problem of the crisis threatening the fragile Himalayan ecosystems and their own livelihoods (Ojha et al., 2014). The crisis theory, however, has since been heavily criticized as an exaggeration, relying on myth, misinformation, misunderstanding and misrepresentations (Hamilton, 1985). Ives and Messerli (1989) provide a comprehensive

rebuttal of the theory in their book *The Himalayan Dilemma.* The authors highlighted the complexity and diversity of the Himalayas with multi-faceted problems and emphasised how the problems of degradation, landslides and flooding were not environmental but were deeply linked with socio-economic processes, techno-bureaucratic system and above all the political chaos of the country (Satyal et al., 2017, Ives and Messerli, 1989). The local mountain communities, once identified as a major driver of the crisis, were recast as important actors for dealing with the crisis – highlighting the importance of local participation (Paudyal et al., 2017, Hobley and Malla, 1996).

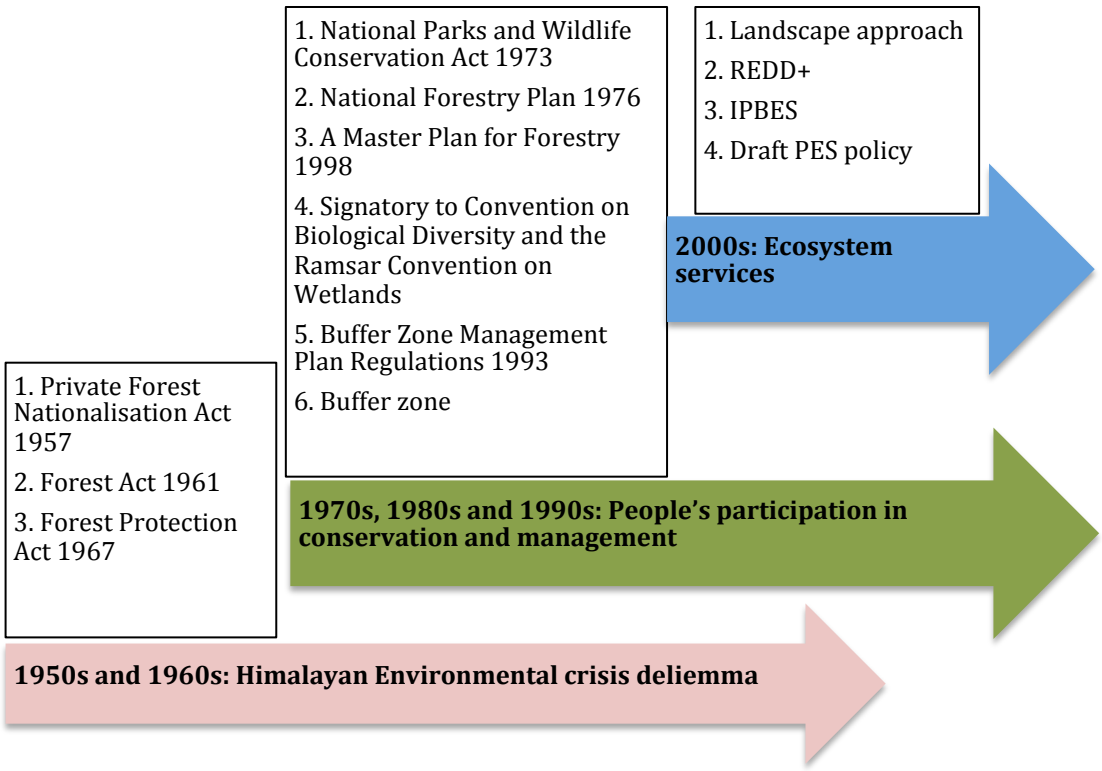
During the 1970s, the concept of 'people's participation' in forest conservation and management was introduced to deal with the environmental crisis and support subsistence living of forest-dependent communities (Bhattarai et al., 2017, Gautam et al., 2004). The introduction of participatory forestry was formally recognised in the National Forestry Plan 1976 (Gautam et al., 2004). Formal recognition institutionalised a decentralised system of forest management in Nepal (Ojha et al., 2009b). In 1993, the *Forest Act* legitimised Community Forest User groups (CFUG) as self-governing institutions responsible for managing and utilising national forests (Paudyal et al., 2017, Ojha et al., 2014) and in 1998, a Master Plan for the Forestry Sector provided a further base for community-based forest management. Today, Nepal has more than 2.05 million hectares of forests managed by community groups (DoF, 2017). People also participate in forest conservation and management within buffer zones surrounding national parks, under Buffer Zone Management Regulations 1996, which were also established to allow people to use resources and engage in conservation (Bhattarai et al., 2017). The establishment of a number of protected areas across the country, followed by the declaration of the first national park in 1973 as per the *National Parks and Wildlife Conservation Act (1973),* strictly controlled the people's access to forested areas. This led to adverse impacts of increasing degradation of protected areas, leading to establishment of buffer zones (Bhattarai et al., 2017).

During the 1980s and 1990s, Nepal entered into a number of multilateral agreements to conserve its biodiversity. In 1988, Nepal signed the Ramsar Convention to conserve wetlands and manage these resources, and in 1993, signed the Convention on Biological Diversity (CBD) that obliged it to conserve and sustainably utilise its biological resources. Nepal continues to practice different approaches to sustainable ecosystem management and support its development goals. During the 2000s, the landscape approach, emphasising the role of corridors and connectivity, was adopted for better conservation and development outcomes (Chettri et al., 2007). In 2001, the country initiated the Terai Arc Landscape approach to

conserve iconic species such as the Bengal tiger (*Panthera tigris*) and one-horned rhinocerous (*Rhinoceros unicornis*), establishing corridors between protected areas that also support the livelihoods of the local people (Bhattarai et al., 2017). The landscape approach aimed to benefit both nature and people and the revenue earned by protected areas was shared between conservation areas and local communities (HMGN, 2004).

During the same period, the government initiated Sacred Himalayan Landscape – a transboundary conservation area covering protected areas in Nepal, India and Bhutan (Bhattarai et al., 2017) – and engaged with the Reducing Emissions from Deforestation and Forest Degradation (REDD+) program, which emerged after the 2007 Bali Conference of Parties to the United Nations Framework Convention on Climate Change (UNFCCC). REDD+ provides financial incentives to reward increases in forest carbon stocks and is being explored within community-based forest management schemes (Ojha et al., 2014). Obliged to CBD, Nepal revised its National Biodiversity Strategy Plan in 2002 and 2014 to include ecosystem approach for integrated management of land, water and living resources for conservation and sustainable use in an equitable way (CBD, 2016).

Figure 5: Key policies and legislations governing ecosystems of Nepal (1950s – 2000s)



More recently, in 2014, Nepal joined the Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES), which strengthens the science-policy interface of ecosystem

services (IPBES, 2017), and as a member of IPBES, is increasingly exploring how ecosystem services can be implemented in policy. A proposed policy on Payment for Ecosystem Services has recently been drafted and is under discussion (ICIMOD, 2016b). There is an increasing trend in ecosystem services research and project initiatives (Bhatta et al., 2014, Chaudhary et al., 2016, Paudyal et al., 2017). This engagement with the global discourse of ecosystem services has the potential to reshape environmental governance and human-nature relations in Nepal, and this evolving contact and the different issues it raises at different levels of governance are at the centre of this thesis.

2.2. The case study area

The case study area is the Mai Pokhari Ramsar site of Nepal (see Figure 4, map 3), an area that hosts a heterogeneous society heavily reliant on community forestry. The Mai Pokhari Ramsar site is situated in the middle mountain area of Himalaya in eastern Nepal between 87º 55' 20"-87º 56' 14" East and 27º 00' 04"-27º 00' 43" North (see Figure 4). It is located about 17 kilometres north of Illam Bazaar, the administrative centre of the district.[2] The Ramsar site area spans over several wards of three Village Development Committees (VDCs): *Mai Pokhari VDC* (wards 4 and 6), *Sulubung VDC* (ward 8) and *Sumbek VDC (*wards 2,4, and 5*).* The Ramsar site with these wards across three VDCs covers a total of 239 hectares (with the core territory of 90 hectares). The Mai Pokhari Ramsar site area hosts around 500 households of which 61 households lie within the core territory (90ha) of the Ramsar site. These households collect fuelwood, fodder, leaflitter and other forest products from the *Bhalu Kateri* and *Bhedi Chowk* community forests. The area has diverse ethnic indigenous[3] groups who share the area with other non-indigenous groups. The people are mostly dependent on agriculture and livestock farming (GoN, 2012). The area has four major land covers: Forest (42%), agriculture land (49%), grassland (6%) and wetland (3%), hosting 231 species of plants, 36 species of herpetofauna, more than 300 species of birds and 20 species of mammals. The declared Ramsar site has two community forests (CF) and one religious forest (RF) while the rest of the land is held in private ownership for agricultural production (GoN, 2012) (see further detail in Chapters 5 and 6).

[2] District is an administrative zone in Nepal divided into several village development committees (VDC). VDC is the lower administrative part which is further subdivided into nine wards (the smallest administrative unit).
[3] The indigenous ethnic community is a tribe/community native to a particular area with its own mother tongue, traditional culture and egalitarian social structure. They do not fall under the conventional Hindu hierarchical caste structure (GoN, 2002).

The Mai Pokhari Ramsar site was chosen for the research because it hosts a heterogeneous population that provided insights on access to ecosystem services across diverse groups and met the project's aim to *analyse how ecosystem services are accessed by disaggregated populations (based on caste, income and gender) and explore the associated justice issues* (*research objective 3*) (see chapter 5). As the population is highly dependent on community forest resources for subsistence living, the area further provided opportunities to analyse justice issues in terms of access to forest services. Social differentiations are helpful in analysing issues of justice, in terms of who has access to ecosystem services benefits, as is diversity, in terms of the types of cultural values that are important to different groups of people.

The area was particularly important to *investigate the local cultural services associated with the ecosystems (research objective 4)* as the site has a natural pond holding high spiritual values. The pond is known as the Mai Pokhari (*Mai*=Mother and *Pokhari*=Pond), one of the prime cultural sites of eastern Nepal. The pond is highly sacred for the local community as it is regarded as a point of convergence for different cultures and religions such as *Animism, Buddhism* and *Hinduism* (GoN, 2012) and has been conserved by the community for decades. It provided a platform to *analyse the local cultural services (research objective 4)*. Moreover, the area having high biodiversity, was declared a Ramsar site of international significance in 2008. Management of a Ramsar site is one of the important ecosystem management systems in the country, demonstrating its commitment to contribute to global mandates and multilateral conservation agreements. The area was therefore chosen to *further analyse the recognition of local cultural values at national and global scales of decision-making (research objective 4)* through a multi-scalar analysis (see chapter 6).

The Mai Pokhari Ramsar site hosts two community forests and one religious forest, and offers insights into two major management systems in Nepal. With the analysis of access in the community forestry system, and recognition of cultural values in national and global decision-making of the Ramsar site, this thesis aims to provide insights on the influence, or likely influence, of the ecosystem services discourse for ecosystem governance in the country.

2.3. Mixed methods case study approach

This thesis employed a mixed methods approach, drawing on a range of both qualitative and quantitative methods to address the research aims and objectives of the thesis. These methods were important to trace the evolution of concept at global scale, track the advancement of the discourse at national scale and analyse the experiences and practices relating to the research questions at the community scale. Through these methods, the thesis explores four case studies

which examine the evolution and influence of discourse across scales from global to national and local.

A mixed method is a systematic integration of both qualitative and quantitative methods to gain an in-depth and elaborated understanding of the phenomenon of interest (Creswell and Clark, 2011). It combines the positivistic elements of quantitative and the constructivist elements of qualitative approaches to investigate a phenomenon (Mills et al., 2010). The combined methods employed in the research complement each other in inquiring into ecosystem services in Nepal. As both inductive and deductive analysis is applied, the results of mixed methods are often seen as more robust than a single method, involving both rich empirical data collection techniques (Zoellner and Harris, 2017, Mills et al., 2010).

Mixed-methods approaches are well regarded for case study research (Mills et al., 2010). They allow the researcher to collect rich empirical data from a specific case study and various approaches to data collection, analysis, and interpretation are possible (Johnson et al., 2007). This is particularly relevant in this project as the gaps identified and objectives set out are interdisciplinary in nature, as explained in chapter 1. The diverse objectives of tracing the evolution of the concept, tracking the advancement of a global discourse at a national scale, analysing justice issues at community scale, and following cultural services across scale requires diverse, and in this case, mixed methods. Depending on the nature of each objective, a mix of both qualitative and quantitative methods was applied in the thesis. A brief overview of methods and theories applied to address all four objectives is given in Table 3 and in the following discussion. Full details of the theories and methods are covered in the empirical chapter.

Table 3: Methods, theory and data employed in the articles

Chapter (Paper no.)	Methods and data
Chapter 3 (*Paper I*): Evolution of ecosystem services at global scale	Content and discourse analysis of 7,985 peer-reviewed articles from *Scopus*, and 519 articles based on citations from *Google Scholar*. Non-academic literature such as reports from governmental, non-governmental and research organisations were also considered.
Chapter 4 (*Paper II*): Advancement of global ecosystem services discourse in Nepal	Content analysis, both deductive and inductive, of 28 policy documents and 77 other textual data (peer-reviewed articles, reports, working papers, proceedings, media articles and social media) through *Sciencedirect, Google* and organisations' websites. This research was supported by 16 in-depth interviews through *Skype* and *telephone.*

Chapter 5 (*Paper III*): Access to ecosystem services with a case study from community forestry	Descriptive statistical data of 109 households obtained through household survey with closed and open-ended questions, and content analysis of qualitative data obtained from eight focus group discussions and 15 key informant interviews following the framework method.
Chapter 6 (*Paper IV*): Multi-scale analysis of cultural services	Content analysis of 33 in-depth face-to-face interviews in three villages and interviews with 15 key informants representing governmental, non-governmental and community-based organisations, hotels, and local political parties. This was supported by content analysis of national and global policy documents (policies, acts, regulations, conventions and related project documents).

2.3.1 Ethical considerations

The Macquarie University Human Research Ethics Committee gave approval to the research methodology in October 2014, in accordance with Australia's National Statement on Ethical Conduct in Human Research (2007). All the methods and questionnaires conducted in the field are in compliance with the terms and conditions of the Human Ethics code. The approval letter is provided in Annexure 1.

2.3.2 Document analysis: Peer-reviewed articles, media articles, policies

Document analysis was employed to track how the discourse of ecosystem services influence academic, public and government knowledge (see Table 4). Discourses are expressed through a wide array of written texts, visual presentations and practices such as acts, speech and events (Foucault, 1998). A systematic review of academic articles was conducted to track how ecosystem services discourse is influencing international academic research. Web platforms such as *Google Scholar, Sciencedirect* and *Scopus* were used to identify relevant articles. The major focus of the review was to establish the evolution of 'ecosystem services' as a concept and to trace how it was being shaped and reshaped over time (*see objective 1*). The thesis considered 7,985 peer-reviewed articles identified through *Scopus* to track the evolution of the ecosystem services discourse. This was accompanied by an in-depth analysis of 519 articles identified through *Google Scholar*, to identify the key subject areas covered in each article (see chapter 3). Articles with citations (high to low) were listed chronologically in an excel sheet to consider influence and key papers and moments in more depth. Reports and proceedings of some key organisations were also reviewed (see chapter 3).

To address *research objective 2* – how ecosystem services discourse is influencing Nepal – academic articles, proceedings, websites, policy documents and media stories about ecosystem

services were reviewed. A total of 17 peer-reviewed articles were identified through *Sciencedirect* and *Google scholar* and analysed to trace the advancement of global ecosystem services discourse within Nepal. Peer-reviewed articles, books, reports, working papers and proceedings of workshops from donors, non-governmental Organisations (NGO) and International non-governmental Organisations (INGO) were obtained through *Google*, and respective organisation's websites were also thoroughly reviewed. The collected literature was qualitatively reviewed to identify actors, their interests and major subject areas. Media articles from the major national newspapers of Nepal were also reviewed to capture more popular or general public concerns and opinions as well as the voices, interests and concerns of different interest groups (Boykoff and Yulsman, 2013, Khatri et al., 2016). The research canvassed major newspapers selected according to their popularity and number of subscribers to explore actors and their interests engaged with ecosystem services discourse in Nepal from 2005 (the year MEA 2005 was released) until 2016. The contents of the collected documents were analysed through coding guided by three questions: 'who are the actors?'; 'what are the main themes?'; and 'what are the major interests?'

The major policy documents governing ecosystems governance in Nepal were also selected and reviewed to address *research objective 2* (see chapter 4). A total of 28 policy documents (11 legal acts and regulations, 7 policies, 7 strategic plans, and 2 guidelines) were reviewed. The content of these documents were analysed deductively, exploring if and how the concept of ecosystem services was utilised in the documents. Management plans of community forests, state forest policy/guidelines of Nepal, and the national reports prepared for the Ramsar Convention and CBD were also reviewed for *research objective 4* (see chapter 6).

Table 4: Number and type of documents considered for analysis

S.N.	Chapters (Paper)	Number and types of documents
1.	Chapter 3: History of ecosystem services (*Paper I)*	Peer-reviewed (Scopus) = 7,985 Peer-reviewed (Google Scholar) = 519 Reports and books = 10
2.	Chapter 4: Advancement of global ES discourse in Nepal (*Paper II*)	Peer-reviewed (Scopus) = 17 Reports, proceedings = 15 Policy documents = 28 Media articles = 17 Social media = 27
3.	Chapter 5: Access to ecosystem services with a case study from community forestry (*Paper III*)	Policy documents* = 9 *Community forestry operation guidelines, management plan, religious forest operation guideline, Ramsar management plan, state forest policy and regulations
4.	Chapter 6: Multi-scale analysis of cultural services	Policy documents* = 13 *Acts, regulations, plans, country reports to conventions

(*Paper IV*)	(CBD, Ramsar)

2.3.3 In-depth interviews

Semi-structured in-depth interviews were conducted with three groups: policy-makers, practitioners and scientists. The policy makers were representatives of the major administrative and public bodies concerned with ecosystem governance in Nepal, while the scientists and practitioners were chosen based on their involvement in the workshops and contribution to reports, policy briefs, media articles and peer-reviewed articles. A total of 16 interviews (see Table 5) were conducted between August 2016 to January 2017, mostly through Skype and/or telephone depending on their availability. Interviewees were asked to give their views on the concept of 'ecosystem services', integration of the concept into policy, opportunities, barriers/challenges, and any implications of the integration in ecosystem governance in Nepal. The topic for semi-structured interviews is provided in Annexure 2. The recorded interviews were transcribed and coded with themes, inductively and deductively, using NVivo. Themes, already shaped by the semi-structured interview questions, were coded deductively, while any new issues were coded inductively and noted down in a notebook. The identified themes were then interpreted as per the research questions of the study.

Table 5: List of interviewees at national scale

S.N.	Organisation	Position	Date of interview
1.	South Asian Network for Development and Environmental Economics (SANDEE)	Research economist	August 2016
2.	International Centre for Integrated Mountain Development (ICIMOD)	Specialist	August 2016
3.	International Union for Conservation of Nature (IUCN)	Natural Resources Management Specialist	September 2016
4.	World Wildlife Fund (WWF Nepal) under Hariyoban Program	REDD specialist	September 2016
5.	IPBES Asia Pacific (Nepal)	Lead author	October 2016
6.	Bird Conservation Nepal (BCN)	Senior officer	October 2016
7.	Ministry of Forests and Soil Conservation (MoFSC)	Under-secretary	October 2016
8.	REDD Cell, MoFSC	Officer	October 2016
9.	MoFSC	Under-secretary	November 2016
10.	Forest Action Nepal (NGO)	Senior officer	December 2016
11.	United Nations Development Program (UNDP)	Officer	December 2016
12.	International Water Management Institute (IWMI)	Officer	December 2016
13.	Kathmandu Forestry College (KFC)	Lecturer	January 2017

14.	Tribhuwan University (TU)	Professor	January 2017
15.	MoFSC	Assistant Planning Officer	January 2017
16.	IPBES Global (Nepal)	Coordinator	January 2017

Within the community, fifteen key informants representing the village, government, community-based organisations, older citizens, hotels and local political parties were considered for interviews in consultation with the District Forest Office Illam and a local NGO working in the area. Information on locally perceived criteria for wellbeing rankings (i.e. landholding per household, number of cows, occupation) was obtained, along with the information on the operation of community and religious forests, ecosystem services, and issues regarding recognition. This was important to gather details about the whole area, different social settings, culture and history of the place.

Figure 6: Key informant interviews

Photo 1: Priest of the Mai Pokhari village; Photo 2: *Mukhiya* didi (Photos by Sunita Chaudhary, Photo used with prior consent)

In addition to the key informants interviews, a total of 33 participants from three villages (eleven participants from each village who had lived in the area for at least 15 years) were chosen to explore the cultural services of the area. The key informant interviews were broadly focused on the area, its history and other issues including cultural services, while the interviews with the 33 householders were specifically focused on local cultural services. The list of

householders' names was first obtained from the District Forest Office of Illam and households from three villages were chosen purposively who had lived in the area for at least fifteen years and had knowledge about the holy pond. Open questions focused on non-material benefits and cultural services, access and the establishment of Ramsar site (relating to research question 3 and 4). The interviews lasted for approximately 45 minutes. The responses from both sets of interviews were first transcribed and then coded with themes such as history, spirituality, recreation, sense of place and others following CICES 2011 (see Chapter 6). The qualitative data obtained from focus group discussions and interviews were analysed using a framework method following Gale et al. (2013).

2.3.4 Household survey

A household survey employing stratified random sampling was conducted between November 2014 and March 2015 at the case study site. The main purpose of the survey was to obtain details of socio-economic characteristics that could provide precise and accurate details on the characteristics of different social groups in the society (e.g. income, caste, gender). With these details, I hoped to get specific numerical data on the collection of products from the forests, the percentage of people participating in forest-related activities, factors explaining different social groups. For the survey, a list of forest user households including details on social wellbeing was sourced from the District Forest Office (DFO). The households were then categorised into different strata based on income (high, medium and low), caste (higher, ethnic and lower-caste) and gender (male-headed and female-headed). Caste, also known as *Jaat* in Nepalese, is a social stratification system that categorises populations into four broad social classes based on occupation. *Brahmin* (priests and scholars), *Chhetri* (warriors) and *Vaishya* (merchant and traders) belong to the first, second and third social classes respectively, and are regarded as higher-caste with access to education and occupation. *Dalit (labors),* the lower-caste group. *Dalits,* also regarded as 'untouchables', and are socially, economically and culturally disadvantaged with very limited access to education, occupation, politics and power (Gurung, 2005). Male-headed and female-headed households were distinguished based on the head of decision-making power. Female-headed households were those headed by female - those female whose husbands were out of village for work, or were widowed, divorced or unmarried women.

Figure 7: Household survey

Household survey with a *Mukhiya* couple (Photo by Pragya Dhakal, Photo used with prior consent)

Then a sample from each group was chosen in proportion to their number. Participants from other groups were chosen randomly by drawing their nametags from a box – resulting in a total of 109 households for the survey. The survey had both closed and open-ended questions in a Nepalese language. The head of the household was selected for the survey which was most often conducted in the morning or evening, outside normal working hours. The closed questions focused on basic household characteristics such as the gender, age, caste, and ethnicity of the household, and landholding capacity, livestock and food sufficiency. The open-ended questions focused on ecosystem services, distribution, access, recognition/misrecognition, and the nature of participation (active, forced and passive) (see chapter 5). Specific open-ended questions were asked, such as 'what tangible/intangible benefits do you get from Mai Pokhari Ramsar site?' The reported benefits listed in Nepalese were translated into English and categorised into 'provisioning', 'regulating', and 'cultural services' following the Common International Classification of Ecosystem Services system (CICES 2011). The household data was analysed using Microsoft Excel and descriptive statistics were used to explain the data. Chi-square tests were done to identify the key characteristics and association with others characteristics of social groups. The questionnaire is provided in Annexure 3.

2.3.5 Focus Groups Discussions

A total of eight focus group discussions were conducted, with an average of nine people in each. The groups were stratified so as to involve only community members from a particular social category - i.e. high income, medium income, low income, higher caste, lower caste, ethnic, male-headed and female-headed groups. Focus group participants were selected randomly from the list provided by DoF, and were contacted through representatives of a local NGO, and/or local leaders. The focus groups discussed access to ecosystem services, decision-making processes, rights and responsibilities. These group discussions were important, and gave me an opportunity to learn about feelings, perceptions, issues and opinions specific to particular social groups, such as the women's group or a low income group in the case study area. The group felt comfortable sharing information and discussing the issues faced, especially matters regarding decision-making processes and outcomes. The discussions stimulated new information that I did not obtain from the household surveys or interviews. The list of topics for focus group discussions is provided in Annexure 4.

Figure 8: Focus Group Discussions

Photo: Discussions with a women group who were drawing a resource map of the Mai Pokhari area and sharing their experiences (Photo by Sunita Chaudhary and used with prior consent)

2.3.6 Positionality and reflexivity

> *If we understand the world as it appears to us, it will be a big booming-buzzing confusion. Hence, we do not see the things as they appear, but we see them as we want in a more meaningful way.*
>
> *William James, 1878*

Hastrup (1992) explains how one's position – one's age, gender, race or identity and one's personal history – can inhibit or enable insights and shape research methods and fieldwork. Schoenberger (1992) also argues to reflect on gender, class, race, and sexuality, as these positions affect the production of knowledge. Considering the importance of positionality, this section reflects on my own and discusses how it enabled or hindered my research methods, fieldwork and the research process. I find myself positioned in multiple contexts, which influenced my research and my approach to it, and the way others involved in the research responded to me. As Haraway and Harding (1991) argue that knowledge is marked by its origins and identity, I will start with my origin and personal identity, reflecting on education and the experiences that shaped my knowledge and the lenses through which I view the world.

I am a Nepalese woman from a patriarchal middle class Hindu family and also the mother of a five-year old daughter. I was born and grew up in a small town of the Nepal lowland where I had easy access to education, compared with millions of children who still do not have access to education in the rural villages of Nepal. My access to education was shaped not only by the place I was born, but by my father's and grandfather's identities as educators. As I mentioned in my preface, they believed in educating not only their family members but also the *tharu* community. Although the community is becoming more educated and has good access to government systems today in comparison with previous years, the majority of the people are still uneducated.

We belong to a *tharu* community – one of the most underprivileged indigenous ethnic communities of lowland Nepal. This community, once the landlords of the lowlands and resistant to malaria, was involved in agriculture. But after eradication of malaria from the lowland in the 1950s, the land-holding dynamics of our community underwent drastic changes. After 50-years of migration of people from other parts of Nepal to the lowland, most people of our community had become mere tenants, working as forced labourers on their own land (McDonaugh, 1999).

My grandfather, a leader of the community who worked for an education institution to educate the *tharu* community, inspired my father to devote his life to education. My father recently retired from his position as Professor from the Institute of Forestry, the only public university in Nepal to teach forestry. Because of their contribution to and belief in education, I have had access to education. I completed my elementary and high schooling at a private school, and tertiary studies at a public university, graduating in forest science. My opportunity for education and my identity as a *tharu* have shaped my perspective and inspired me to work towards the betterment of life of underprivileged groups, whether due to caste, income, physical disability, gender or non-human beings.

I trained as a forest technician with the support of several national and international organisations, including the World Wildlife Fund (WWF). Because of my keen interest in big fauna and my attachment with WWF through their generous scholarship, I worked on the Royal Bengal tiger and one-horned rhinoceros during my internship at WWF, and focused on river dolphins in my thesis for a Masters of Management of Protected Areas in Austria. As a natural scientist, I had little experience of thinking of issues from a human perspective although I was aware of the role humans play in conservation. My thinking was trained to focus on framework and tools, and analyse issues quantitatively rather than qualitatively focusing on varied subjects and subjectivities surrounding us. I would say my thinking was structured with a certain framework that set a boundary to my thinking and was framed through a lens of idealism.

I worked with international organisations working for sustainable conservation and development through research and advocacy, including roles as an Associate Advocacy Officer at the Mountain Forum Secretariat and later as a Research Associate for the International Centre for Integrated Mountain Development (ICIMOD), and undertook some consultancies for international organisations such as the Institute of Ecology (Austria) and the Cambodian Institute for Peace and Cooperation (CICP) (Cambodia). These experiences shaped my approach to problematise and analyse issues in a pragmatic way, but also to advocate solutions in an idealistic way. This challenged my idealistic and reductionist perspectives. My identity as a *tharu*, and as a woman also contested my reductionist views, forcing me to think and act realistically. This pragmatism was further shaped when I became a mother and had to juggle multiple roles: worker, mother, wife and traditional daughter-in-law who had to be perfect in handling everything at work and home. This multi-functionality not only made me a 'multi-tasker' but also opened my eyes to ways of dealing with issues in a more realistic, less perfectionist way, and able to focus on real life situations. While working for these organisations, I built strong networks with both government and non-governmental

organisations, collaborating in research and implementing projects. My association with these international organisations offered both opportunity and risks for this PhD research. Parr (1996) notes that doing research is a messy business as researchers are entangled in the research process in different ways, and the demand to situation knowledge is a demand to recognise that messiness (Rose, 1997). Following Rose (1997) and Parr (1996), I reflect on my messiness to map out my multiple positions and its impacts in this research.

An important opportunity came through my long-established networks with non-governmental and community-based organisations in the research area. During the fieldwork, I collaborated on data collection with Namsaling Community Development Cooperation (NCDC), a community based organisation working in the region for more than two decades. Through them, I had easy access to the villages and some of the influential key informants of the area. Similarly, my strong network with government organisations at central and at local scales also helped me to access the required government data. Through the government organisations, I was easily able to organise community meetings of the forest user groups. The district forest authorities provided detailed information about the local forest users groups and coordinated with the representatives of community institutions to organise discussions. In this work, I did not have to negotiate my space as a female researcher. My identity and professional profile was not only associated with international organisations but with my father, Professor from the only forest university in Nepal. Almost all of the government forest authorities were the graduates of the same university and readily accepted me as the daughter of their *guru*[4]. Without these identities, it could have been difficult to work as an independent female researcher in the field within the limited time period, as the forestry sector in Nepal is one of the male-dominated sectors of the country (Wagle, 2015).

However, opportunity comes with risks. I was sometimes viewed as an outsider. First, I was not treated by the community women as a 'typical' woman with so many household responsibilities, as is reflected in the quote below:

> *You have such a wonderful job! You do not have to cook and take care of your family but instead you get paid to talk to people and go around the villages.*

With this comment from one of my participants, I felt an outsider. As an outsider, women might not have felt comfortable to share their daily struggles and issues associated with my research

[4] A Nepal term for a teacher

questions. Second, some of the local people regarded me as an important ally of the government forest authority, and this could have restrained them from sharing their views concerning forest policies, enforcement of regulations and issues related to corruption. Third, I was viewed as a representative of an aid organisation and some expected that research or development aid would come to the area through my research. Given these expectations, it is probable that some participants may have exaggerated their real problems. My identification with ICIMOD also had risks for my interaction with other international organisations working in the area. Viewing ICIMOD as a competitor, my attempts to interview some representatives from international NGOs were obstructed, and here I had to negotiate my space as an independent university student.

However, living in the villages for more than four months, eating, drinking, and walking with the local people, made them comfortable to interact with me. Being from the same country, belonging to one of the underprivileged ethnic communities, as well as an educated woman, I was respected and treated as one of their own. Hoping for solutions for their local issues, I was also seen as an intermediary to convey their problems to the government and the international community. This helped me to run the focus group discussions and explore the issues in-depth, making the fieldwork more collaborative and enabling us to explore inequity and justice issues.

At the beginning of my research journey, I approached my research questions and methodologies through a reductionist approach in terms of understanding and simplifying complex issues through an equation, framework, or economic tool rather than considering the reality and contextual factors. However, my interaction with supervisors and other academics at Macquarie University changed my reductionist views and approach. I often struggled to think beyond my comfort zone, but conservations with my Principal Supervisor helped me to come out of that zone and think ‘outside the box’.

The constant struggle and negotiation with the emotional dynamics of power, between my idealistic and pragmatic views, and between my quantitative (natural science) and qualitative thinking made it necessary to shift my sense of self to fit somewhere in between the two – political ecology! Hence, my PhD research process was shaped not only by the immediate habitus surrounding me but also by the messiness of my life experiences and understandings in relation to ethnicity and gender.

2.4. Limitations of the methods

The thesis findings are derived from a particular case study and are therefore limited in their applicability to other places. Frictions will appear differently in different places. The findings are also influenced by my own positionality within the research. The choice of methods used and how these methods are implemented impact the results obtained (Hattam et al., 2015), and in my case, my educational background in forest science affected the choice of methods. Someone with a background in social science or critical geography, using methods such as ethnography over a longer period of time, may have come to more critical understandings of issues associated with the political ecology of ecosystem services. Another constraint arose from my positionality as a representative of an international organization in the field. As explained in the previous section, I was viewed as an outsider and had some difficulty contacting and interviewing representatives of other international NGOs working in the area, who often view other international organisations as competitors. An independent researcher without any affiliation may have had more success in collecting different perspectives from these organisations. At the same time, however, my contacts provided me with good access to policy makers and my nationality allowed me to mix comfortably with the community and undertake research in a rural mountain setting of Nepal.

Another limitation was physical accessibility. The selected site, situated at 2,800 metres above sea level, was accessible only during winter through a dry mud road. The randomly selected households were situated far apart from each other and were accessible only by foot – sometimes one household at the bottom and another at the top of the mountain. It took an average of two-three hours to reach these destinations to interview householders. Sometimes, a day could go just by interviewing three households. As a result, I had to reduce the number of households surveyed from the 160 initially planned to 105 (21% of the total number of households). If the 160 households originally planned been surveyed, they may have generated different findings than the 105 that were actually surveyed. However, 21% is still considered a representative sample of a total of 504 households (Karim et al., 2015).

As the research focused only on forest user groups in a mountainous region, the findings cannot be extrapolated to the whole country, and especially not to the lowland regions of Nepal where forests are managed under different systems. Moreover, the multi-scale analysis reported in chapter 6 focused only on the global policy documents and did not include interviews with global policy makers which may have strengthened the analysis and hence interpretations.

However, this was beyond the scope of this project and the policy analysis was triangulated with other secondary sources.

2.5. Conclusion

In the last six decades, the country has seen profound changes in the state of ecosystems governance. The country experienced drastic forest degradation during the 1950s and has since moved into an era of ecosystem services where the country is participating in REDD+ schemes to sell carbon from its forests, and strengthening the science-policy dialogue for better management of ecosystems and ecosystem services for conservation and development. Policies, legislations, guidelines and frameworks have provided a clear guideline to manage ecosystems especially forests for conserving the rich biodiversity and supporting the subsistence living of people. Forests management is a priority of the government for assuring better ecosystems management especially through the decentralised community forestry and protected areas management systems. The thesis commissioned a mixed method approach employing a range of both qualitative and quantitative methods to a case study of community forestry and a Ramsar site hosted by the Mai Pokhari Ramsar site. The subsequent chapters provide critical insights on the influence or the likely influence of ecosystem services discourse.

Chapter 3: Ecosystem services as a global discourse: exploring the history

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Background

This chapter explores the evolution of the 'ecosystem services' concept and traces its rapid growth across academic disciplines and amongst the organisations at the boundary of science and policy. The discourse is rapidly engaging with multiple disciplines and influencing both science and policy from global to national and local scales. The paper therefore considers 'ecosystem services' as an evolving discourse and adopts a discourse-centred approach to identify the concepts, ideas, actors and moments influential in normalising and shaping the concepts associated with the concept.

A content-driven grounded theory approach was used to develop the subject areas/disciplines of the selected articles. For each of the selected articles, a core theme was first identified. Core themes were then grouped together and a subject area theorized. For instance, article focusing on valuation of ecosystem services using different tools and methods was themed as 'economic valuation', or an article focusing on ecosystem services assessment with different tools and methods was themed as 'ecosystem services assessment'. The themes falling under the same category were grouped together and given a particular subject area such as 'ecological economics', or 'ecosystem services assessment'. For the time series analysis, the selected peer-reviewed articles, books and reports by citations through *Google Scholar* were categorised into selected time frames (Pre-1997, 1997-2000, 2001-2004, 2005-2009, 2010-2013). Articles in

each timeframe were thoroughly reviewed focusing on subject areas, author's origin, organisations, projects and key milestones to analyse the temporal and geographic growth of the discourse. *Google Scholar* was chosen over *Scopus* for the time-series analysis as it also focuses on books and theses as well as non-academic literatures like reports and proceedings. This was important to explore the role played by boundary organisations in contributing to the growth of ecosystem services discourse. The list of articles with ordered according to citations is given in Annexure 5.

The analysis shows that the concept emerged from the work of ecologists and economists from the United States who were concerned about ecosystem degradation. As a discourse, ecosystem services then rapidly expanded across multiple disciplines and countries, where various actors including government, non-government, non-profit, for-profit and academia and non-academia institutions helped to shape and influence the development of the concept forming an institutional spiral. The spiral shows four key moments when ideas and initiatives from science and policy became institutionalised: 1997 when PES was initiated; 2001 when MEA was officially launched; 2005 when MA 2005 reports was published; and 2010 when agreement to establish IPBES reached. The spiral further shows how actors, their ideas and initiatives interacted to institutionalise ecosystem services at particular moments. Using this metaphor, the paper shows how such moments shape research, policy and practice. The paper shows that the foundations of ecology and economics remain dominant but also demonstrates emerging opportunities for other disciplines marginalised by the discourse so far, such as social science and critical geography, to contribute to this increasingly powerful and global concept. It also discusses the criticisms attracted by this influential discourse throughout this period. The list of critics is provided in Annexure 6. Finally, the paper speaks to the roles of social scientists and critical geographers, especially political ecologists, in addressing issues of justice, equity, differentiated wellbeing, governance and community values to influence the next institutional spiral of this influential discourse. With its emergence and development by the western community and considering its rapid influence from global, to national and local scales, the paper shows the need to analyse the advancement of the discourse at national scale in developing nationa.

Contributions

This paper is jointly authored with Associate Professor Andrew McGregor, Dr. Donna Houston and Dr. Nakul Chettri who are supervisors of this research. The idea of this paper evolved when I was researching the literature review at the very beginning of my PhD and struggling to understand the roots of the ecosystem services concept. Associate Professor Andrew McGregor

(my Principal Supervisor) shared a paper by den Besten et al.'s (2014) paper on '*The evolution of REDD+: An analysis of discursive-institutional dynamics'*. In this paper, the authors used the concept of an institutional spiral to track the inclusions and exclusions of ideas in the context of REDD+. I became interested in the spiral and planned to apply it to explore the history of ecosystem services. As a lead author, I designed the concept of the paper under the direct supervision of the principal supervisor. I collected and analysed the data and prepared the very first draft of the paper. The paper was continuously updated through regular discussions and feedback. Dr. Houston and Dr. Chettri generously provided feedback on the drafted manuscript. With the overall responsibility, I finalised the paper by integrating the feedback from all the co-authors and submitted to the journal.

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Review

The evolution of ecosystem services: A time series and discourse-centered analysis

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ABSTRACT

The concept of ecosystem services is becoming increasingly influential in environmental research and policy – reshaping human–environment interactions. In this paper, we trace the rapid growth of ecosystem services across academic disciplines and amongst organizations at the boundary of science and policy. We approach ecosystem services as an evolving discourse and track its evolution across key institutional time frames. The review shows how the concept emerged in the United States as an economic and ecological response to ecosystem degradation, and has since expanded to incorporate a wide array of disciplinary perspectives across multiple countries. A discursive-institutional analysis identifies four key moments when ideas and initiatives from academia and policy became institutionalized. Using a spiral metaphor, we argue such moments shape subsequent research, policy and practice. The foundations of economics and ecology remain dominant, however there are emerging opportunities for other disciplines who have been marginal to this discourse up until now to contribute to what is becoming an increasingly powerful and global concept. We argue that social scientists must become more involved to ensure issues of poverty, justice, equality, differentiated wellbeing, governance, rights, and marginality are to influence the next institutional spiral of this important and influential discourse.

1. Introduction

The concept of ecosystem services, which first appeared in the 1980s, is becoming increasingly influential (Gómez-Baggethun et al., 2010). Ecosystem services, according to the Millennium Ecosystem Assessment (MEA, 2005), are 'the benefits ecosystems provide to human wellbeing'. The term has been joined by related terms such as 'environmental services' or 'ecological services', however 'ecosystem services' remains the most common term in scientific literature (Abson et al., 2014). The meanings and applications of the concept are rapidly evolving as researchers, policy makers and managers explore the benefits ecosystems provide for people (Haines-Young and Potschi, 2009). As a consequence, the literature on ecosystem services has grown exponentially (Fisher et al., 2009) and its central place in plans and programs by different institutions has occurred surprisingly quickly.

A variety of disciplines are now exploring the concept with their specific interests and approaches (Abson et al., 2014). Older notions that saw nature and humans in competition, or as threats to one another, have given way to newer interpretations emphasizing the interconnections and dependencies between human and natural systems. Researchers are exploring social, economic and ecological aspects of ecosystems services and incorporating the concept into decision-making, adaptation, sustainability and others. Global initiatives, such as the recent formation of the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) emphasize the expanding influence of ecosystem services within environmental fields.

Given the growing interest and its incorporation into policy, it is important to understand the history of the concept, how it is being shaped, and what concerns are arising. Mooney and Ehrlich (1997) provided an earlier review, and Gómez-Baggethun et al. (2010) provided a historical exploration of the concept with regard to economic theory and practice, particularly its incorporation into market mechanisms. In this paper, we attempt a similar task but

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look at the growth of ecosystem services as a multidisciplinary concept and track how different disciplines have approached the concept. We are interested in ecosystem services as a discourse and how this discourse has taken shape over time.

We are primarily interested in the evolution of ecosystems services discourse in the academic literature – however this cannot be isolated from developments in the policy arena. Instead developments in each sector influence one another (Pesche et al., 2013). Within the academic sector, the concept has traditionally been dominated by ecologists and economists (Lakerveld, 2012), however there have been calls to broaden the concept beyond economic discussions to include more diverse disciplinary perspectives (Daily et al., 2009; Pagiola, 2008), and to enable greater recognition of social and political issues (Daw et al., 2011). We are interested in the extent to which this is already happening, and whether the concept is evolving into a truly multidisciplinary concept or whether it remains anchored in ecology and economics. Such analysis is important given the increasing influence of the concept in policy and practice, where the omission/adoption of important social and political issues like gender, rights, and justice in the application of ecosystem services will have far reaching consequences for those affected by environmental plans and decision-making.

We focused more on academic research and spent less time focusing on how concept was shaped in policy arena. However, we do focus on particular organizations that work between academia and policymaking known as 'boundary organizations' (Guston, 2001). Also known as hybrid organizations, they play an important role in mediating between political and scientific institutions and include the Intergovernmental Panel on Climate Change (IPCC), and the Subsidiary Body on Scientific Technical and Technological Advice (SBSTTA) of the Convention on Biological Diversity (CBD) (Miller, 2001). Arts and Buizer (2009) show how boundary organizations play an important role in communicating science to policy makers, and institutionalizing particular understandings. There are many other activities being pursued by advocacy and policy organizations that contribute to the institutionalization of ecosystem services that we do not consider in this paper given the key aim described above. With these considerations in mind, the research seeks to answer the following questions:

1. When, why and how did the concept evolve?
2. What are key subject areas, institutions and actors shaping the concept?
3. What are the key moments of institutionalization in the development of ecosystem services discourse?
4. What key concerns/critiques have emerged regarding ecosystem services?

In doing so, we are particularly interested in how the more recent multidisciplinary interest in ecosystem services can further develop and strengthen the concept.

2. Methodological framework

2.1. Literature review

The evolution of ecosystem services discourse is tracked through a review of the literature. Fisher et al. (2009) identified over 1100 articles by using Web of Science, and Haines-Young and Potschi (2009) identified over 4000 journal articles by using Web of Knowledge (WoK) and Science Direct (SD). Following Fisher et al. (2009) and Haines-Young and Potschi (2009), this study also used web platforms, in this case '*Scopus*' and '*Google Scholar*'. They were used for their specific merits with regard to the aims of this research. *Scopus*, a bibliographic database containing abstracts and citations of peer-reviewed literature with access to more than 20,000 journals, was used to analyze number, journals coverage, and country contributions as it provides detailed information on affiliation/zipcodes and number of journals (Harzing, 2010). With access to 55 million articles, *Scopus* claims to be the largest abstract and citation database of peer-reviewed literature and is therefore appropriate for literature review tasks. As the volume of the articles was large, some criteria were used to focus on targeted literature. The term 'ecosystem services' was used as the keyword and practicalities dictated that only English language peer-reviewed journals were analyzed. The articles were then grouped into selected time frames (Pre-1997, 1997–2000, 2001–2004, 2005–2009, 2010–2013). The time frames were chosen based on key events/landmarks identified early in research during initial review (see Section 2.2). Some influential books, reports/strategic plans and websites were also reviewed. The reasons for choosing the term 'ecosystem services' as a keyword rather than 'environmental services' or 'ecological services' are:

1. The term 'ecosystem services' has become the most common term in literature (Abson et al., 2014);
2. Pilot research confirmed Fisher et al.'s (2009) observations that the term 'environmental services' retrieved a much broader set of publications – such as those relating to hospital environments. Far more articles referred to 'ecosystem services' rather than 'ecological services'.
3. Most international organizations and initiatives use the term 'ecosystem services'.

Google Scholar was used to order articles by citations as it casts a broader net for citations and results in higher counts than *Scopus* (Harzing, 2010). The selected peer-reviewed articles and books were saved in an EndNote database. In a separate excel sheet, articles with citations (high to low) were chronologically listed and reviewed. A grounded theory approach was applied for categorizing those ordered articles into subject areas. Grounded theory is a method that generates theory based on field data/content, rather than initial conceptualization of theories (Glaser and Strauss, 2009). The core themes of each article were first identified and a subject area was theorized based on those noted themes. The common subject areas of articles were then grouped and counted for each time frame. The total number of articles for each time frame, subject area, journal, and country of author's origin was counted and reviewed (Annex A), which helped us to analyze the temporal and geographic growth. The overall methodological framework is portrayed in Fig. 1.

2.2. Discourse analysis of ecosystem services

In this paper, we adopt a discourse-centered approach through which we are interested in the evolution of ecosystem services, the concepts and ideas that have been normalized and the role of different actors in shaping those concepts. Discourse, in simple terms, is a conversation of a formal nature, or an orderly expression of ideas in speech or writing (Mills, 2004). In a more critical academic sense, discourse refers to the languages, knowledge, institutions and means through which we make sense of the world. Attention is directed to the ideas that become accepted as 'commonsense', how these ideas are mobilized and communicated, and the institutions, such as the norms, plans, guidelines, conventions or procedures, which are embedded within, enable or constrain particular ways of thinking or acting (den Besten et al., 2014; Schmidt, 2008). Different discourses construct and interpret phenomena in different ways – hence a tree has very different meanings when embedded in an economic discourse than an

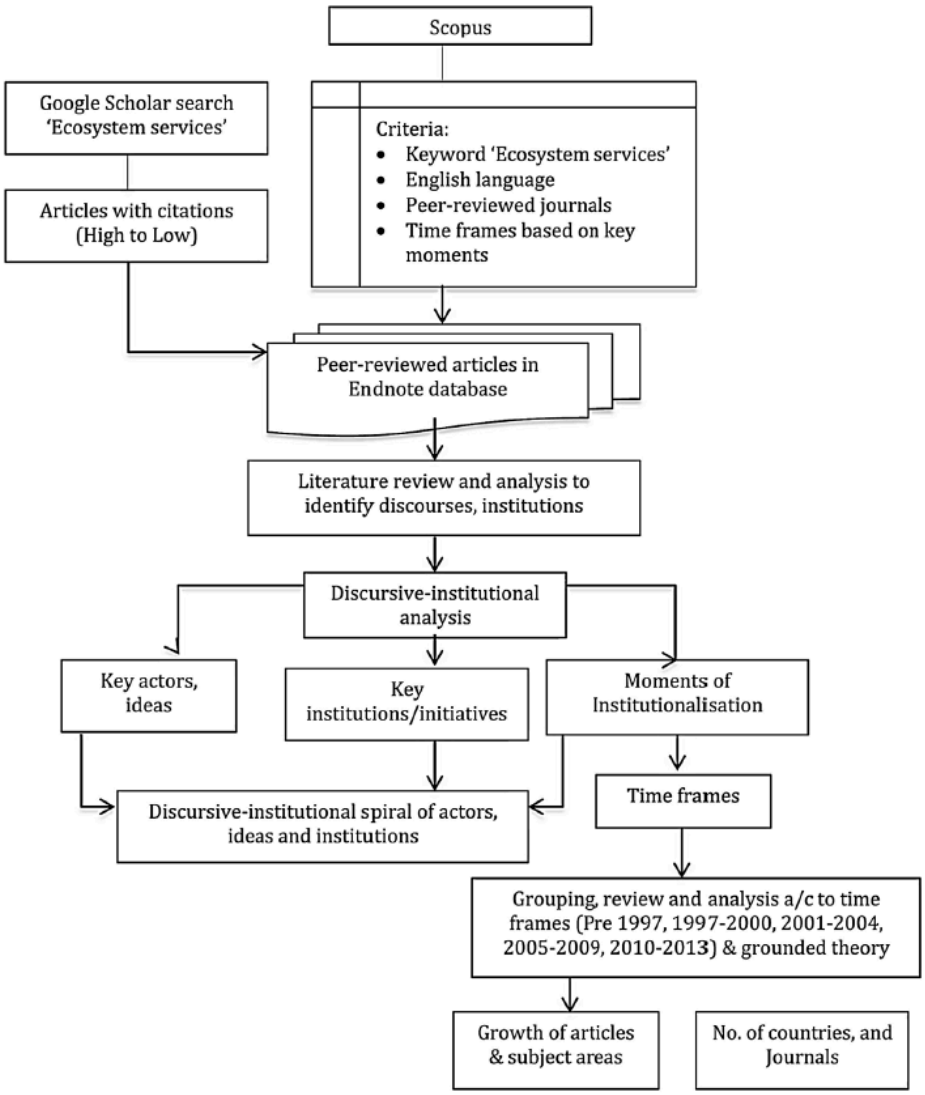

Fig. 1. Overall methodological framework of the study.

ecological one. Here we use a discourse-centered approach to focus on the role and influence of different actors, subject areas and institutions in normalizing or contesting particular ideas within ecosystem services.

During our analysis, we identified similarities to den Besten et al.'s (2014) findings in relation to the conceptual development of the Reducing Emissions from Deforestation and forest Degradation (REDD+) framework. We have sought to identify a similar discourse institutional spiral between actors, their ideas, subject areas and institutional initiatives (Annex B). den Besten et al. argue that the discursive-institutional spiral is a dynamic process involving the institutionalization of discourses and subsequent contestation and evolution of discourses in response to these institutionalization processes. Such approaches look at the relations between discourses and institutions, and how actors shape discourses (Arts and Buizer, 2009). Rather than see discourse as static, it can spiral through moments of expansion when actors and ideas contribute to discourse development, and subsequent moments of discourse institutionalization in arrangement and practices. The spiraling process temporarily highlights some principles and concerns while marginalizing others as the discourse grows and takes more robust shape through institutionalization (den Besten et al., 2014).

Drawing on these approaches, we identified four key events early on in the research that signaled the institutionalization of discourses. They were identified through analysis of academic and policy literature – particularly that of boundary organizations – as moments that attracted attention and critique, and spurred new research and policy directions. The moments:

1. 1997: when Payment for Ecosystem Services (PES) was first adopted as a national scale policy initiative in Costa Rica;
2. 2001: the launch of MEA;
3. 2005: the release of MEA synthesis report;
4. 2010: when agreement on IPBES was reached, followed by its establishment in 2012.

These moments helped in division of time frames and grouping of articles. Each of these moments reflects the culmination of much academic and policy work. In many ways, they were moments of

celebration when the collective efforts of ecosystems services proponents became institutionalized within national and global frameworks. They were also moments where the increasing influence and recognition of ecosystem services spurred further interest and debate as researchers, policy makers and activists became aware of strengths and weaknesses of those institutionalized approaches. In this paper, we focus particularly on academic contributions and responses to these moments in terms of multidisciplinary research. In the following section, we focus initially upon a quantitative analysis of our findings, followed by a more qualitative summary, before a depiction of the historical discursive-institutional spiral of ecosystem services and discussions of findings.

3. Results

3.1. Growth of ecosystem services literature by number

More than 13,000 papers on 'ecosystem services' were retrieved. However, the refinement criteria of 'ecosystem services' as keyword, only English language, peer-reviewed articles, and restricted time frames reduced this to a total of 7985 articles in *Scopus*. Before 1997, only 166 articles were found whereas 326 articles were found for 1997–2000, 488 for 2001–2004, 1980 for 2005–2009, and 5025 for 2010–2013 (Fig. 2). The trend line shows an exponential growth in articles, particularly from 2009 to 2013. We then focused on the most influential papers in *Google Scholar* – using a cutoff of 15 citations resulted 519 articles with 11,108 cites for the most highly cited paper (Annex A).

3.2. Growth of ecosystem services literature by subject areas

To explore the breadth of interest, we applied grounded theory using 519 articles retrieved through *Google Scholar* to qualitatively identify the key subject areas covered in each article. The review of most cited articles resulted in identification of 29 different subjects (Table 1). Before 1997, the concept was rarely mentioned in academia beyond economics and ecology. Some policy initiatives developed related ideas, such as the United Nation Environment Program (UNEP)'s Global Biodiversity Assessment 1995 and the Beijir Program on Biodiversity 1992, both of which focused on ecological and economic consequences of biodiversity loss. Some economists recognized ecosystem services in terms of use values (free gifts of nature) and then exchange values in 1980s, as a way to incorporate them into classical economics (Gómez-Baggethun et al., 2010). Gradually, the science behind economics (valuation) and ecology (ecosystem functions and biodiversity) broadened.

Table 1
List of subject areas identified through review of 519 articles in *Google Scholar*.

Subject areas/themes	No. of articles
Ecological economics (valuation studies)	150
Ecology/biodiversity (definition/classification/standardization)	137
Ecosystem services assessment (methods, framework, case studies)	34
Impact assessment (landuse, urbanization)	31
Agriculture and agroecology	20
Sociology (ethics, culture)	11
Hydrology (freshwater resources: river, wetland)	11
Landscape planning, and management	10
Restoration ecology	10
Forestry	9
Multidisciplinary (including health)	7
Marine biodiversity	9
Planning, and decision-making	9
Urban ecosystem services	8
Environmental science	7
Human wellbeing	7
Sustainability	7
Governance	6
Integrated ecology and economics	5
Livelihoods and poverty reduction	5
Coastal management	4
Political ecology	4
Adaptation	4
Agroforestry	3
Vulnerability and risks	3
Environmental law	2
Food security	2
History	2
Geography	2
Total subject areas: 29	Total articles: 519

The analysis of 519 articles showed broadening of concept from 3 subject areas (Pre-1997) to 12 (1997–2000), 18 (2001–2004), 26 (2005–2009) and 25 (2010–2013) (Fig. 3).

The original disciplines of economics and ecology were joined at first by other sciences such as forestry, hydrology, marine biodiversity as well as social sciences such as sociology and history. This was followed by an increasing interest in policy, planning, law and governance, before more critical commentary emerged from areas such as political ecology, human geography, food security and poverty reduction. Clearly the ecosystem services concept is changing, however, the economic and ecological originators still hold the most sway in determining its meanings (Table 1; Annex A). This is also emphasized in terms of journal coverage where, despite 280 journals carrying articles relating to ecosystem services, ecological and economic journals continue to predominate (Table 2). In 2012 the *Journal on Ecosystem Services* was launched to address the high volume of

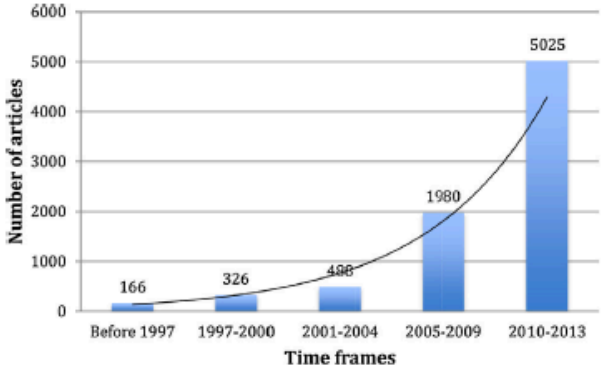

Fig. 2. An indicative figure showing growth of articles, identified analyzing 7985 articles in *Scopus*.

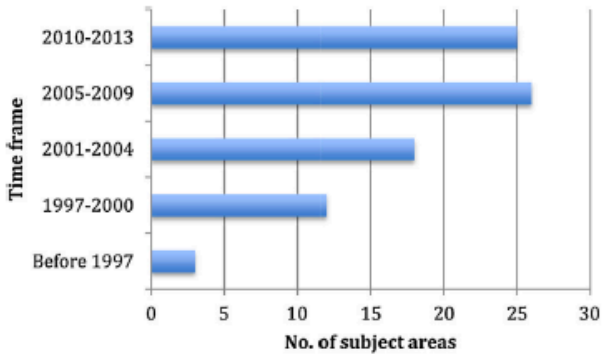

Fig. 3. An indicative figure showing broadening of subject areas, identified analyzing 519 articles through *Google Scholar*.

Table 2
Top 15 journals, identified analyzing 7985 articles through *Scopus*.

Journals	No. of articles
Ecological Economics	271
Ecology and Society	144
Forest Ecology and Management	126
PLoS ONE	119
Environmental Management	119
Journal of Environmental Management	121
Ecological Applications	121
Proceedings of the National Academy of Sciences of the United States of America	104
Journal of Applied Ecology	102
Landscape and Urban Planning	85
Biological Conservation	81
Ecological Indicators	68
Agriculture, Ecosystem and Environment	64
Biodiversity and Conservation	62
Ecosystem Services	56
Total journals: 280	7985

publications on ecosystem services, suggesting the concept has formed a sub-discipline of its own.

3.3. Contributions from countries

Contributions from countries were noted with regard to affiliations of authors of 7985 articles identified through *Scopus*. More than 100 countries have contributed articles on ecosystem services until the end of 2013, with top 15 given in Table 3. The concept was found to originate from the United States (Pistorius et al., 2012) and to have expanded gradually to Europe. However, the United States still dominates research output, followed by the United Kingdom, Germany, China, Australia, Canada and others. China is the only developing country in the top 10, however South Africa, Brazil and Mexico are increasingly embracing the concept. We note here our bias toward English-language articles but would not expect substantive differences if more local journals were included. Reviews by Fisher et al. (2009) and Haines-Young and Potschi (2009) had similar limitations in reviewing English articles only.

4. Time series analysis

For each time frame, articles with high citations were identified and their key ideas noted and reviewed. The top 4–5 highly cited articles shows the shifting evolution of the concept (Annex C). The key points are discussed below.

4.1. Pre-1997: early academic conceptions of ecosystem services

The notion of ecosystem services emerged with an increasing recognition that humans depend on nature and their negative actions are degrading earth's ecosystems. This is not a new observation as benefits of and disturbances to nature by human actions were observed even during Plato's era in 400 BC when he noted the drying of springs as a result of soil erosion caused by deforestation (Daily, 1997). Concerns were reignited by George Perkin Marsh's book '*Man and Nature*' in 1865 and Aldo Leopold's famous work in 1949, both alluding to services that nature provide. A resurgence in environmental concerns emerged through the influential work of Rachel Carson's (1962) *Silent Spring*, Ehrlich's (1968) *The Population Bomb*, Hardin's (1968) *Tragedy of the Commons* and Meadow et al.'s (1972) *The Limits to Growth*. Each emphasized the detrimental impacts of environmental degradation on humans. While these texts did not necessarily argue for valuation of ecosystem services, indeed some opposed them, their core messages provide rationales for those who do. Early attempts to value nature include Vogt (1948) who promoted the idea of natural capital and Schumacher (1973) discussed the valuation of natural resources (Gómez-Baggethun et al., 2010). In 1970, the

Table 3
List of top 15 countries identified analyzing 7985 articles in *Scopus*.

	Countries	Number of articles
1.	United states	3118
2.	United kingdom	1015
3.	Germany	614
4.	China	602
5.	Australia	501
6.	Canada	341
7.	France	320
8.	Netherlands	311
9.	Spain	301
10.	Italy	209
11.	Switzerland	154
12.	Sweden	153
13.	South Africa	143
14.	Brazil	102
15.	Mexico	101
	154	**7985**

Study of Critical Environmental Problems (SCEP) attempted to list services provided by natural systems – a concept that evolved into 'public services' (Ehrlich et al., 1977), 'nature services' (Westman, 1977) and finally 'ecosystem services', when the term was first used in 1981 by Ehrlich and Ehrlich (Mooney and Ehrlich, 1997). During that time, the concept was primarily discussed as an idea within the confines of academia, despite recognition by different institutions, including the Beijir Institute and the Brundtland report (Gómez-Baggethun et al., 2010). The idea was originally dominated by ecologists with a focus on ecosystem functions (Braat and de Groot, 2012) and economics focusing on quantification of ecosystem services (Carpenter et al., 1995). Their efforts were attempts to recognize the reliance of human society on environments.

4.2. 1997–2000: expanding economic and policy interest in ecosystem services

Though the term ecosystem service was first used in 1981, the time frame (1997–2000) marked an important period for mainstreaming and institutionalizing the concept. This period was shaped by two major developments. The first was the publication of two landmark studies by Daily (1997) and Costanza et al. (1997). Daily's book *Nature's services: societal dependence on natural ecosystems* provided a strong foundation providing a definition, stressing its importance for humanity, and emphasizing the need to link with policy. Costanza et al.'s paper, one of the most highly cited articles on ecosystem services, calculated and presented the monetary values of world's ecosystem services, attracting a lot of attention and criticism (Gómez-Baggethun et al., 2010). These triggered a rush of ecosystem services research, especially monetary valuation studies (Table 1; Annex A). Both publications helped mainstream ecosystem services in academic research and provided a strong rationale in policy making (Gómez-Baggethun et al., 2010).

The second major development was the transition of the concept from academia into policy. The most significant of these happened when PES was launched in Costa Rica in 1997 in response to increased global attention and commodification of ecosystem services (Gómez-Baggethun et al., 2010). However, it should be noted that the launch was not a straightforward transferal of academia debates but reflected the failure, and subsequent domestic politics of the country's forest policies to stop degradation (Pagiola, 2008). The PES policy was an outcome of negotiations involving diverse national and international stakeholders including scientists, economists, business, government and non-governmental organizations (Pesche et al., 2013). Though Pagiola (2008) and Pesche et al. (2013) argue that ecosystem services and PES are not same, this was the first instance when an ecosystem services approach was institutionalized at national level and progressed from a conceptual idea to implementation. PES, a voluntary and conditional transaction regarding a well-defined ecosystem service involving providers and beneficiaries (Wunder, 2005), was well received and began to be replicated elsewhere (Pagiola, 2008). The PES principle normalized a construction of nature that suggested that parts of nature could not only be given an economic value, but these economic values could guide effective management decisions. This economic understanding of environmental management proved popular. By 2002 just 5 years later, more than 300 PES examples were reported worldwide (Landell-Mill and Porras, 2002). The concept also began influencing multilateral treaties/initiatives: the 'ecosystem approach' was adopted by CBD in 2000 (Korn et al., 2003) and the Millennium Development Goals (MDGs) recognized the role of ecosystem services for poverty reduction (Uy and Shaw, 2012).

4.3. 2001–2004: uptake of ecosystems services concept by global actors

Ecosystem services became a subject of considerable global interest from 2001 to 2004. The most significant event was the official launch of the MEA in 2001, a multilateral initiative aimed at detailing global and sub-global assessments of the links between ecosystem change and human wellbeing (Pistorius et al., 2012). In 2003, it provided a framework that aimed improve decision-making for ecosystem services management. The impact of the MEA was widespread, with many (non)governmental organizations like The Nature Conservancy, World Wildlife Fund and Conservation International and multilateral organizations, including the World Bank, adopting the concept (Tallis et al., 2009). New international and national networks formed to research and promote the concept, including A Long-Term Biodiversity, Ecosystem and Awareness Research Network (ALTER-net), a network involving 27 institutes from 18 European countries focusing on ecosystems services. During this time, neoliberal approaches to ecosystem management were also increasing as market-based instruments were developed to value particular ecosystem services. Under the influence of the United Nations Framework Convention on Climate Change (UNFCCC), particular attention was devoted to measuring carbon services of forests. This was pursued initially through the Clean Development Mechanism (Pistorius et al., 2012) and at a later date through various incarnations of REDD mechanism (Holloway and Giandomenico, 2009).

All these initiatives had a major impact on research and policy, raising the profile and furthering the concept. In academia, the number of studies and disciplines multiplied (Fisher et al., 2009). Research focused on a broader array of issues including neoliberalization (Robertson, 2004), resilience and sustainable development (Folke et al., 2002), social values (Costanza, 2003), agroforestry (DeMarco and Coelho, 2004), and agricultural sustainability (Tilmand et al., 2002). This rapid expansion toward other disciplines strengthened robustness of ecosystem services in academia and increased its potential to inform policy makers and underpin action oriented at improved ecosystem management (Chee, 2004).

4.4. 2005–2009: global reporting on ecosystem services

The year 2005 marked the release of MEA synthesis report. The report, which involved more than 1300 scientists worldwide, reported the degradation of over half of the world's ecosystem services in the last 50 years. The nature at the center of ecosystem services discourse was no longer compartmentalized into separate parts but was conceptualized as a whole system, a fragile and depleting system whose services to humanity were rapidly degrading. It was a milestone publication that strengthened the concept and provided a global definition and means of classification. The report provided a rationale for upscaling research and urged to incorporate ecosystem services into global policy. As Mitchell et al. (2006) note, MEA (2005) was not only an assessment but also a social process involving scientists, policy makers and diverse stakeholders to produce knowledge. This multi-actor MEA process was undeniably successful in disseminating the produced knowledge with high impacts. As a consequence, global, multilateral and national initiatives increased, including the launch of programs such as The Economics of Ecosystem and Biodiversity (TEEB) 2007, Biodiversity Indicator Partnership (BIP) 2006, UK National Ecosystem Assessment 2007, European Union's Strategic Environmental Assessment (SEA) 2007, and the Ecosystem Services Partnership (ESP) 2008. Among these, TEEB, an important global initiative was started as a response to a proposal by

environmental ministers of G8+5 countries to provide global assessment of economic benefits of biodiversity and ecosystem services, and the costs associated with their loss. TEEB, an excellent example of communicating science and policy, has been influential in strengthening the economic aspects to policy making. An International Mechanism of Scientific Expertise on Biodiversity (IMoSEB), originated in 2005 at a Conference entitled "Biodiversity: Science and Governance", where the need to create 'IPCC-like mechanism for biodiversity' was discussed. IMoSEB negotiation processes decided to bring biodiversity science into policy by establishing IPBES in 2007. International organization such as DIVERSITAS (an international program for biodiversity science), International Council for Science (ICSU) and International Union for Conservation of Nature (IUCN) also supported the establishment of IPBES. DIVERSITAS helped to identify stakeholders and incorporate their knowledge to IPBES formation (Larigauderie and Mooney, 2010). In academia, governance, landscape management, human wellbeing, political ecology, poverty reduction, restoration ecology and vulnerability were new subject areas researching the concept.

4.5. 2010–2013: institutionalization of an intergovernmental body on biodiversity and ecosystem services

In 2010 the landmark decision to form the IPBES was approved, with the panel being established in 2012 (Pistorius et al., 2012). It was the phase where global action was taken at policy level, and both academic and non-academic actors were involved in science–policy interface. IPBES is an intergovernmental body on biodiversity and ecosystem services committed to bridging the gap between science and policy, seeking to advise governments on how to halt further degradation. The IPBES provides a science–policy interface where scientific information will be analyzed and synthesized to inform decision-making and influence global conventions. Capacity building, strengthening science–policy interface, assessment and communication, and evaluation are four major themes of the interface. The need to involve governments in scientific work for public benefit was the major reason for its establishment, which was possible through intense negotiations among the governments, scientists, international institutions, other stakeholders, and global initiatives and was thoroughly discussed in different meetings and Conference of Parties to the CBD (CoP) (Larigauderie and Mooney, 2010). Ecosystem services were institutionalized in global policies such as the CBD strategic plan 2011–2020, Satoyama Initiative 2010 and UNEP's Green Economy Initiative 2010. Multi-million global initiatives like Ecosystem Services for Poverty Reduction (ESPA) was also initiated aiming to integrate assessment findings to policy. Ecosystem services were also consolidated in academia with over 5000 articles being published from a wide variety of disciplines. From its early roots in the writing of a small group of environmentally concerned academics, the concept has arrived as a globally significant force.

5. A discursive-institutional spiral

Drawing from den Besten et al. (2014) approach, we identified a discursive-institutional spiral that illustrates how academic and some key non-academic actors have contributed to the development of the concept over time (Table 4). The spiral revolved around the four key moments of institutionalization: 1997 when PES was initiated; 2001 when MEA was officially launched; 2005 when MEA, 2005 synthesis report was published; and 2010 when agreement to establish IPBES reached. Throughout this period, discourses about ecosystem services have become more influential and attracted an increasingly broad array of interest from academic and policy stakeholders. Each spiral reflects the array of actors, institutions/initiatives that preceded it, so that our current understandings of ecosystem services, and the global approach of IPBES, reflects the evolving history of the concept. Perhaps most striking from this spiral is the rapid ascent of the discourse from the relatively obscure internal debates of ecologists and economists to its current prominence at the global scale through the 121 member countries of IPBES. Indeed the trajectory appears quite direct, however each spiral required the institutionalization and successful efforts of proponents of the previous period, and the subsequent academic and policy responses to that moment of institutionalization. It is quite easy to imagine, for example, that the discourses could have headed in quite different directions if Costanza et al.'s (1997) and Daily's (1997) work had not come out when it did. These papers provided powerful sets of arguments for policy makers by highlighting the economic service ecosystems provide for human societies. The conjoining of ecology and economics has created momentum for global action on environmental issues that neither could have achieved on their own.

Another interesting observation that derives from the spiral is how an increasing array of disciplines and institutions engaged in ecosystem services discourse. Organizations as diverse as non-profit, for-profit, government, inter-governmental, community, networks and academia at all levels from local to global across the world are adopting the concept, seeing opportunities within it to promote economic, social and environmental interests. The role of academics, policy makers and in particular the boundary organizations that emerged from collaborations at the science–policy interface have propelled the concept to an issue of widespread interest and concern.

Similarly a broad array of disciplines are now engaging, but as noted in Table 1, the vast majority of work still comes from the disciplines of ecology and economics. This suggests that the original influence of ecology and economics weighs heavily, and that the engagements of other disciplines like planning, law ethics and geography poverty and vulnerability studies, are still at the conceptual margins of this increasingly influential discourse. Hence they are drawn to a particular construction of human–nature relationships in which the services ecosystems provide are prioritized over other, less anthropocentric, interpretations. The rapid formation of the IPBES suggests these particular constructions of ecosystems have become institutionalized and will be difficult to shift.

6. Discussion

The concept of ecosystem services has arisen from early concerns about environmental degradation to a formal body of knowledge, policy and research, oriented at valuing and protecting valuable ecosystems. We have identified four key stages of institutionalization within ecosystem services discourse, which has followed a relatively smooth upward trajectory from the publication of key papers and launch of national initiative in 1997 to a subject of global research and focus today. In recognizing values of ecosystems in terms of services, environmental issues have been propelled onto the global agenda as degradation of those services is seen to carry an economic cost. However, in reifying particular meanings it necessarily excludes others and over the years the concept has attracted increasing criticism as it becomes more mainstreamed. A list of sample critiques/concerns is given in Annex D. At a very basic level, there is still a clear distinction between ecosystems and services they provide, however the growth of ecosystem services discourse is becoming more influential in shaping how people think about and value ecosystems. 'Ecosystem' generally refers to the complex interactions among living and non-living components of environment (Golley, 1995), often conceptualized as existing independent of

Table 4
A discursive-institutional spiral of ecosystem services (1997–2010).

Key actors (based on article's citation)	Key institutions & their initiatives	New discipline in each time frame		Remarks
Pre-1997 • Marsh (1965) • Westman (1977) • Ehrlich and Ehrlich (1981) • Ehrlich and Mooney (1983)	• SCEP, 1970 • Beijier Program on Biodiversity 1992 • UNEP's Global Biodiversity Assessment, 1995	• Ecology • Economics • Impact assessment		The term 'ecosystem services' was first used in 1981
1997- PES launched				**National interest in ecosystem services**
1997-2000 • Costanza et al.1997 • Daily(ed) 1997 • Bolund & Hunhammar (1999) • Rapport et al.1998 • Daily et al.2000	• International Geosphere and Biosphere Program, 1997 • Ecosystem Approach, 2000 • Millennium Development Goals, 2000 • TNC 2000	• Agriculture • ES Assessment • Forestry • History • Hydrology • Marine biodiversity • Sociology • Sustainability		Discursive expansion and response
2001- MEA officially launched				**Global interest in ecosystem services**
2001-2004 • Tilman et al. 2002 • De Groot et al. 2002 • Tilman et al. 2001 • Folke et al. 2002 • Balmford et al. 20	• Earth Summit 2002 • Launch of MEA Framework, 2003 • Recognition in MDG, 2000 • World Wildlife Fund 2004	• Adaptation • Agroforestry • Coastal • Environmental law • Environment • Integrated (ecology + economics) • Planning and decision making • Urban ES		Discursive expansion and response
2005- MEA Synthesis report launched				**Global reporting on ecosystem services**
2005-2009 • Costanza et al. 2006 • Foley et al. 2005 • Worm et al. 2006 • Balvanera et al. 2006 • Costanza, R., 2008	• TEEB • IMoSEB • Ecosystem Services Partnership • Biodiversity Indicators Partnership • DIVERSITAS • ICSU, IUCN	• Governance • Human wellbeing • Landscape management • Political ecology • Poverty reduction • Restoration ecology • Vulnerability		Discursive expansion and response
2010- Establishment of IPBES approved				Establishment of an intergovernmental body on biodiversity and ecosystem services
2010-2013 • de Groot et al. 2010 • Muradin et al. 2010 • Gomez-Baggethun et al. 2010 • Norgard et al. 2010 • Kosoy & Corbera, 2010	• IPBES established 2012 • CBD's Strategic Plan 2011-2020 • International Satoyama Initiative, 2010 • ESPA 2010	• Food security • Geography • Multidisciplinary		Discursive expansion and response

humans, in a pristine or natural state. The term 'services' referring to 'labor' within economics (Braat and de Groot, 2012) has focused attention on how particular ecosystems provide services to humans and how humans influences affect those services. As such the concept has attracted criticism for its anthropocentric focus, disregarding nature's intrinsic values (Redford and Adams, 2009) and excluding more challenging forms of environmental ethics (Jax et al., 2013). In contrast, Schröter et al. (2014) argue that it is the anthropocentric focus of ecosystem services that has facilitated the mainstreaming of the concept, creating a convincing rationale for policy makers to protect and use ecosystems sustainably and address ecosystem degradation.

The broadening of disciplines engaging the topic has led to other criticisms. Some are more technical, such as concerns over

the limitations of ecosystem services to account for uncertainty and reversibility (Chee, 2004), confusion between ecosystem functions and services (McCauley, 2006) and consequently the possibilities of double counting when valuing ecosystem services (De Groot et al., 2002). Others, however, reflect the engagement of new disciplines, which have different interests to that of ecology and economics. A common concern is the prioritization of economic values, which has led to an exclusion/marginalization of other ecological and socio-cultural values (Jackson and Palmer, 2014). Hence despite Aldo Leopold being an important figure in raising interest in developing solutions to environmental degradation, he explains his Land Ethic in 1949 as a direct response *against* those who were trying to put economic values to nature. A range of authors have raised concerns that putting a price on nature (Fairhead et al., 2012) can lead to separation, commodification and ultimately exploitation of environment, rather than a closer relationship to it. Others, coming from a biological sciences perspective, are concerned about the perceived weak links between biodiversity management and ecosystem services provision (Ridder, 2008) and that the anthropocentric focus may have detrimental effects on species (McCauley, 2006). Concerns are also being raised for insufficient attention devoted to poorer communities, and the multiple values and services ecosystems provide (Fisher et al., 2013). In contrast, others have highlighted the potential for using the concept to pursue sustainable development, resilience, and food security (Bommarco et al., 2013).

Hence the broadening of ecosystem services to other disciplines is raising new challenges and questions, and creating new avenues of research as ecosystem services emerges as a global project seeking to reconstruct human–environment relationships in a particular way. It is important that researchers from diverse disciplines continue to engage with the concept as it becomes increasingly influential in policy circles. While ecologists and economists along with policy makers and enormous variety of organizations have been successful in positioning the concept on global agendas by testing, implementing, influencing, and criticizing research, policies and practices, there is now a role for social scientists, activists and policy makers to contribute in ways that can ensure that ecosystem services contribute to the types of human–nature interactions we would like to see. To date, social sciences have been under-represented and subsequent moments of institutionalization, such as the formation of the MEA in 2005, under-emphasizing social issues (Daw et al., 2011) (Table 1). More research is needed on the impacts of ecosystem services on the global poor (Fisher et al., 2013) and justice to nature and society (Sikor, 2013). Key questions about who is benefitted and who is marginalized through distribution of ecosystem services remain unresolved. Decentralization of IPBES and developing transparent, fair and equitable working modalities for ecosystem services based programs like REDD+ and PES are ongoing challenges. There is a need and opportunity for social sciences to explore the social issues linked with ecosystem services including poverty alleviation, access, governance, dependency and justice. With sustained collaborations and contributions to this evolving field, such efforts could influence future cycles in the evolution of the discourse, and consequent global efforts aimed at managing human–nature relationships.

7. Conclusion

Like any environmental policy or concept, ecosystem services has its own unique history. In this paper, we have traced its academic history and, in doing so, raised questions about how the concept could have evolved in different ways. We have shown, for example, the concept emerged from the work of ecologists and economists working in the US who were concerned about environmental degradation. The discourse of ecosystem services has rapidly expanded across disciplines and countries, where varied actors including (non)government, non-profit, for-profit and institutions from academic and non-academic settings have helped to shape and influence the development of concept forming an institutional spiral. The spiral shows how actors, their ideas and institutions/initiatives interacted and came to institutionalize meanings of ecosystem services at particular moments. Boundary organizations played a critical role in contributing to the institutionalization of discourse at all stages. The concept has already been mainstreamed in many countries and continues to attract political support from decision-makers. Economics and ecology remain the most influential disciplines but we can imagine that the concept may have looked quite different if it had emerged in a different place, or amongst different types of disciplines. Instead core papers and institutions have driven the concept ever upwards, and it is only more recently that a broader array of disciplines have become interested and raised questions over concepts and directions. However, it is important that social scientists and other interested researchers who have been marginal to this discourse till now, also contribute to what is becoming an increasingly powerful, global and institutionalized concept. There is an urgent need and opportunity for a wider array of academic disciplines to join in efforts of activists and policy makers to influence the next phase of institutionalization, if issues of poverty, justice, commodification, governance, ethic, rights, biodiversity and social–environmental relationships are to take center stage in the next institutional spiral of this important and influential discourse.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.envsci.2015.04.025.

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Chapter 4: *Paristhitiki sewa*: A critical analysis of global ecosystem services discourse in Nepal

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Background

This chapter, building on the analysis of chapter 3, that showed the need to analyse advancement of the 'ecosystem services' discourse in developing nations, tracks the influence of this global discourse at the national scale.

Drawing on a case study in Nepal, the paper examines the integration of the 'ecosystem services' concept in environmental policies and analyses its implications for ecosystem governance. Adopting a discourse approach, the chapter employs in-depth interviews and content analysis of policies and other textual data including academic and non-academic literature. The analysis shows that the term 'ecosystems services', translated into Nepalese as *paristhiki sewa* (ecosystems – *paristhiki*, services – *sewa),* is increasingly being integrated into policy documents, including explicit recognition in seven different national policies. The analysis indicates that international actors are disproportionately influencing the adoption and integration of the concept in Nepal, with particular emphasis being placed on valuation and payment for ecosystem services (PES), changing the traditional understandings of human-nature relations. Once limited to the extraction of tangible benefits, especially forest products, the understanding has broadened to include intangibles such as carbon, water retention, air purification and others. The chapter discusses the challenges and barriers posed by the discourse, including the risk of marginalisation of national priorities and practice, marketisation of economically valued ecosystem services and entrenchment of injustice issues already embedded in ecosystem management, especially in community forestry.

Based on these findings, the chapter proposes that the concept be contextualised by consideration of national priorities and practices, and recommends further analysis of the likely influence of ecosystem services discourse on the existing system of ecosystem governance, especially in community forestry and the protected areas system.

Contributions

This paper is co-authored with Associate Professor Andrew McGregor, the principal supervisor of my doctoral research project. The idea for the paper emerged from the project's intention to explore the advancement of the global ecosystem services discourse in Nepal. It was shaped by the literature review, which analysed the influence of the discourse in developing countries. I collected and analysed the research data reported here and drafted the first version of the paper. Associate Professor McGregor's feedback has been integrated into the final version of the paper.

Abstract

'Ecosystem services' is a globalising concept that is being incorporated into environmental policies around the world. It is particularly advanced in Western nations which were active in developing the concept, but less applied in non-Western contexts. In this paper, we explore how the ecosystem services concept is being promoted and interpreted in the context of Nepal. We conducted a content analysis of environmental policies and media coverage, and conducted in-depth interviews with key stakeholders. The findings show that the concept is being increasingly integrated into environmental policy documents and is likely to become influential. International actors are most responsible for supporting the concept in Nepal, primarily through funding projects, shaping the way ecosystem services concept is understood and articulated in the country. Ecosystem services is primarily constructed in terms of economic valuation and payments for ecosystem services, in particular for forest and water services. This poses risks associated with the commodification and marketisation of valued ecosystem services, including over extraction of resources and inequitable outcomes, and marginalising intangible benefits that cannot easily be monetarily valued. The study argues that rather than complying with international agendas, a more comprehensive approach to ecosystem services that defines the scope of the concept, the risks and benefits associated with it and contextualises ecosystem services within national priorities and issues is needed in Nepal.

Keywords: ecosystem services discourse, Nepal, policy, economic valuation, environmental policy, intangible values

4.1. Background

Contemporary conservation approaches focus on both conservation and development outcomes – a response to the failure of traditional conservation policies that focus only on nature protection and exclude development (Liberati et al., 2016). One of the new policies that focuses on both conservation and development is referred to as 'ecosystem services' (Primmer et al., 2015), that is, the 'benefits human derive from ecosystems for their wellbeing' (MEA, 2005). Ecosystem services programs, focusing on the benefits generated by ecosystem processes and the functions that human derive (and to which they attach a range of values, e.g. social, economic, cultural), bring nature and human values together for both conservation and development outcomes, albeit with an anthropocentric focus (Schroter et al., 2015).

The ecosystem services concept has been influential in both the science and policy of ecosystem management, particularly after the release of Millennium Ecosystem Assessment (MEA) report in 2005 (Schleyer et al., 2015). Global ecosystem services initiatives such as the Economics of Ecosystems and Biodiversity (TEEB), and the International Panel on Biodiversity and Ecosystem Services (IPBES) have been particularly influential (Turnpenny et al., 2014). The global Convention on Biological Diversity (CBD), a legal framework with 196 member countries, recognises the concept for actions on biodiversity and urges its member states to integrate it into their national policies (CBD, 2016). This is occurring in many Western nations, including European Union countries, the United States, United Kingdom, Australia and New Zealand, which are already mainstreaming the concept into their environmental policies for better environmental management (Schleyer et al., 2015).

The discourse is criticised, however, for its western-centric focus (Dempsey and Robertson, 2012). It originated in the United States and expanded gradually to Europe. By the end of 2013, almost ninety percent of ecosystem services research reported was from developed countries (see Chaudhary et al., 2015, p.29). In the United States, ecosystem research initiatives are numerous at federal and state levels, and are integrated in policy and programs such as land use planning and water resources management (Schaefer et al., 2015). Similarly, in Europe, ecosystem services assessment tools, classification systems such as the Common International Classification of Ecosystem Services (CICES), and valuation methods have been developed and integrated into regional and national policy and frameworks (McDonough et al., 2017). In developing nations, policy-makers and practitioners are also beginning to design and implement programs that integrate the concept (Ferraro et al., 2012). However, their contribution to the development of the concept and associated knowledge is very limited, with only 13% of global

publications coming from developing countries – and these are dominated by China (10%) and Brazil (3%) (McDonough et al., 2017, Chaudhary et al., 2015).

To date, very few studies have been conducted to understand the advancement of this global discourse into national policies, particularly in developing nations (Pandeya et al., 2016 Barber et al., 2014; Lovei et al., 2007). There is a need to move beyond the western origin of the ecosystem services concept and acknowledge the different approaches to human-nature interactions that derive from diverse geographies in order to appropriately engage with ecosystem services in policy and practice (Schroter, 2014). This is important as in many developing nations, development itself is often more immediately tied to the services arising from ecosystems (Mertz et al., 2007). Identifying how the concept is unfolding in these nations would help to understand how human-nature relations and ecosystem governance is shifting to accommodate globalising concepts that originated in the West.

In this study, we analyse the integration of ecosystem services into the policies of Nepal, where the term has been translated as '*Paristhitiki sewa'* (*paristhitiki* - ecosystem, *sewa* - services). We selected Nepal as the case study as it is a signatory to CBD and a member of IPBES, and is embracing the concept in research (Bhandari et al 2016, Chaudhary et al 2016, Thapa et al 2016, Paudyal et al 2017), science-policy dialogues (ICIMOD, 2016), project initiatives, and policy formulation (Bhatta et al., 2014). Our study was guided by the following research questions:

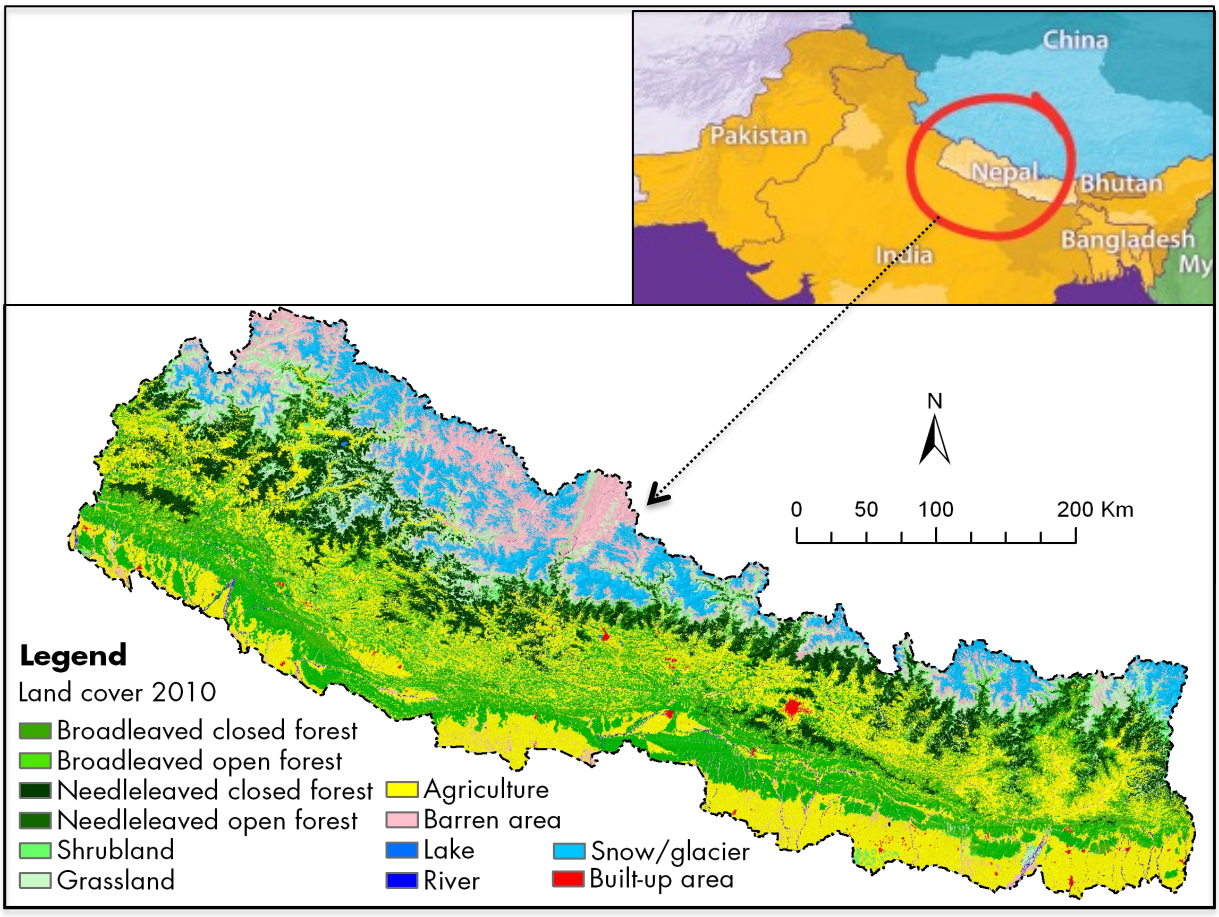
1. To what extent is the concept 'ecosystem services' integrated into environmental policies of Nepal?
2. Who are the key actors involved in promoting and integrating the concept, and what issues do they prioritise?
3. What are the barriers and challenges emerging with the advancement of the discourse?

To answer these questions, we carried out a content analysis of policy documents and conducted in-depth interviews of the decision-makers, practitioners and scientists involved in policy making or lobbying. We also analysed media and social media (facebook and twitter) related to policy formation to track the progression of the discourse. Our aim is to contribute to ecosystem services knowledge through developing a critical understanding of how these global environmental initiatives are interpreted and applied in place. The following section describes the methods and approaches adopted, and the results are briefly summarised before discussing the implications of our findings and concluding the paper.

4.2. Study area

Nepal is a Himalayan nation in South Asia, located between China in the North and India in the East, West and South (see Figure 9). The country, with a population of 26 million, is highly diverse in its geography with an elevation starting from 70 meters above sea level on the alluvial plains in the South to 8,848 meters at the peak of Mount Everest in the North (NBS, 2014). Nepal hosts diverse ecosystems. The major land covers are forest (40%), agriculture (30%), bare areas (11%), snow (8%), grassland (8%), and shrubs (3%), (Uddin et al., 2015).

Figure 9: Map of Nepal with its major land covers



Source: ICIMOD, 2014

These land covers support a rich biodiversity, with a total of 118 ecosystems providing habitat to 208 species of mammals (Jnawali et al., 2011), 867 species of birds (BCN and DNPWC, 2011), 6500 species of flowering plants of which 284 are endemic, 123 species of reptiles, and 117 species of amphibians (NBS, 2014). These diverse ecosystems also provide a wide range of services of local, national and global importance. For example, services such as water, timber, fuelwood and food are of local importance, while ecological functions such as climate/water

regulation, soil retention, flood control, aesthetic experience and habitat for biodiversity have regional and global importance (Poudyal et al., 2017, NBS, 2014). These services are closely linked to the wellbeing of the millions of people who directly depend on these natural resources for their subsistence living and household income in Nepal (NBS, 2014, pg.xx). About 78 percent of total energy consumed in 2008/09 was supplied by fuelwood (WECS, 2010), and major populations of rural Nepal still depend on non-timber forest products (NTFPs) for income, subsistence living and traditional medicines (UNDP, 2005). Agriculture employs more than 65% of the population and contributes 32% of Gross Domestic Product (GDP). The country, and particularly the rural population, is very dependent on the services provided by its diverse ecosystems (NBS, 2014, pg.xx).

The country faces several threats to its rich ecosystems. The major threats are overexploitation, invasive alien species, pollution, poaching/illegal trade, and human-animal conflict especially near forested and protected areas (NBS, 2014). To deal with these threats and conserve its ecosystems, Nepal has different strategies, plans, conventions and policies in place. There are more than 30 biodiversity-related national policies, strategies and legislation for sustainable management of natural resources (NBS, 2014, p. 36). The country has adopted and pioneered different approaches and has been successful in achieving many conservation outcomes, especially in halting forest loss and increasing protected areas coverage (NBS, 2014). Protected areas make up about 23% of the total land area of the country (Bhattarai et al., 2017). Community forestry in particular, where the authority to manage forests is decentralised from the state to the local community, has been successful in halting forest loss, increasing forest cover and supporting local livelihoods (Pokharel et al., 2013). Today community forests cover one-third of the country's forests and provide subsistence living to millions of people (DoF, 2017).

Legal provisions for nature conservation and management began in the 1950s with the enactment of the *Private Forest Nationalisation Act* (see Table 6) in 1957. The Act nationalised all forests and the state controlled the forests through a techno-bureaucracy that excluded local people (Malla, 2000). State control over the forests served the interests of ruling elites who encouraged local people to convert hill forests into agriculture to generate tax, and large expanses of forests were also cleared to meet timber demand of India (Blaikie et al., 2002). In the late 1950s, Himalayan degradation became a major concern leading to intense landslides, soil erosion, flooding and decrease in soil fertility. Despite the establishment of a Ministry of Forests and Soil Conservation (MoFSC) and enactment of further protection legislation during the 1960s (*Forest Act 1961* and *Forest Protection – Special Provisional Act 1967*), forest

degradation continued. The degradation was linked with rapid population growth of subsistence mountain communities and their overdependence on forests for food and fuelwood - leading to denuded hills, catastrophic soil erosion, landslides, and flooding across the country (Ives, 1989) - a period often referred to as the Himalayan environmental crisis era, or the *Theory of Himalayan Degradation* (Ojha et al., 2009c, Eckholm, 1976). The degradation portrayed the local mountain communities as a major problem of the crisis threatening the fragile Himalayan ecosystems and their own livelihoods (Ojha et al., 2014, Paudyal et al., 2017, Hobley and Malla, 1996). The crisis theory, however, was heavily criticized as an exaggeration and myth (Ives and Messerli, 1989). Ives and Messerli (1989), through their book *The Himalayan Dilemma,* highlighted how the problems of degradation, landslides and flooding were not environmental but they were deeply linked with socio-economic processes, techno-bureaucratic systems and above all the political chaos of the country. The local mountain communities, once identified as a major problem for the crisis, were regarded important to deal with the crisis – highlighting the importance of local participation (Satyal et al., 2017, Ives and Messerli, 1989).

During the 1970s, the Chitwan National Park was established in 1973 as the first park in the country created under the *National Parks and Wildlife Conservation Act* (NPWCA) – a milestone in the history of conservation, that was followed by the establishment of other protected areas in the country (Upreti, 2001). These parks, however, mostly followed a 'command and control' approach to conservation that contributed to over-extraction of resources and degradation of ecosystems. The people's participation in forest conservation and management was officially recognised in the National Forestry Plan 1976 (Gautam et al., 2004) and in the amended NPWCA in 1979. The amended National Parks Act adopted a more people-centred approach which gave rights to local communities to collect grass and reeds from the reserves once a year to meet their basic needs (Bhattarai et al., 2017).

During the 1970s, Nepal also signed international treaties to show its commitment to conservation, including the Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973), the Convention on Wetlands (1971) and the World Heritage Convention (1972). The people-centred approach was further developed through the revised NPWCA 1993, and through the *Buffer Zone Management Regulations*, 1996. Buffer zones are areas surrounding national parks and reserves which have been set aside for local communities to fulfill their basic forest needs. The 1993 amendment of the NPWCA gave access rights to local people and was also influenced by the community forestry approach endorsed by the Master Plan for the Forest Sector in 1988 (Bhattarai et al., 2017). This was the foundation of community-based forestry in the country, strengthened during the 1990s by the *Forest Act*

(1993), *Forest Regulations* (1995) and *Local Self Governance Act* (1999). Nepal signed the Convention on Biodiversity Diversity (CBD) in 1993.

Table 6: Major policies, acts, strategies and commitments to multilateral agreements

Year	Key events	Legal documents	Commitments
		National	**International**
1950s	Himalayan crisis dilemma	Private Forest Nationalisation Act 1957	
1960s		Forest Act 1961	
		Forest Protection Special Provisions Act 1967	
1970s	First national park established in the country – landmark for conservation	National Forestry Plan 1976	Ramsar Convention on Wetlands 1971
		Wildlife Conservation Act 1973	World Heritage Convention 1972
		National Park and Wildlife Conservation Act 1979	
1980s		Master Plan for Forestry Sector 1988	
1990s	Community forestry established 1987	Forest Act 1993	Convention on Biological Diversity 1993
		Forest Regulations 1995	
		Local Self Governance Act 1999	
	Buffer zone establishment 1997	Buffer Zone Management Regulations 1996	
		National Parks and Wildlife Conservation Act 1993	
2000s	Landscape approach 2002	REDD+	United Nations Framework to Combat Climate Change 1992
		Community Forestry Guidelines 2008	
		Forest Policy 2000 (Amendment)	IPBES 2012
	PES type project initiated in 2003	Leasehold Forest Policy 2002	
		National Biodiversity Strategy 2014-2020	
		Collaborative Forest Management Guideline 2003	
		Wetland Policy 2003	

During the 2000s, Nepal adopted further innovative approaches to conservation and forest management. In the conservation sector through the protected areas system, the approach changed from site-based conservation (limited within isolated national parks) to landscape and transboundary-scale conservation encouraging the establishment of corridors and connectivity for conservation and development outcomes beyond countries or political entities (Bhattrarai et al., 2017, Chettri et al., 2007). Landscape approaches attempt to reconcile broad-scale conservation and development objectives by holistic management of landscapes with multiple land covers such as agriculture, conservation and other land uses (Reed et al., 2016). In early 2000, the country also adopted an'ecosystem approach' – an approach to conserve entire ecosystems, especially in areas of high human activity, to reach a balance between ecological,

social and economic needs (Smith and Maltby, 2003). This approach was incorporated in the National Tenth Five-Year Plan (2002-07) to emphasise the contribution of forest conservation to poverty alleviation, and again in the Ten-Year (2006-2016) Strategic Plan for long-term sustainable use and management of biodiversity (Acharya et al., 2010).

Another recent influence has been the development of the Reduction of Emissions from Deforestation and Forest Degradation (REDD+) program, which emerged after the 2007 Bali Conference of Parties to the United Nations Framework Convention on Climate Change (UNFCCC). REDD+ Readiness has involved developing a payment system for measuring and increasing forest carbon stocks in community forests in Nepal, paving the way for payments of other services provided by community forests. Community forests have since been recognised for their potential within Payment of Ecosystem Services (PES) systems. PES is a market-based approach designed to conserve the environment through financial payments, in which the users of ecosystem services pay those who maintain the ecosystems to adopt environmental friendly approaches to ensure long term supply of desired services (Wunder, 2005). PES was introduced in 2003 as a pilot project of the World Agroforestry Centre (ICRAF) to compensate and reward upstream communities of the *Kulekhani watershed* (Khatri, 2009).

As a result of adoption of these contemporary approaches to sustainable ecosystem management, including REDD+ and PES, the stakeholders involved in the conservation and forest management sectors have broadened beyond the local and national community to include the global community (Paudyal et al., 2017). In addition, private sector organisations are becoming more involved in environmental issues, joining government and civil society organisations (Dixon and Challies, 2015). Recently, Nepal committed to strengthen the science-policy interface of ecosystem services, encouraging ecosystem service-based research and project initiatives (ICIMOD, 2016). Within this context, there is increasing international and domestic interest in identifying, and in some cases valuing, the services provided by ecosystems and hence an active engagement with the concept and practices embedded within the discourse of ecosystem services. In the following section we outline the methods we adopted to analyse how the concept of ecosystem services has been received and interpreted at the national scale.

4.3. Approach and methods

We adopted a discourse-centred approach to track the advancement of ecosystem services in Nepal. Discourse, in this study, is an orderly expression of ideas in speech and writing (Mills, 2004). It is a social construction of reality, a kind of knowledge (Fairclough, 1995) where ideas are “normalised” and accepted as “commonsense”. Discourses can be languages, knowledge,

power, institutions and means, where interests and beliefs are negotiated (Bulkeley, 2000), shaping meaning and particular ways of thinking and acting (Schmidt, 2008). The aim of discourse analysis is to understand the processes through which reality becomes constructed by analysing actors, interests, narratives and languages (Lees, 2004). There is no 'right and wrong' in discourse analysis, rather it is a process of understanding the way particular truths are produced and applied (Astuti, 2015, Rutherford, 2008). In our analysis, we identify the actors, their interests, and the means through which the discourse of ecosystem services is being constructed and integrated into policy in Nepal.

We developed a qualitative interpretative approach that involved interviews with key informants (policy-makers, practitioners and scientists working in the environmental field) and content analysis of environmental policies, following Hansen et al., (2015) and Kabisch (2016) (see Table 7).

Table 7: Methods adopted for the study

Data collection		Analysis		Key coding themes
Policy documents	28	Content analysis	Interpretation	Ecosystem services integration into policies
In-depth interviews	16			
Peer-reviewed articles	17			
Reports Media	15 17			Major actors and major interests
Social media	27			Barriers and challenges

This was supported by further analysis of other textual data: academic literature (peer-reviewed articles), non-academic literature (reports, working papers, proceedings), media articles (newspaper) and social media (Twitter and facebook posts). The content analysis of policies and other textual data helped us to understand how the concept of ecosystem services was being integrated into policies, and identify the major actors and their interests. The in-depth interviews helped to identify barriers and challenges and better understand the processes through which policies are produced.

In terms of policies, we chose the major policy documents that govern environmental landscapes and issues in Nepal. A total of 28 policy documents: 11 legal acts and regulations (a

legal document issued by the legislature with detailed set of standards, procedures and principles to be followed), seven policies (a legal document with detailed principles set for implementation), seven strategic plans (long-term plan to provide strategic direction), and two guidelines (public documents to guide actions) were selected for analysis. The advancement of ecosystem services discourse was anaslysed by assessing the explicit and implicit adoption of the ecosystem services concept in the environmental policies. 'Explicit' in this sense means a conscious adoption of the term 'ecosystem services' and the notion it holds, while 'implicit' refers to the benefits from natural ecosystems to humans without conscious reference to the term (Hansen et al., 2015; Matzdor and Meyer, 2014). The content of these documents was analysed to identify explicit and implicit references to the concept of ecosystem services, which were then tagged for further analysis to identify how the ecosystem services term was interpreted and used in policy documents. The interpretation of the results was complemented by in-depth interviews.

Sixteen semi-structured in-depth interviews were conducted with policy-makers, practitioners and scientists involved in the field of environmental protection and ecosystem management, from government, academia, and non-government and international organisations. The policy-makers chosen were representatives of the major administrative and public bodies concerned with ecosystem governance in the country: the Ministry of Forests and Soil Conservation (the Department of National Parks and Wildlife Conservation, Department of Forests, and Department of Forest Research and Survey), the Ministry of Environment, and the Reduced Emissions from Deforestation and Forest Degradation (REDD) Cell. Representatives from most of the major international organisations working in the field of nature conservation were interviewed: the International Centre of Integrated Mountain Development (ICIMOD); International Union for Conservation of Nature; International Water Management Institute; South Asia Network for Development and Environmental Economics (SANDEE); United Nations Development Program; and the World Wide Fund for Nature (WWF). The scientists and practitioners were chosen because of their involvement in the workshops focused on ecosystem services and their contributions to reports, policy briefs, media articles and peer-reviewed articles.

The interviews were conducted between August 2016 and January 2017, mostly using Skype and/or telephone depending on their availability, and in Nepalese or English. They were asked to provide their views on the concept of 'ecosystem services', integration of the concept into policy, opportunities, barriers/challenges, and any implications of the integration for ecosystem governance in Nepal. The interviews took an average of 35 minutes. The recorded interviews

were transcribed and coded with themes, inductively and deductively, using NVivo 10.21. The themes, already shaped by the semi-structured interview questions, were coded deductively, while any new issues were coded inductively and noted down in a notebook. The interviewees' interests in ecosystem services – such as adaptation or valuation – were also coded. The identified themes were then interpreted with respect to the research questions of the study.

The academic literature analysed, was focused on peer-reviewed articles selected through the search engines *Sciencedirect* and *Google scholar*. The four key search terms used were: 'Nepal' followed by either 'ecosystem services', 'Payment for Ecosystem Services (PES)', 'environmental services' or 'economic valuation'. Based on the recommendations by the interviewees during interviews, the term 'environmental services' was included for the literature review in contrary to global scale literature search focusing only on 'ecosystem services' (see chapter 3). The interviewees suggested that the term 'environmental services' has been included in some of the published policy documents and would be wise to use the term. With these terms, a total of 17 peer-reviewed articles published between 2005 (the year the MEA was released) and 2016 were retrieved using these search criteria and were reviewed. The non-academic literature retrieved through *Google* searches and organisational websites included reports, working papers and proceedings of workshops from donors, NGOs and INGOs. This resulted in 15 reports and papers for review.

Three major national newspapers, *Kantipur, Gorkhapatra* and *Himalayan times*, were searched for relevant articles. These were selected because of their popularity and the number of subscribers, following Khatri et al., (2016). *Kantipur* and *Himalayan Times,* both privately-owned publications, are the largest-selling English national daily newspapers in the country, whereas *Gorkhapatra*, the nation's first daily newspaper, is government-owned and publishes articles in both English and Nepalese. We included the English-language papers as many experts and donors publish articles in English (Khatri et al., 2016). The articles chosen were published between 2005 and 2016. Other online newspapers such as *Nagiknews* and *Setopati* (both in Nepalese) were also considered for review, but only those articles that were posted on Twitter and Facebook were selected due to problems in accessing their archives online.

Social media sites such as Facebook and Twitter were also included in the literature search as they provide a platform for rapid communication between scientists, organisations and the general public (Papworth, 2015) and have become one of the major means of spreading environmental messages among key institutions, including government, non-government, private and donor organisations. Academic articles are now widely shared through social media

to circulate information across the network (Darling and Rummer, 2015). We searched these platforms for information about 'ecosystem services' in Nepal, particularly projects, articles and published reports, workshops, and opinions. Tweets and Facebook posts were searched through the keywords and/or hashtags, 'payment for Ecosystem Services (PES), 'ecosystem services' and 'Nepal', and by time-period and location for postings between 2005 and 2016, which retrieved 27 posts. These were analysed to identify actors, interests and major subject areas surrounding ecosystem services in Nepal.

A database of all the collected textual data was developed to assist the analysis[5]. The contents of the collected documents were analysed through coding guided by three questions: who are the actors; what is the main subject area (theme); and what is the central claim (interests). The coded texts were then interpreted in reference to the research questions, and the findings are summarised in the next section.

4.4. Findings

This section highlights the key findings of the paper in response to the three major questions posed by this research. The findings show the extent to which the term 'ecosystem services' has been integrated into the policy documents of Nepal, the major actors engaged with the discourse and the emerging interests, and the barriers and challenges brought by the ecosystem services discourse in the country. Each finding is explored in detail in the discussion section below.

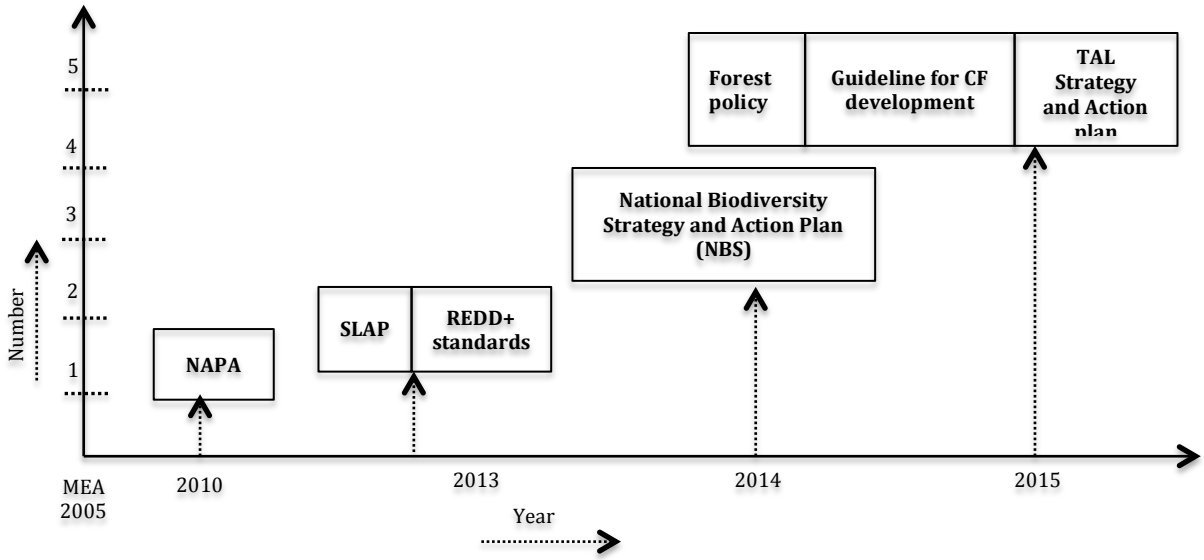
4.4.1 To what extent is the 'ecosystem services' concept integrated into policy in Nepal?

The concept of ecosystem services is increasingly being integrated into environmental policies in Nepal. The analysis of 28 policy documents showed that the term 'ecosystem services' or '*paristhitiki sewa'* was explicitly mentioned in seven different policy documents (three strategic plans, two guidelines, one policy and one action plan) over the last two decades (see Figure 10). The term was first mentioned in 2010 in the National Adaptation Programme of Action on climate change (NAPA), explaining it as a new concept that emphasised the services people get from different ecosystems and that it could help society respond to the rising risks of climate change such as forest fire and pests, while securing forest livelihoods (NAPA 2010): *the adaptation should focus on the ways that ensure better ecosystem health and its services*

[5] A list of the peer-reviewed articles, reports, media articles and social media posts is provided in Annexures 9, 10, 11 and 12.

including payment for environmental services (p.27) (see Annexure 7). In the context of increasing concern about the impacts of climate change, the benefits of ecosystems for human adaption have been more widely recognised (Baro et al., 2014). Forests products, for example, can provide safety nets to local communities in the event of crop failure caused by climate variability (Paavola et al., 2008). This is particularly important in Nepal, where forests are regarded as integral to subsistence living and rural economies (Maren et al., 2013).

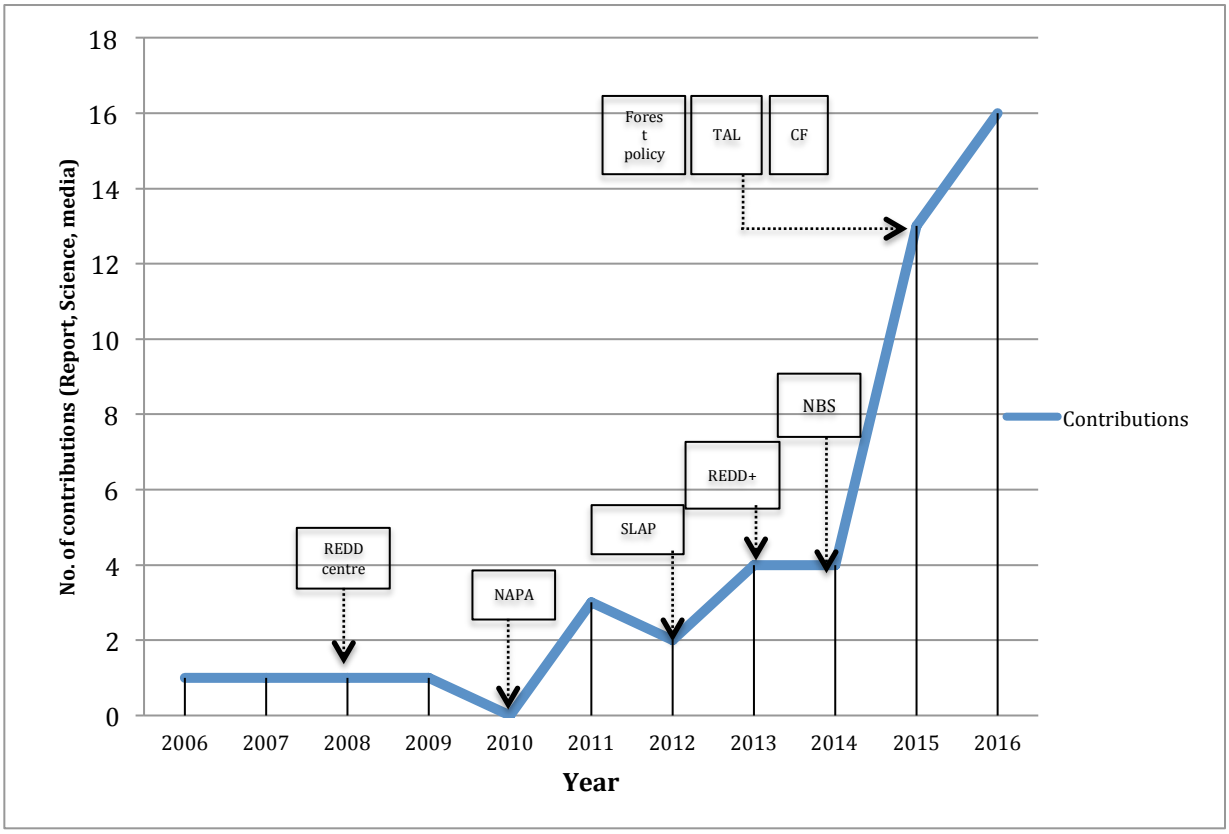
Figure 10: Explicit recognition of 'ecosystem services' in national policies and strategies



After 2010, the term wasn't explicitly mentioned until two policy documents were published in 2013: the Snow Leopard Conservation Action Plan (SLAP), and the REDD+ Social and Environmental standards. In SLAP, the term was promoted as a means to support conservation of the endangered snow leopard. The SLAP recommended PES approaches that could be funded through tourism (GoN 2013, page.11). The ecosystem services concept in the REDD+ Social and Environmental standards was used to promote improved forest management to increase forest carbon, support biodiversity and support societal wellbeing. More recently, the term was used in the Nepal Biodiversity Strategy and Action Plan (NBS) 2014-2020, a principal instrument for biodiversity management in the country. It is an umbrella strategy that guides national policies and actions, emphasising the valuation of ecosystem services and their incorporation into national development plans and Gross Domestic Product (GDP) calculations (NBS 2014, pg.60). After the NBS in 2014, three 2015 policy documents recognised the concept explicitly: Forest Policy 2015 (amendment); Guideline for Community Forestry Development; and Terai Arc Landscape Strategy and Action Plan (2015-25). These documents strongly advocate valuation of ecosystem services and support PES schemes to manage ecosystems, especially forests, sustainably.

The term has also been increasingly integrated into other non-policy documents. A total of forty-nine documents were found to explicitly mention the term since 2006: reports (15), peer-reviewed (17) and media (17) (see Figure 11).

Figure 11: Number of reports, peer-reviewed and media articles on ecosystem services



Until 2012, very few reports and media articles were found to mention the concept explicitly. However after 2012, interest started to grow to a peak in 2016 when 16 documents referred directly to the concept: media (7), academic articles (7) and reports (2). The growth in explicit use of the term reflected increases in funding schemes available for ecosystem services based research, projects and workshops in Nepal. For instance, Birdlife International applied a Toolkit for Ecosystem Service Site-based Assessment (TESSA) for assessing ecosystem services in the Important Bird Areas (IBAs) of Nepal in collaboration with a local NGO, Bird Conservation Nepal (BCN). Similarly, the increased funding for REDD+ for forest carbon has stimulated discussions regarding the feasibility and establishment of PES for other ecosystem services in Nepal (Bhatta et al., 2015).

Sixteen different research and development projects were found to apply the concept of ecosystem services to practice (see Annexure 8) showing an increased awareness of the term among government and non-government entities in policy and practice. The major aim of these projects is to sustainably manage ecosystems and their services for the wellbeing of people and improve adaptation to the risks of climate change. A number of workshops, forums and policy dialogues were found to focus explicitly on ecosystem services, aiming to bridge the gap between knowledge generation and policy-making.

It is evident that the concept has been increasingly integrated into national policy documents and important projects, and is perceived as important for both human development and environmental conservation. It is integrated in environmental policies, mostly focused on forest and water ecosystems. Interestingly, the content analysis showed that the term is often used without any specific definition of what is meant by 'ecosystem services', including in the NAPA, and there is no specific framework of pathways to implementation. For example, in NAPA, the term is used for managing ecosystems to help people adapt to the increasing risks of climate change, but the policy doesn't outline how forests should be managed to adapt to the risks of climate change or secure livelihoods of people in ways that are informed by the concept. While the National Biodiversity Strategy and Action Plan (2014-2020) defines 'ecosystem services' explicitly following MEA (2005) and highly recommends 'valuation' of ecosystem services, it doesn't provide a framework, guidelines or methods for valuation. Similarly, within the Snow Leopard guidelines, PES is encouraged for conserving the species but details about how and where to implement PES are unclear. The country is increasingly embracing the concept but there are few specific guidelines for implementation.

4.4.2 Who are the actors involved in the discourse and what are their interests?

A range of actors have contributed to the development of ecosystem services discourse in Nepal. The analysis showed seven different types of actors: international organisations and donors, academics, media, NGOs, government, civil society and the private sector (see Table 8).

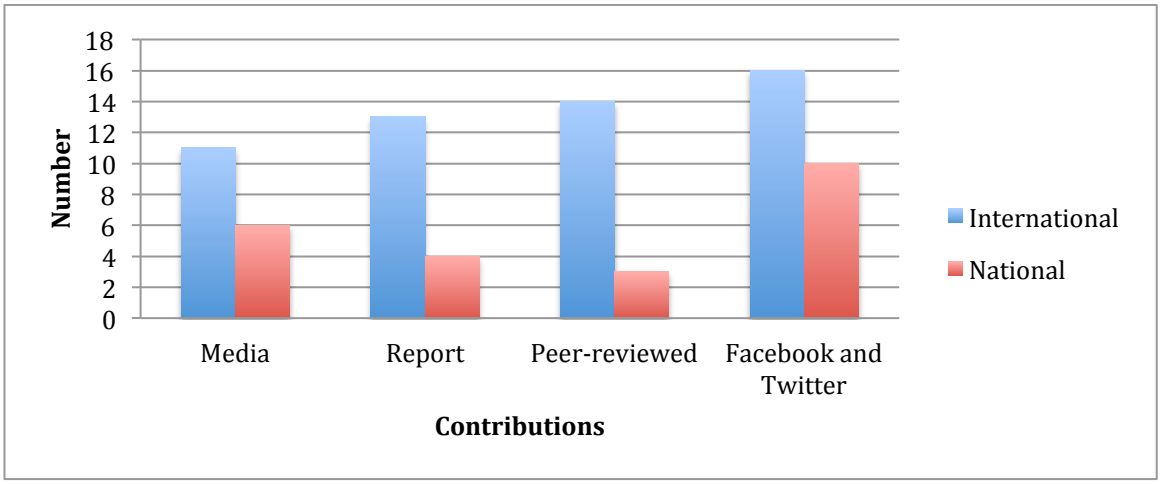
Table 8: Types of actors engaged in ecosystem services discourse

Types of actors	Contributions			
	Media articles	Report	Peer-reviewed articles	Facebook and Twitter
International organisations and Donors	3	13	9	14

Academia	4	0	6	3
Media	6	0	0	0
NGOs	3	2	2	9
Government	1	0	0	0
Civil society	0	1	0	0
Private sectors	0	0	0	0
Total	17	17	17	26

International organisations and donors were the most active, as reflected in their contributions to media articles, published reports, peer-reviewed articles and Facebook/Twitter posts (see Figure 12).

Figure 12: Contributions from national and international actors



After international organisations and donors, academia was the second most influential, but most of the articles were affiliated with international universities. National NGOs were found to be active in Facebook and Twitter. The private sector, while not involved in any of the documentary sources we analysed, was also reported to be an important stakeholder by the interviewees. Private sector actors were involved in hydropower projects initiated by the government where there is an intention to pay for the ecosystem services provided by upland communities – those which adopt good forest and agricultural practices that deter sedimentation – from the revenue generated by the distribution of electricity. They were also involved in supplying drinking water – derived from watersheds involving community forests such as the *Dhulikhel* drinking water supply scheme – to city dwellers. Private hotel owners were increasingly included in PES-like projects in the *Phewa watershed*, where hotels receive a green sticker indicating the hotel owner's contributions to watershed conservation through adoption of environmentally friendly activities (WWF, 2015).

Analysis of the interviews and other textual data revealed eight key themes representing various interests. PES was the most important theme and demonstrated strong interest amongst policy makers, scientists and practitioners (see Table 9). A draft PES policy released in 2016 attracted a lot of attention. PES was considered particularly important due to the increasing shortage of drinking water in cities. Studies and pilot projects establishing PES were found to be underway in different parts of the country. For instance, a pilot project in *Sardu-Khola* watershed started in 2013 with the aim of establishing payment for water services to upland communities by downstream city dwellers (SANDEE, 2013). Similarly, PES-like schemes were reported in the *Dhulikel* municipality of Kathmandu, and the *Kanchanpur* Irrigation Project in Western Nepal, where upland communities receive payment for water services (see Bhatta et al., 2013 for a detailed list of PES-like schemes in the country). The participants believed that PES systems would help manage ecosystems, especially those with limited resources such as water, and would help local communities adapt to changing climates.

Table 9: Themes representing interests, analysed through Nvivo

Major interests of the actors	Weighted Percentage
PES	39.89
Valuation (identifying economic values of ecosystem services)	22
Conservation	14
Resource Management (community forestry, wetlands, protected areas, watershed, upstream-downstream, river basin)	8
Ecosystem services assessment, REDD+	7
Livelihoods/Poverty, adaptation	7

Similarly, valuation was highly regarded. The rationale behind valuation was reflected in an interview with a policy maker:

> *Valuation of ecosystem services is really important in Nepal. This would make the decision-makers, especially from development sectors, realise the values of ecosystems and its contribution in our national GDP. The monetary values of ecosystems should be accounted and linked with development. This would convince other Ministries to increase funding for conservation. The valuation might change how decision-makers see the conservation sector and this would definitely help in halting degradation (Interviewee from Ministry of Forests and Soil Conservation).*

Better resource management through mainstreaming the concept in community forestry and protected areas was also identified as important. In this regard, several workshops to brainstorm ways to mainstream the concept in policy and programs were conducted by local NGOs in collaboration with government and donor agencies. Forest officials and related stakeholders were trained at the workshops to mainstream the concept in community forest operational plans. They then followed this up through pilot projects in fourteen different sites across the country (BCN, 2016). International actors were found to focus on training aimed to build the capacity of forest officials to use ecosystem services assessment tools (DoF, 2016). This was considered important to effectively manage the ecosystems and services for people and wildlife, as community forests and protected areas together cover around 51% of the total forests of the country (DoF 2017, Bhattarai et al., 2017).

The concept was also used to respond to the impacts of climate change and natural disasters, and incorporated into the national climate change adaptation plan. The concept was seen to be important for a country with rich natural resources but with high risks of natural disasters. An interviewee from an international organisation, shared how a recent natural disaster had made decision-makers appreciate the value of ecosystem services:

> *The recent earthquake made people especially in the Kathmandu valley realise the values of green space and its services for their wellbeing. This is high time we can convince the policy makers from development sectors to invest more on urban forestry and its services. And now, we will convince the government authorities to act on ecosystem services based policy making (representative from INGO).*

The international actors prioritised the integration of ecosystem services in development policy making through policy dialogues, especially after the Nepal Earthquake in 2015.

The influence of international actors appeared to be much greater than that of domestic actors. Gautam and Pokhrel (2011) showed that policy-making in the conservation sector of Nepal is inclined more towards the priorities of international donors than of domestic ones. One of the major reasons is limited domestic funding and high dependency of the forestry and conservation sector in Nepal on foreign aid. Since the 1980s, approximately USD120 million has been spent on community forestry in Nepal through international funding (Bhusal, 2010). International funding is often blamed for catering to donor interests rather than national and community needs, with developing countries overly reliant on these sources of funding for conservation (Fan, 2014). The case of ecosystem services in Nepal is no exception: international actors were found to be highly influential in science-policy dialogues, workshops

and consultation processes and through technical and financial assistance in the country. The central place of PES in ecosystem services policy in Nepal is a good example of international influence, which commenced in 2003 with the financial and technical support of the World Agroforestry Centre (ICRAF) (Khatri, 2009). Most of the reports and projects funded by international organisations are focused on PES and valuation of ecosystem services (ecological and economical), reflecting global ecosystem services trends (ICIMOD, 2016, WWF 2014, BCN 2012, IUCN 2012,) (see Table 9 and Figure 12, and also Annexures 8 and 10).

4.4.3 What are the tensions and challenges surrounding the emergence of ecosystem services discourse?

The tensions and challenges surrounding ecosystem services were explored through in-depth interviews. Three major issues identified were: (i) the ecosystem services term is used as a buzzword leading to various interpretations; (ii) technical and ethical issues in establishing PES schemes for intangible services; and (iii) dependence on international conservation aid.

We found evidence that people use 'ecosystem services' as a buzzword,[6] rather than critically engaging with the term. 'Ecosystem services' in Nepal lacks definition, especially in policy documents (as discussed earlier). The limited but often varied understanding of the concept was identified as a challenge. Some complained about the vagueness and lack of specific focus: "*The definition is so vague and complex. It covers everything but still nothing" (government officer).* This vagueness has created confusion among many stakeholders who engage with the concept. Some viewed ecosystem services as 'the benefits human derive from ecosystems for their wellbeing' as defined by MEA (2005), while most of the interviewees linked the term with PES and REDD+. Selling of carbon under REDD+ was linked with 'ecosystem services', while PES was used interchangeably. For instance, payment for water services by city dwellers to upland communities in exchange for their management and conservation of water through effective forest management was interchangeably linked with ecosystem services.

The lack of definition allowed organisations to be flexible in their interpretations. We found many examples of actors engaging with ecosystem services concepts to get funding for research or projects:

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6 Buzzwords often lack real definition and are used differently according to interest and context (Cairns and Krzywoszynska, 2016, Cornwall, 2007).

Our project was initially focused on community-based wetland management, but we were asked to focus on valuation. With the funding guaranteed, we changed our project theme and focused on valuation of wetland services" (representative of national environmental NGO 1).

Most of the projects and workshops these days are focusing either on ecosystem services or climate change. We have therefore decided to engage with this concept in some of our ongoing projects (representative of local environmental NGO 2).

This illustrates how civil society organisations are responding to international funding opportunities and adjusting their programs accordingly. Some considered the concept to be a just a new term for forest products such as timber, fuelwood, non-timber forest products, with the additional carbon service added to the forest. Others viewed it more broadly to include the intangible benefits like carbon, air purification, water and others, along with the forest products. Certainly, some interviewees suggested that the importance of intangibles, especially carbon and water regulation services, has increased since ecosystem services became more well known.

Some believed that the notion behind the concept is not new and has existed in Nepal for a long time, being implicitly reflected in earlier approaches including community-based conservation areas. This was also noted in our study, where 16 out of 28 policies recognised the concept implicitly (see Annexure 7). With the emergence of the concept, some traditional approaches such as buffer zone systems were tagged with the 'ecosystem services' label, and communities incentivised for their efforts in managing ecosystems surrounding protected areas (about 50% of the revenue generation from protected areas goes to buffer zone committees for their community development). The use of the term 'ecosystem services' as a buzzword in ecosystem governance is growing, especially in forestry, where old and new projects are being framed to fit the concept, enhancing flows of international finance with variable impacts in practice.

A second tension concerned the technical and ethical issues surrounding establishment of PES schemes for services like conservation and water regulation. One interviewee stated: "*For the locals who have been using water in the downstream for free since decades, it would be hard to bring them on board and ask [them] to pay money for the free services to the upstream communities" (practitioner from a national NGO 3)*. PES schemes, if established, were considered a time-consuming process with no immediate benefits for local communities. Some believed that bringing two voluntary parties on board for a payment system is not only time

consuming but a tedious and expensive process, as the country does not have specific policy and funding in place. Issues of tenure rights for services, especially for intangible services such as improved water quality and retention, pollination services, and access to and equity within the distribution of benefits were also raised. More importantly, the idea of paying money directly to the provider or owner was seen as problematic, as this would encourage marketisation of currently free natural services, thus encouraging privatisation and elite capture. This would promote services with high economic values, and marginalise services that cannot be monetarily valued, such as spirituality and sense of place (see also Maczka et al., 2016 on concerns regarding the monetary rhetoric advocated by the discourse).

A final tension involved securing funding to implement ecosystem services programs. Interviewees complained about the limited funding within the country and high dependency on donors for implementing any initiatives. This was sometimes blamed for marginalising national priorities while fulfilling international mandates:

> *Donors fund initiatives and fulfill their international mandates rather than our national priorities. Though national stakeholders and local communities are involved in initiatives, the overall mandate is still donor-driven (academic researcher).*

Donors were reported to have their own mandates and limited flexibility. Developing countries are overly reliant on international funds for conservation resulting in criticisms that donor interests are more influential than national and community needs (Fan, 2013). This can marginalise national priorities and aspirations, and result in inappropriate projects or approaches. For example, four decades of waste management projects in Kathmandu (the capital city of Nepal) funded by foreign aid (Germany, India and Japan) has failed to provide adequate services and ended up with riverbank waste disposal by the project end. The reasons for failure included the undermining of local government authority, implementation of systems that were too technical for local capacity, use of outdated or unusable equipment that did not meet local needs, and constructing costly landfilling with equipment inappropriate for local conditions (Dangi et al., 2015).

4.5. Discussion

This study demonstrates that ‘ecosystem services’ as a discourse is advancing in Nepal through integration in environmental policy documents and through the actors engaging and promoting the concept. We have argued that one of the main drivers is the increased funding available for ecosystem services research and development projects. For instance, there are already nine

projects focused on ‘ecosystem services’ funded by the Ecosystem Services and Poverty Alleviation (ESPA) initiative of the UK since 2009 (ESPA, 2017). Similarly, other projects, including those funded by the Darwin Initiative, the United Nations for Environment Program and WWF-funded ecosystems services projects in Nepal. Most of these projects were implemented through national and local NGOs who act as translators and/or filters to communicate the concept to other actors in country, thus contributing to its absorption and normalisation. Forest projects feature prominently due to the profile of REDD+ in the country, which attracts substantial international funding.

Nepal has been very active in REDD+ activities since its engagement with the UNFCCC negotiations in 2007 and with the Forest Carbon Partnership Facility in 2008. International funding has been received from organisations such as the World Bank, NORAD (the Norwegian Agency for Development Cooperation) and UN-REDD, to undertake REDD+ Readiness activities such as establishment of a REDD+ implementation centre and capacity building programs for national experts and local communities (Sharma et al., 2017), further normalising ecosystem service concepts. The focus of PES programs in Nepal has largely been on water, as water has a clear economic value and is a highly demanded resource, particularly amongst city dwellers. The focus on these types of programs has directed ecosystem service knowledge and practice towards economic valuation (of carbon or water). Ecosystem services has thus been translated primarily as payments for water and forest services in the context of Nepal.

This particular focus on economic valuation reflects the dominance of economic and ecological thinking within the global ecosystem services discourse (Chaudhary et al., 2015). Different interpretations that emphasise livelihoods, wellbeing or justice, for example, are under-appreciated at the national scale. The emphasis on economic valuation is likely to result in commodification and marketisation. Ecosystem services and functions such as water, timber and carbon could be further commoditised opening the possibility of privatisation (Dempsey, 2016). In a country like Nepal, where social, political and economic inequalities notably exist already, an over-emphasis on economic valuation risks exaggeration of pre-existing inequalities and claims of injustice. The community forestry system in Nepal, for example, is already criticised for inequity (Malla et al., 2003) and injustice (Maharjan et al., 2009), and further commodification and marketisation of services from community forests and/or buffer zones could lead to more formal and informal appropriation of services by elites. Economic valuation can also result in over-consumption and eventual exhaustion of resources if poorly managed (Leibanath, 2017). For instance, the highly valued Himalayan Viagra (*Catepillar fungus*), the

world's most expensive medicinal herb, is reported to be over-extracted, resulting in the decline of its availability in the Nepalese highlands (Shrestha and Bawa, 2013). Collection of this valued product often leads to conflict between local communities and outsider collectors (Pant et al., 2017).

The emphasis on economic valuation is likely to de-emphasise those things that are not easily economically quantifiable. Intangible benefits such as spiritual values, sense of place, emotional attachments, or locally significant histories cannot be easily, if at all, valued in monetary terms. In this regard McCauley (2006, p.28 in Hansen (2011)) has strongly criticised monetary valuation and marketisation of nature:

> *'the greatest values of nature are not those that turn us monetary profits. The real values of nature are its intrinsic biological, aesthetic, cultural, and evolutionary merits. I think we need to put primacy on teaching people about these values.'*

Somewhat ironically, it is often these intangible benefits that have most motivated people to care for ecosystems. By ignoring them, both community wellbeing and ecosystem conservation are likely to be marginalised (Chan et al., 2012).

This focus on economic valuation reflected limited understanding of the ecosystem services concept, as has been reported elsewhere (Kabisch, 2015). The increased use of the concepts in a variety of contexts in Nepal is likely to lead to complexity, confusion and conflict among stakeholders as a result of different values, perceptions and insufficient information (Moore, 2003). While slipperiness in definitions can allow flexibility in bringing diverse stakeholders together, complexity and misunderstandings can lead to disagreements over ultimately incompatible interests among the stakeholders, leading to inequitable and undesired outcomes. There is always a risk of failure where there are inequitable outcomes of ecosystem service management (Vira et al., 2012). These complexities and conflicts may challenge the practice of the concept on the ground in Nepal and other places (Bull et al., 2016, Norgard, 2010).

To avoid misunderstandings and broaden the concept away from simple economic valuation, a well-defined national legal framework needs to be developed, with detailed descriptions of definition, methods and guidelines for implementation. This should guide the interested stakeholders to use the concept in a consistent way and highlight non-economic approaches. But more importantly, a national consultation should be initiated, not only to identify the interests of stakeholders in implementing the concept but also to assess its effectiveness at the

community level. This means that ecosystem services policy and practice should be adapted to the conditions of the country and prioritise the national mandates and priorities, as opposed to fitting into international agendas (also stressed by Maes et al., 2012).

The current focus on economic valuation does not fit easily with community forestry practice and needs to be broadened to include social issues such as terms of fair distribution, meaningful participation and representation of marginalised groups, and recognition of the intangible benefits provided by ecosystems. A proper assessment of the implications of adopting the concept at national as well as community scales would enable better understanding of its strengths and weaknesses in the Nepalese context. Future research at community scales could focus on community forestry, as one-third of the country's forests is managed under this system, and it is now actively being considered for ecosystem services-based approaches, including PES (Birch et al., 2014). As the community forestry system is blamed for elite capture (Marharjan et al., 2009), there is a need to analyse on how the ecosystem services framework, with relevant articulations, could influence the process and outcomes of community forestry in Nepal.

4.6. Conclusion

Ecosystem services is a globalising concept that is now well-integrated into the Nepalese context. The study has shown that international actors are driving this integration through project funding and public narratives. The full breadth of ideas associated with ecosystem services does not appear to be well understood by key stakeholders in Nepal, and a narrow interpretation derived from REDD+ and PES programs has emphasised the economic valuation of services. This risks commodifying ecosystem services, and consequent over-extraction of valued services, privatisation, elite capture, and the marginalisation of intangible benefits such as spirituality, sense of place and other personal and ethical values. If the discourse continues to progress in this way, it is likely to accentuate rather than resolve justice issues, as some interests are likely to benefit from economic valuation over others, further marginalising the poor and other disadvantaged groups. This is particularly the case in respect of community forestry in Nepal where there pre-existing inequities and injustice issues are already entrenched within the system. To minimise these risks and maximise potential benefits, a more explicit engagement with ecosystem services and systematic, in-depth consideration of the potential costs and benefits of adopting this approach are needed. This had not yet occurred due to the ad hoc nature of international funding and its influence in advancing the concept. A national legal framework that provides detailed descriptions of definitions, methods and guidelines for

implementation could guide interested stakeholders about the meanings and use of the concept in ways oriented to minimise confusion and maximise socio-ecological benefits.

Chapter 5: Environmental justice and ecosystem services: a disaggregated analysis of community access to forest benefits in Nepal

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Background

This chapter focuses at the community scale, examining access to ecosystem services among populations disaggregated by income, gender and caste. Focusing on two community forests and one religious forest, the chapter adopts an environmental justice framework with distribution, participation and recognition as the three dimensions of analysis. This is important, as injustice issues are rampant within and beyond the community forestry in Nepal, although the community forestry program is successful in halting degradation, increasing forest cover and supporting livelihoods of millions of people. The chapter, recognizes the injustice extends beyond immediate communities but focuses here on injustices within communities and employs both qualitative and quantitative methods. A household survey was conducted with a total of 105 households out of 504 households from three villages (*Mai Pokhari, Sulubung and Sumbek*) in the Ramsar site with a total area of 239 hectares including the core zone of 90 hectares. Eight different focus groups categorised by caste (higher-caste, lower-caste, ethic), class (high-income, low-income) and gender (male-headed and female-headed) were conducted to discuss specific issues associated with justice. Male-headed and female-headed households were distinguished, based on who assumed decision-making power. Female-headed households were those that involved women who were unmarried, widowed, or divorced, or whose husbands were out of village for work. The disaggregated analysis shows uneven access to

ecosystem services, demonstrating how access is differentiated by social characteristics such as caste, income and gender with uneven distributive outcomes and participation. The chapter finds that advantaged groups such as high-income, higher-caste and male-headed households disproportionately access more benefits than the lower-caste, low-income and female-headed households. The chapter shows that injustice issues remain despite social equity provisions built into policy and institutional structures of community and religious forestry systems. The analysis reveals how some of the policies formulated to assist the disadvantaged are in fact burdensome for them. This chapter thus suggests amending those regulations to produce beneficial outcomes for both advantaged and disadvantaged groups. For instance, regulations, such as restricted collection time, should be simplified and made flexible to allow the disadvantaged to schedule their collection and other priorities. Policies aiming to ensure an equitable representation in executive committees, such as 50% representation of women and equal representation of all social groups, should be strictly implemented and monitored. Outcome-based policies focusing more on production rather than only protection and encouraging small-scale forest enterprises should be formulated to generate local jobs and meet local forest demands. While discussing these solutions, the chapter argues that environmental justice needs to be made more central to avoid further marginalisation of the already marginalised to achieve just outcomes. The chapter particularly highlights the risks of aggregated analysis as a barrier for practical implementation of ecosystem services based programs contributing to sustainable socio-ecological wellbeing. While analysing justice issues at the community scale, the research found spirituality attached to the holy pond in the area as one of the most important cultural services. Based on this finding, and considering the limited exploration of cultural services in ecosystem services science, I focused on examining local cultural services at the community scale.

Contributions

This paper is co-authored with Associate Professor Andrew McGregor, Dr. Donna Houston and Dr. Nakul Chettri. As a lead author, I conceptualised the paper and collected the data. Based on my data analysis, I drafted the paper that went through several revisions. Dr. McGregor generously contributed to the final draft and the discussions and conclusions through regular supervision meetings and feedback. Dr. Houston provided guidance on the theory of environmental justice, and Dr. Nakul provided guidance for the fieldwork conducted in Nepal. I finalised the paper by integrating the feedback from all the co-authors and submitted it to the journal.

Abstract

The concept of ecosystem services is influencing how environmental stakeholders pursue dual conservation and community development goals. While rapidly growing in popularity, the ecosystem services approach has been criticized for adopting a homogenous approach to communities and failing to consider social diversity and associated power structures influencing access to benefits. In this paper, we adopt an environmental justice lens to analyse access to ecosystem services in a case study of community forestry in Nepal. Using mixed methods, our disaggregated analysis shows that access to ecosystem services is differentiated by social characteristics such as caste, income and gender with uneven distributive outcomes and participation. High-income groups were able to disproportionately access the benefits despite the social equity provisions built into policy and institutional structures. Our study shows that some of the protections oriented at assisting disadvantaged groups were experienced as onerous and should be amended if they are to have beneficial outcomes. In highlighting entrenched inequities, we argue that the ecosystem services approach needs to make environmental justice more central to avoid further marginalising the marginalised, and have fair and just outcomes. The current emphasis on aggregated analysis may contribute little to practically implementing programs that will contribute to sustainable socio-ecological wellbeing.

Keywords: environmental justice, ecosystem services, Nepal, social differentiation, community-based forestry

5.1. Introduction

Ecosystem services are defined as the benefits humans derive from ecosystems (MEA, 2005). The concept has proved popular by providing a means of reconceptualising and revaluing human dependence on natural processes (Schröter et al., 2014). It has become influential in environmental policy and practice and provides the basis for multilateral conservation initiatives such as The Economics of Ecosystems and Biodiversity (TEEB) and Ecosystem Services for Poverty Alleviation (ESPA) (Chaudhary et al., 2015). Within these frameworks the core principle is that nature, in the form of ecosystems, directly and indirectly, shapes people's wellbeing (MEA, 2005, Hicks, 2013). In doing so ecosystems services provides an anthropocentric rationale for pursuing conservation outcomes.

While popular, the approach has also attracted criticism (Schröter et al., 2014). One of the critiques is its focus on 'aggregated' wellbeing. The problem associated with aggregation is that attention is steered towards the wellbeing of 'undifferentiated populations'. Such approaches assume everyone in a given locality benefits from ecosystems in a similar manner (Hicks, 2013), thus neglecting the social heterogeneity of societies where caste, class, ethnicity, wealth, power and many other factors can shape access to benefits (Few, 2013). In focusing on aggregate benefits, most ecosystem services research is inadequate for determining which groups in society actually benefit from particular initiatives and why. As Daw et al. (2011), pg.377 argue there needs to be much more 'explicit recognition of the distributional patterns across groups' within society to explore how ecosystem services come to be accessed. Disregarding the distributional patterns means ignoring questions of justice and raise the troubling prospect that ecosystem service approaches may make societies more uneven, thereby risking development outcomes and associated conservation capacities.

Several researchers have emphasised the importance of conducting disaggregated analyses to analyse ecosystem services in order to address concerns about justice and equity (Bull et al., 2016, Daw et al., 2011, Sikor et al., 2014). Fisher et al. (2014), for example, provide a conceptual framework for analysing the differentiated contribution of ecosystem services to poverty reduction. Horcea-Milcu et al. (2016) and Lakerveld et al. (2015) focus on factors mediating ecosystem contributions to wellbeing of different social groups - recommending a focus on disaggregated benefits and associated justice issues. This not only helps to identify the winners, losers and trade-offs of ecosystem services (Rodríguez et al., 2006), but also sheds light on who and how people benefit from ecosystems (Horcea-Milcu et al., 2016).

In this paper, we extend this work by developing a disaggregated environmental justice framework to analyse how ecosystem services are accessed within a community forestry case study in Nepal. We develop a mixed methods approach oriented at providing rich quantitative and qualitative data that can be disaggregated by gender, caste and income. Our main aim is to understand how and why the ecosystem services generated through community forestry benefit different groups within society. Our key objectives are to:

1. Identify the major ecosystem service benefits associated with community forestry in the case study area,
2. Identify how access to ecosystem service benefits is differentiated by income, caste and gender, and
3. Adopt an environmental justice framework to focus on distribution, participation and recognition in order to identify problems involved in uneven distributive outcomes and to develop policy suggestions.

Community forestry in Nepal makes an interesting case study as Nepal is a member of Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES) - and a country that is increasingly embracing the ecosystem services concept in science and policy dialogues (ICIMOD, 2016b). More importantly, community forestry is one of the most successful and widely accepted forest management systems in Nepal. Currently, over one million hectares of forests (nearly one third of the total forests of the country) are managed under community forestry, providing a vast array of services. Nepal has developed a decentralized community-based forest governance system oriented at forest management, meeting basic forest needs and improving the welfare of socio-economically disadvantaged groups (Maharjan et al., 2009). Despite these goals community forestry in Nepal has been criticised for elite capture (Yadav et al., 2008, Yadav et al., 2015), resulting in uneven access to ecosystem benefits (Pokharel and Tiwari, 2013, Shrestha, 2016). As such the case study can provide interesting insights into how ecosystem service type initiatives are grappling with issues of justice and attempting to steer benefits to marginal groups in society.

The paper is structured into seven sections. Following this introduction, we discuss environmental justice and its relevance to ecosystem services. We introduce the study area in section 3 and the methods in section 4. Our results are described in section 5 and ordered according to the three pillars of environment justice, before a discussion and conclusion in sections 6 and 7 that focus on the implications of our findings for environmental justice in ecosystem services policy and practice.

5.2. Theoretical framework

The quest for justice is becoming central to global conservation policies and initiatives (Forsyth and Sikor, 2013). In this paper we adopt the framework of environmental justice which focuses particularly upon the justice issues that emerge from human-environment relations. Environmental justice provides a well-developed lens to focus on fair treatment of all (irrespective of differences in origin, color, caste) with respect to the development, implementation and enforcement of environmental laws, regulations and policies (Schlosberg, 2004). Environmental justice, as a social movement, emerged during 1970s as a response to the unequal distribution of risks associated with industrialisation in the United States (Byrne et al., 2002). The movement sought to overcome injustices by ensuring equal distribution of benefits and burdens across the population irrespective of social and economic differences. The struggles were often framed as opposing 'environmental racism' – as environmental injustices were more frequently linked to oppressed or marginalised groups in society – and particularly concentrated amongst people of colour (Shrader-Frechette, 2002). Similar movements in the developing world were framed as 'environmentalism of poor'– movements oriented against the disproportionate use of environmental resources by the rich and powerful (Martinez Alier, 2002).

Over the years, environmental justice moved beyond the issue of distribution of environmental goods and bads to also consider issues of participation and recognition. Distribution is important but incomplete without consideration of institutional contexts, rules, and languages that mediate social relations and are the foundation of unjust distributions of environmental benefits. Issues of cultural 'recognition' and political 'participation' then became crucial components in the movement of environmental justice (Schlosberg, 2004). Within the environmental justice literature attention is also directed towards issues of intergenerational justice and interspecies justice (see Lele et al. (2013)) however in this paper we focus on intra-community environmental justice issues to tease out the socio-political processes that shape access to ecosystem benefits across existing human populations.

The environmental justice framework has rarely been applied to ecosystem services discourse however can make an important contribution. Sikor et al. (2014) advocates for an environmental justice framework to avoid unfair trade-offs of ecosystem services between stakeholders (see also Chan and Satterfield (2013)). The MEA (2005) framework alludes to justice issues when claiming that 'freedom of choice and action' is important for achieving wellbeing (MEA, 2005, pg.V). However, the MEA (2005) addresses justice concern in a

superficial way - overlooking social dimensions such as disaggregated access to ecosystem service benefits, the injustices embedded in the trade-offs between ecosystem services, and the inattention devoted to the distribution of disservices (harms and nuisances of ecosystems such as natural disasters, pests, diseases etc) (Lele, 2013). Environmental justice approaches help overcome such oversights and play an important role in informing ecosystem services policy and practice.

In this paper we follow Schlosberg (2004) and Martin et al. (2015) in positioning distribution, participation and recognition as the three main pillars of environmental justice. In doing so environmental justice provides us with a platform to focus on the distribution of forest services, participation in forest decision-making, and cultural recognition and consideration of different groups in society with respect to implementation and enforcement of community forestry law and policy. Distribution focuses on fair distribution of benefits to different groups of a society. It focuses on the objects to be distributed, the process of distribution, and the resulting distributive outcomes for different groups in society (Schlosberg, 2004). Fair and appropriate distributive outcomes are achieved only through just process. Just processes refers to forms of participation, analysing who participates in decision-making, on what terms, and how decisions are made for equitable outcomes (Gustavsson et al., 2014). Recognition is the final important component of environmental justice and refers to who or what is recognised in decision-making processes (without necessarily actively participating) in terms of respect for differences and avoiding domination (Bohman, 2016). Without recognition, injustices are much more likely as misrecognition is embedded in the cultural norms of society, and sometimes in the structures of language (Martin et al., 2015). As an example, the recognition of Indigenous people has been a long fought for identity that has resulted, in some cases, with pro-Indigenous land and environmental policy – even when they may not be actively involved in particular environmental decisions. Recognition requires acknowledging diverse social identities and respecting socio-cultural values while addressing marginalisation (Sikor et al., 2014). Injustices occur as a result from a lack of recognition or misrecognition of issues related to social categories like caste, class, gender and culture (Fraser, 2000). Applying these three aspects of justice to the case study helps explain why some people are benefiting more than others from ecosystem services of community forestry.

5.3. Study area

The Mai Pokhari Ramsar site was chosen for this study as the area hosts a heterogeneous society that allows insights into social differentiation. It is located in Eastern Nepal (Figure 13)

and is situated at an altitude of 2,080 meters above sea level. The area extends over 239 hectares covering different wards of three villages: *Mai Pokhari, Sulubung and Sumbek.* Forest (42%), agriculture land (49%), grassland (6%) and wetland (3%) are the four major land covers (GoN, 2012). The settlement is quite scattered with an approximate population of 2500 individuals belonging to 500 households. It has seven ethnic indigenous groups (*Rai, Limbu, Sunuwar, Sherpa, Gurung, Tamang and Magar)* who follow Shamanism, Animism, and Buddhism. Other non-Indigenous caste groups also share the area

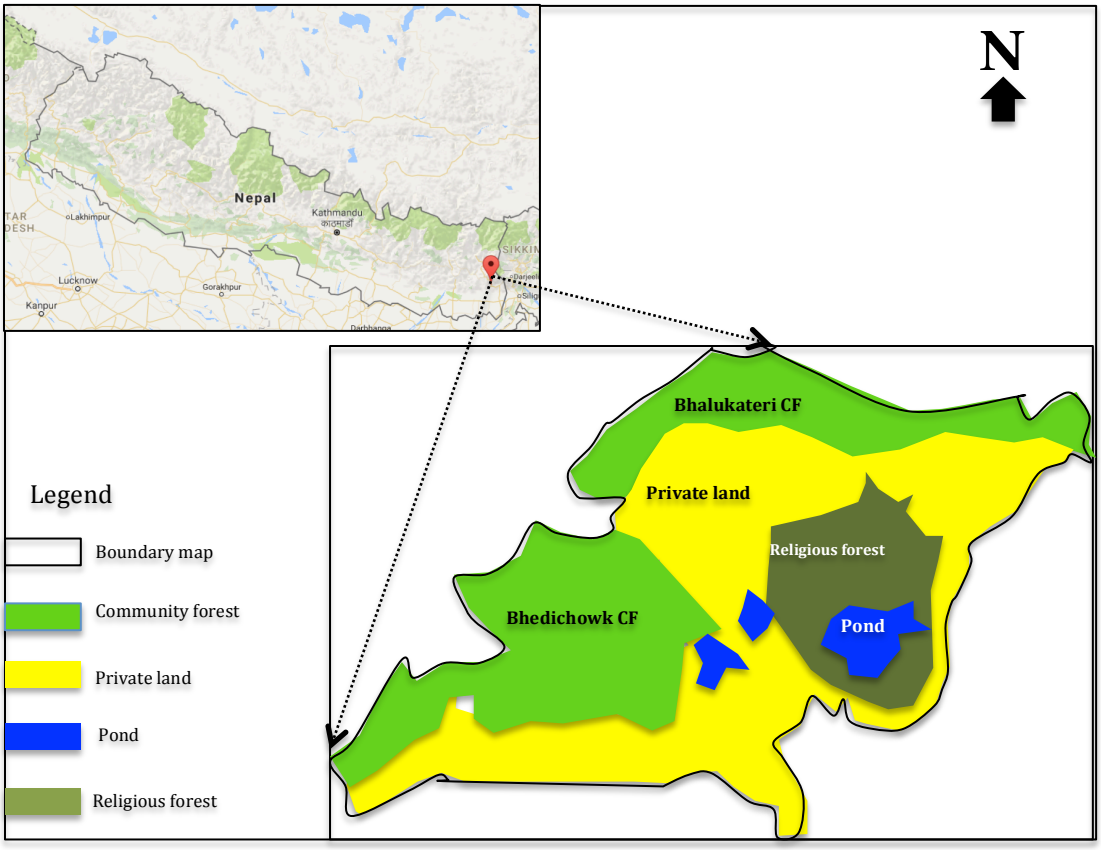
Caste, also known as *Jaat* in Nepalese, is a social stratification system that categorises populations into four broad social classes based on occupation. *Brahmin* (priests and scholars), *Chhetri* (warriors) and *Vaishya* (merchant and traders) belong to the first, second and third social classes respectively, and are regarded as higher-caste with access to education and occupation. *Dalit (labors),* the lower-caste group. *Dalits,* also regarded as 'untouchables', and are socially, economically and culturally disadvantaged with very limited access to education, occupation, politics and power (Gurung, 2005). Each of these groups has its own language, traditions and beliefs. Agriculture (tea cultivation, cultivation of medicinal plants, cash crops), livestock (cows for milk production), government services, tourism, and remittances from absent family members are the major sources of income. The majority of people are dependent on subsistence agriculture and livestock, making access to forest lands integral parts of everyday livelihoods.

The area is also diverse in biodiversity with 231 species of plants, 36 species of herpetofauna, 300 bird species and 19 species of mammals (GoN, 2012). The area was declared as a Ramsar site[7] of international significance in 2008. About 46% of the land area is governed under two community forests (CF) (*Bhedi Chowk* and *Bhalu Kateri*) and one religious forest (*Mai pokhari*), while 54% is under private ownership for agriculture (Figure 13) (GoN, 2012). The religious forest has been managed by the community since 2004 and can only be used for religious purposes. The two community forests were officially handed over to the local communities in 1992 and 2001. The *Bhedi Chowk* community forest has 157 households with a population of 647, while Bhalu Kateri community forest has only 42 households with 214 people and Maipokhari Religious Forest Group has 225 households. The remaining 80

[7] Ramsar sites are the wetlands of international significance under Ramsar Convention, an international treaty for the conservation and sustainable utilisation of wetlands recognising the fundamental ecological functions of wetlands and their economic, cultural, scientific and recreational value.

households reside in the area but are not affiliated with community forests and religious forests (GoN, 2012).

Figure 13: Location map of the Mai Pokhari Ramsar site



Source: Adapted from GoN 2012

Two community forests in the area were handed over as per the Forest Act 1993. Community forests are the national forests handed over to a users group for 10-year time period (with the possibility of extensions based on performance) for protection, utilisation and management of forests. The Forest Act (1993), Forest Regulation (1995), Community Forestry Directive (1995), Guidelines for Community Forestry Inventory (2004), and the Guidelines for Community Forestry Development Program (2009) are the binding and legal basis of community forestry system. The land under community forestry belongs to the state but the land use rights and the forests are owned and managed by forest user groups (FUGs). A forest user group (FUG), an autonomous and legal entity comprising of members from different social, economic and cultural backgrounds, is responsible for the management of forests (Ojha et al., 2009c). The executive committee for the FUGs generally comprises 9-15 members, who are either elected or unanimously nominated by forest users as their representatives. The committee manages the forests on behalf of the FUGs (Pokharel and Tiwari, 2013).

Once handed over, the FUG prepares a constitution and management plan to govern forests with technical support from the government (Forest Regulation 1995, Rule 28.1). Once approved, the FUG has the full right to govern the forest for an approved 10-year period (Pandey and Paudyall, 2015), and can use, sell and distribute forests products independently by fixing their own prices (Forest Regulation 1995, Rule 32.1). However, FUGs must comply with the provisions made by government and forest bureaucracy in operational plans. Provisions, though diverse and case-specific across the country, are often similar. For instance: *'Notwithstanding what is written in this operational plan, the FUG has to comply with Government's Acts, Rules, Regulations, Department of Forest's and District Forest Officer's orders'*. Such provisions are criticised for controlling the rights and actions of FUGs (Paudel et al., 2008). FUGs also must spend at least 25% of the income derived from community forests for management of forests and community development work, like building schools, roads. Each member of FUG, as a co-owner, has equal rights to forest resources and the benefits must be shared on an equitable basis. The state monitors the performance and acts as a facilitator providing technical support for forest management. If a FUG violates any rules against the constitution and management plan with negative impacts on forests, the state can take back the forests and halt the possibility of extending the community forest status. FUGs must submit an annual report to the government specifying financial details and condition of forest each financial year (Devkota, 2005).

The community forestry system is considered to be progressive. The updated Community Forestry Directives in 2008 and 2014 pay specific attention to marginalised groups. Special quotas for socio-economically marginalised groups in FUG management committees were amended to require at least 50 percent women representatives, and proportionate representation from the poor, lower-caste, and ethnic groups. Either the chairperson or the secretary of the committee must be a woman. Land from community forests can be allocated specifically to marginalised groups to support their basic needs and build capacities to improve livelihoods. Participation in forest management is enforced through fines for members who fail to attend activities, including meetings and for acting as forest guards, or for breaking forest rules. As such the rules of community and religious forests of Mai Pokhari Ramsar differentiate between different social groups in an effort to pursue fair processes (detailed rules and regulations of *Bhalukateri* and *Bhedichowk* community forests based on their operational plans are summarised in Annexure 13).

5.4. Methods

The project adopted a case-study approach employing both qualitative and quantitative methods. Fieldwork was conducted from November 2014 to March 2015 as a part of a PhD project. There were three main stages to the research: key informant interviews, household surveys and focus group discussions. The key informant interviews were conducted first with

fifteen key informants representing the village, government, community-based organisations, hotels and local political parties. Information on locally perceived criteria for wellbeing ranking (i.e. landholding per household, number of cows, occupation, etc) was obtained, along with the information on the operation of community and religious forests, ecosystem services, and issues regarding recognition.

The interviews were followed by a household survey employing stratified random sampling. For this, we first obtained a list of forest user households including details on social wellbeing from the District Forest Office (DFO). The households were then categorised into different strata based on income (high, medium and low), caste (higher, lower caste or ethnic) and gender (male-headed and female-headed). Then a sample from each group was chosen in proportion to their number – with the exception of female-headed and lower-caste households in which all were purposively chosen due to their small number. Participants from other groups were chosen randomly by drawing their nametags from a box. The samples from all groups totaled 109 households. Of the sampled households, we prepared a matrix. Forty percent were in the low-income group, 33% high-income and about 27% from medium-income group (see Table 10). About 74% were from an Indigenous group, 16% higher-caste and 11% from lower-caste populations. Only 21% were female-headed households. The matrix allowed us to see the overlapping between the strata. i.e. all the higher-caste were from high-income group with few from the medium income, while all lower-caste were from low-income group.

Table 10: Household matrix based on income, caste and gender

Income/Caste	**High-income**	**Medium-income**	**Low-income**	**Total**
Higher-caste	14	3	0	17
Lower-caste	0	0	11	11
Ethnic	22	26	33	81
Total	36	29	44	109
Gender	**High-income**	**Medium-income**	**Low-income**	**Total**
Male	24	20	46	90
Female	8	9	2	19
Total	32	29	48	109

The survey had both closed and open-ended questions in a Nepalese language. The head of the households was selected for the survey mostly in the morning and evening, outside normal working hours. On occasions, surveys took place on farmlands and forests, as appropriate. The closed questions focused on the basic household characteristics such as gender, age, caste, ethnicity, landholding capacity, livestock, food sufficiency, while the open-ended questions focused on ecosystem services, distribution, access, recognition/misrecognition, and the nature of participation (active, forced and passive) (see Annexure 3). Specific open-ended questions were asked, such as 'what tangible/intangible benefits do you get from Mai Pokhari Ramsar site?' Responses were listed in Nepalese, translated into English and categorised into provisioning, regulating, and cultural services following the Common International Classification of Ecosystem Services system (CICES 2011) (Haines-Young and Potschin, 2011). The quantity for each listed provisioning ecosystem service was also noted (see Annexure 3).

Following the survey eight focus group discussions were conducted with an average of nine people in each. The groups were stratified so as to only involve community members from a particular social category - high-income, medium-income, low-income, higher-caste, lower-caste, ethnic, male-headed and female-headed groups. For each focus group discussion, participants were selected randomly from the list provided by DoF, and were contacted through representatives of local NGO, and/or local leaders. The focus groups provided an opportunity to discuss access to ecosystem services, decision-making processes, benefits, rights and responsibilities. Secondary sources were also reviewed, including the operational and management plans of community forests, and state forest policy/guidelines.

The quantitative household data was analysed through Microsoft Excel and descriptive statistics were used to explain the data. We did further statistical analysis, such as chi-square test, to deepen the findings. The qualitative data was analysed using framework method analysis following Gale et al. (2013). All the recorded data were first transcribed, and transcriptions were coded according to themes guided by environmental justice framework (focusing particularly upon distribution, participation, and recognition). The coded themes were then mapped and grouped together, and interpreted using quotes from interviews according to the objectives of the paper. Findings and insights were triangulated with evidence from other sources.

5.5. Findings

5.5.1 Social diversity

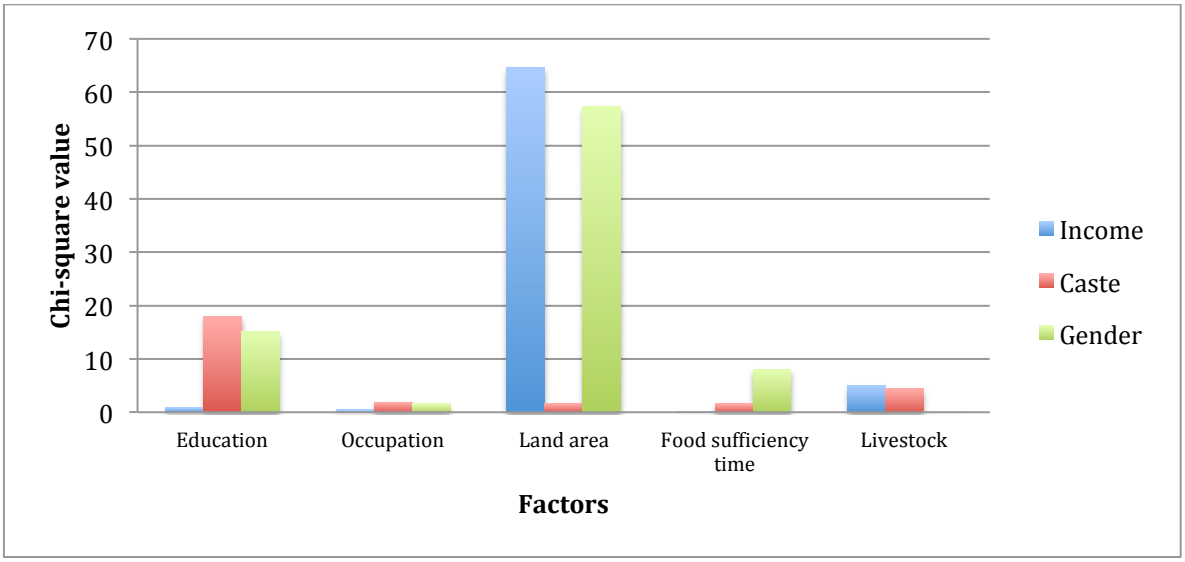
The survey revealed considerable social diversity within the community (Table 11). The high-income group was the most educated and food sufficient. This group included high caste Hindus – many of whom have special privileges derived from their traditional roles as priests and educators of Hindu religion – and well off Indigenous households – some of whom have benefited from remittances when male family members have worked overseas. The high-income groups have the most private land and slightly more livestock per household (Table 11). The average land holding size of high-income was 2.8ha, which is quite high compared to the national figure (1.0ha). However, the Central Bureau of Statistics (CBS) showed that the Eastern region especially Illam, the current study area, has the highest land holding size in Nepal with an average of 2ha (CBS, 2012). In contrast, the low-income group, mostly represented by *dalit,* and poorer Indigenous households, had less access to land or livestock and much lower levels of education and food security. Despite lower levels of education, female-headed households rated slightly better off than male-headed households in terms of access to land and food sufficiency. This is partly because of the remittance the female-headed households were receiving. More importantly, most of the female-headed households were from ethnic community such as *Rai, Sherpa, Mukhiya* where access to land and decision-making especially in farming and livestock is significant. A report by FAO (2010), asserts that ethnic women from hilly regions often have more access and decision-making power in land assets and farming than in other regions.

Table 11: Socio-economic characteristics of groups by income, caste, ethnicity and gender

	Land (ha)/HH		Livestock/HH		Education (years/HH)		Food sufficiency (months/HH)		Occupation (number/HH)	
Social group	**Mean**	**St.Dev**	**Mean**	**St.Dev**	**Mean**	**St.Dev**	**Mean**	**St.Dev**	**Mean**	**St.Dev**
High-Income	3	1	2	1	6	5	9	3	1	1
Medium-income	1	0	2	2	5	5	7	3	1	1
Low-income	1	0	2	1	5	4	5	3	1	1
Ethnic	1	1	2	1	5	5	7	3	1	1
Higher-caste	2	1	2	1	7	5	7	4	1	1
Lower-caste	1	1	2	1	4	5	6	4	1	1
Male-headed	1	1	2	1	6	5	7	4	1	1
Female-headed	2	1	2	2	4	6	8	4	1	1

We conducted a chi-square test with a significance level of 0.05 ($\alpha = 0.05$), which showed land area, education and livestock as the explaining factors for different social groups. Household income has significant association with land size (p-value<9.12×10^{-15}) (see Figure 14). The households with large land size are more likely to have higher income. Land size was identified as an important variable that has significant relationship with different variables analysed - gender, education and food sufficiency. While caste showed a strong association with education of the individuals with p-value<1.2×10^{4}. The households belonging to higher-caste group are likely to have higher education. The gender showed strong association with land size, education and food sufficiency with p-value<3.48×10^{-13}, p-value<5.3×10^{4} and p-value<0.02 respectively. The male-headed households are likely to have higher education, while female-headed are likely to have large land size and food sufficiency.

Figure 14: Factors explaining social group



5.5.2 Variety of ecosystem services

A total of 18 ecosystem services were identified (Table 12). Among them, eight were provisioning, seven cultural and four were regulating services. Ninety four percent of households listed fuelwood as an important provisioning service providing the main source of energy for cooking and heating. A similar number reported spiritual benefits as very important cultural services attached to a sacred pond. Fodder for livestock was reported by 88% and leaflitter used as bedding material for livestock and compost for agriculture were reported as valuable by 53%. Water for drinking was reported important only by 26% as every household had an easy access to water. Local NGOs with support from international donors built water

ponds in the village and installed a tap in each household. Regulating services that are available for free, such as habitat for biodiversity, and fresh air regulation were also listed important by a third of the households. Some households reported disservices, particularly crop damage associated with an increase of wildlife in the area (see Table 12).

Table 12: Local people's perceptions and use of ecosystem services obtained through household survey

S.N.	Ecosystem services	No. of Household (%)	Local's perception and use
Provisioning			
	Fuel wood	94	Cooking
	Fodder	88	Livestock
	Leaf litter	53	Bedding, manure
	Timber	30	House construction, furniture
	Water	26	Drinking
	Bamboo	19	House construction, basket, fuelwood
	Wild food	10	Consumption
	Medicinal plants	6	Use, and sell
Cultural			
	Spiritual and religious values	93	Religious rituals
	Sense of place	21	Devotees feeling of belongingness, nature as a god for some ethnic groups
	Ecotourism and recreation	21	Devotees, picnic spots, views
	Traditional culture and practices	7	Diversity of people, festivals and culture
	Research and education	7	Awareness and employment
	Greenery	5	Green forests and landscapes
Regulating			
	Habitat for biodiversity	32	Conservation values
	Fresh air	31	Forest as a source of fresh air
	Water regulation and purification	27	Drinking, water level in the pond
	Erosion control	21	Control by forest
Disservices			
	Crop damage by wildlife	55	Deer (often), wild pigs and leopard (occasionally) destroy agriculture and livestock
	Pest and disease	22	Pests in cardamom and tea cultivation
	Frost and hailstorm	17	Damage vegetables
	Erosion	2	Risk to house, livestock and sometimes human life

5.5.3 Uneven access to ecosystem services

Different social categories, such as income and gender, influenced access to ecosystem services identified in Table 12. In this section, we analyse access to ecosystem services through the lens of environmental justice by focusing upon distribution, participation and representation.

5.5.3.1 *Uneven distribution of ecosystem services*

The distribution of ecosystem benefits within the community was uneven. Figure 15 shows estimated need and collection of various forest resources according to different social groups. The provisioning services of community forests clearly could not meet the needs of all. The need for fuelwood and fodder by all the groups is twice the supply by the forests. For example, only 416 bhari[8] of fodder was supplied compared to the claimed need of 941 bhari for fodder for the high-income group. As the need was not met, the high-income group fulfilled their needs from their own private forests, while the low-income group had to buy their fuelwood and fodder needs from their richer counterparts who had private forests (Table 11) and/or from the local market which contained products from private forests and nearby villages.

These shortfalls were experienced unevenly within the community. Though community forests operate on equality principles with special provisions for socio-economically disadvantaged groups (Ojha et al., 2009a), the high-income and male-headed households had more access to the key forest provisioning services than others. For example, the high-income group collected 450 bhari of fuelwood and 416 bhari of fodder per household per year, compared to 402 bhari fuelwood and 371 bhari fodder by the low-income group. Similarly, the male-headed households collected 435 bhari fuelwood per year, compared to only 201 bhari per year by the female-headed (see Figure 15). In contrast, low-income households featured more prominently in the collection of bamboo (50 bhari) for house building and basket weaving, and wildfood (5kg) to eat whereas wealthier households had little need for these services. When converting the collected products into local monetary values, the low-income group was found to benefit

[8] *Bhari* is a local unit of measurement. According to the locals, one bhari is a head load carried by individuals with approximately equivalent to:

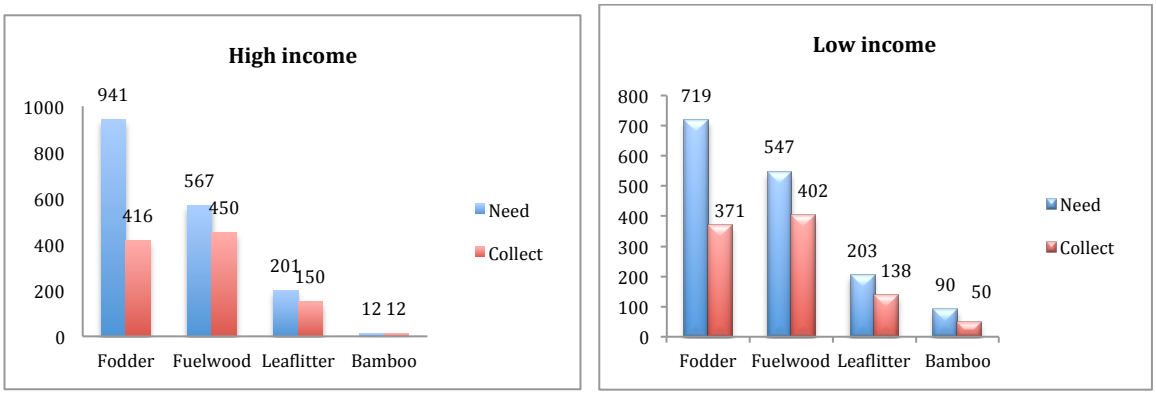
1. Fuelwood = 20 kg
2. Fodder = 13 kg
3. Leaflitter = 10 kg
4. Bamboo (also known as *Ghunde*) =15 kg

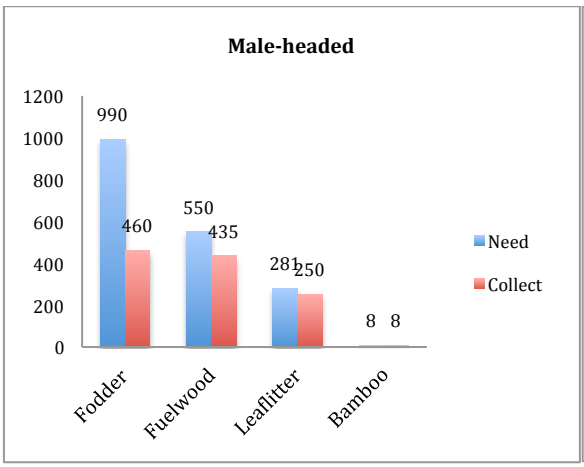
less than the higher-income group (the differentiated importance of ecosystem services by social groups is given in Annexure 13).

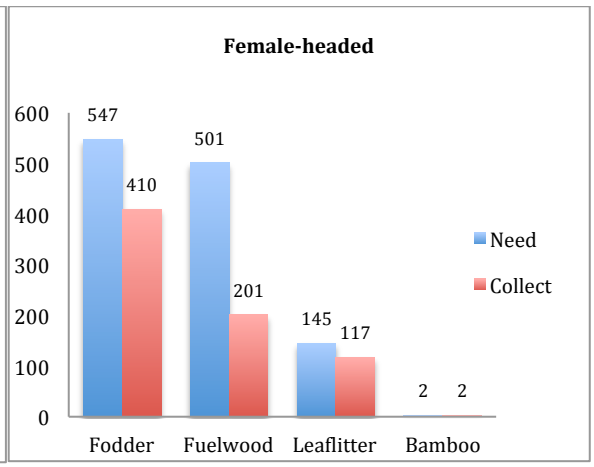
In terms of fodder, the high-income group was found to have higher need than female-headed households despite similar livestock numbers per household (1.9 each-see Table 11). This is because female-headed households were more like to have pigs and goats which have lower fodder requirements than higher income groups who had cows and goats. While for fuelwood (Figure 15), the demand of female-headed was similar to higher-income as they were involved in alcohol-making as well as regular cooking and heating. Alcohol making was not seen among the higher-caste and high-income groups, although practiced by some ethnic households.

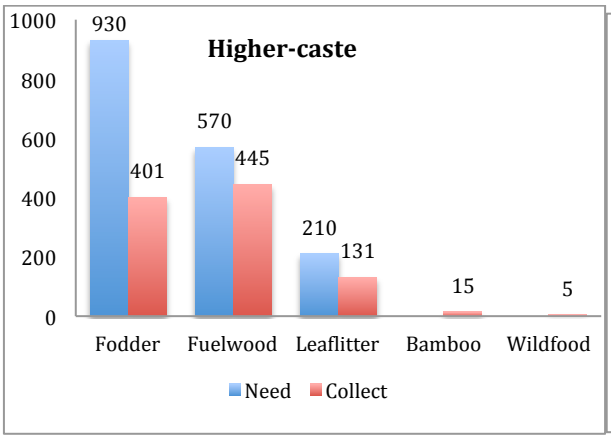
Timber, according to operational plans, should be distributed equally with special consideration to socio-economically marginalised groups (Annexure 14). Low-income households and family hit by disasters should be prioritised and get improved access to timber (see Annexure 14). However, the low-income / lower-caste groups complained about the process through which good quality timber was distributed. Some of the members of Executive Committee from both *Bhalu Kateri* and *Bhedi Chowk* community forests mostly from socio-economically privileged groups, were reported to make decisions about how and where timbers are distributed to households, as the executive committee is responsible for making key decisions on behalf of FUGs (see section 3). One of the respondents during the discussion explained: *'good timbers are often taken by the executive committee members* (mainly high income and male)*, while poor quality timbers are given to us' (39 year old male from low-income and ethnic group).*

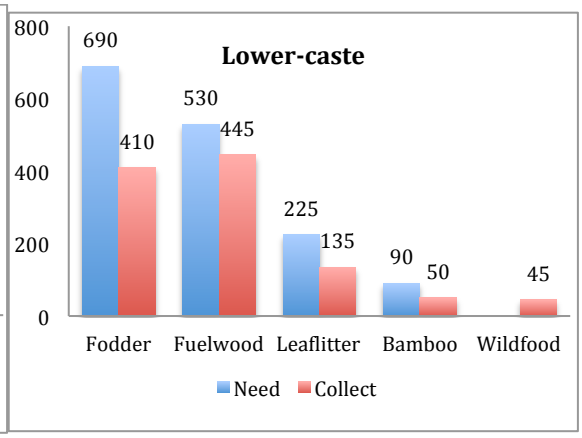
Figure 15: Need and collection of key forest provisional services in *bhari* per household per year across the groups based on Household survey, 2015

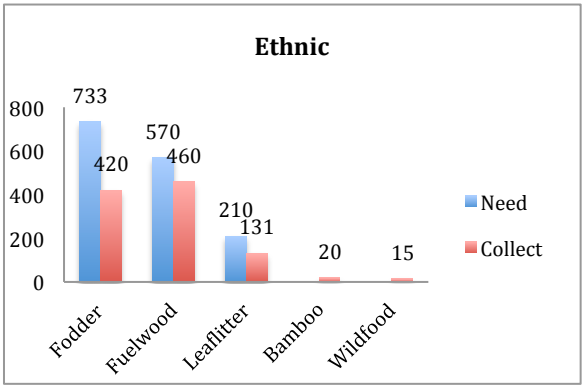












When exploring the reasons for uneven distributions during focus group discussions, some of the regulations were reported as burdens for some. The collection of fuelwood and fodder was restricted to Dec-January and May-June creating problems for some low-income and lower-caste households who had to compromise their income earning activities during the collection time. In contrast high-income groups could hire labor to collect fuelwood and continue to earn income. The ability of low income groups to hire labour were limited by the low returns they received when selling their milk and agricultural products in local markets as the much higher paying city markets were only accessible through private vehicles.

Some highly valued cultural services, particularly those relating to spiritual practices, were available to all. However, people expressed their dissatisfaction over other cultural services – particularly those deriving from research and tourism. Female-headed and low-income groups reported being excluded from these activities. For example, out of three conservation and five research projects reported in 2012, only high-income men from the executive committee were involved in the team and benefitted economically. Some households complained about the limited information sharing about those projects by the executive committees. The committees were also reported to have good relationship with DFO, District Development Committee, timber brokers, local traders and other major institutions working in the area to enable such provisions. Some complained that these relationships enabled members to retain their position in the committee and access buyers for their forest and agricultural products.

The ability of high-income groups to extract greater benefits from ecosystem services was perhaps most succinctly expressed by the opening line made by one of the participants in the high-income focus group - *'Money makes money*'. The high-income groups were found to be investing in hotels, shops near by the holy pond, and other recreational activities:

> *'We have high potential for tourism in the area. Once I started boating in the pond and spent around Rs. 25000 but earned more than Rs. 100000 in a year (estimated USD 1000/year). We are thinking of other recreational activities in the area soon' (43 year old high-income male).*

Access to and impacts of regulating ecosystem services also varied. While everyone benefited from air and water regulation services, some low-income households bore the brunt of biodiversity conservation activities associated with the growing forest cover in the area. They complained about crop raiding by deer and their limited financial capacity to manage risks and deal with the damage. In contrast, high-income groups were able to fence their lands and were not particularly concerned. Similarly, the low-income group was concerned that their houses (generally made from local bamboos) were threatened by erosion and landslides, while wealthier groups whose houses were made of cement concrete/timber expressed much less concern.

5.5.3.2 *Uneven participation in decision-making processes*

The uneven distribution of ecosystem service benefits flowed from injustices within the governance of local ecosystems. Adapting Pretty (1994) definition on types of participation, we focus on *active* participation (voluntary and genuine engagement in decision making processes), *forced* (involuntary participation where people turn up to meetings to avoid fines or

other punishments) and *passive* (people come to meetings but rarely speak or play an active role in decision-making). The household survey asked participants about their involvement in monthly and other meetings of the FUGs and the topic was also discussed in interviews and focus groups. Our analysis revealed high levels of active participation of the high-income group (72%), followed by medium-income groups (52%) and low levels of active engagement by the low-income group (29%). The ethnic community was also found to be particularly active (72%) when compared to higher-caste (59%), and lower-caste (33%) groups. Only 35% of female-headed households actively participated compared to 70% by male-headed households (see Table 13).

Table 13: Participation by different social groups in Mai Pokhari Ramsar site, identified through household survey

Groups	Types of participation (%)		
	Active	Forced	Passive
High-income	72	19	9
Medium income	52	31	17
Low income	29	44	27
Ethnic	72	11	17
Higher-caste	62	21	20
Lower-caste	32	46	22
Male-headed	70	12	19
Female headed	35	29	35

In contrast, forced participation to avoid fines was reported by lower-caste groups (66%) and the low-income groups (44%). Participation in all community forest meetings is a requirement and members are penalised if they fail to attend (see Annexure 14). Though the overall women's participation was reportedly increasing over time, only 35% of female-headed households were found to participate actively, while 29% participated to waive the penalty and 35% participated passively. The non-attendance fine generated negative attitudes among some female-headed, and low-income households. For the majority of the female-headed households whose husbands are abroad, they must care for children and the elderly, oversee farming/livestock and had little help collecting fodder, fuelwood and leaflitter from the forest, particularly when limited to particular seasons. One of the respondents explained:

> *'I am the only one in my home to work in the fields, take care of my family and do the household works. It's really hard to attend all the meetings. If I fail to attend, they charge. I am thinking to quit my membership from community forest soon but don't have*

other options to get fuelwood. Don't know what to do…' (34 year old female respondent from low-income group).

The women who did attend passively noted the overload of household work lessened their capacity to engage. It was also triggered by cultural norms and a lack of confidence in speaking out:

'When my husband is not at home, I sometimes attend the meeting but feel shy to speak. Men are often loud and do not listen, even if we dare to speak. But I can't participate often as I have many things to do. My man just plays cards, smokes and drinks' (19 year old female respondent from lower-caste).

The fine was also a burden for some low-income households, making some feel they had to compromise other income earning opportunities: *"We have to pay Rs.200 if we don't attend a meeting. We often have to compromise our daily wage to attend meetings or collect fuelwood. There is more burden than benefits"(22 year old daily wage female respondent).*

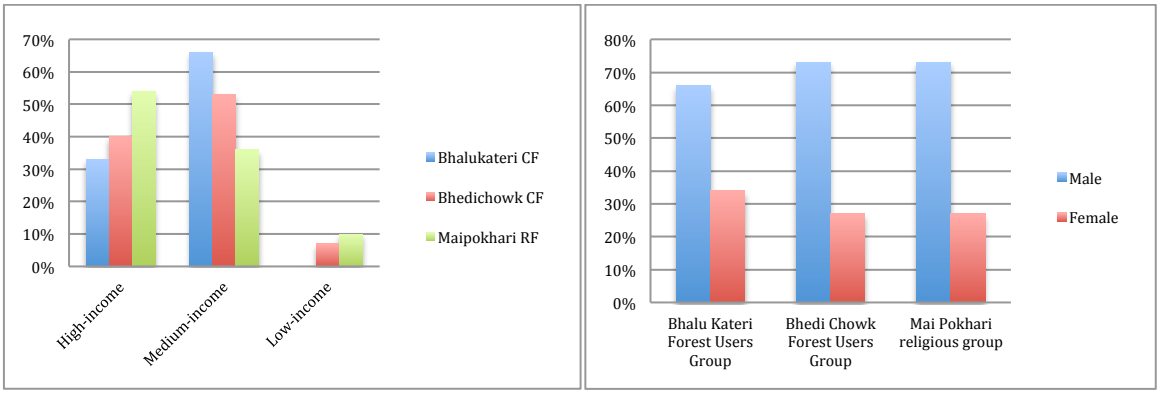
The decision-making process was also criticised for being undemocratic – requiring consensus from the executive committee and approval through the general assembly. Some participants expressed a desire for a more direct voting system. A respondent from a low-income ethnic group complained about the selection of the same president for two consecutive terms through the consensus process: '*We have the same president for the last two-three terms. Though some of us want voting system, our voice has never been heard' (32year old male respondent).* Other respondents from the low-income group also complained that their voices were often ignored during the meetings.

5.5.3.3 *Recognition and/or misrecognition*

Injustices were also apparent in terms of recognition – most evident in the executive committees. The *Bhalu Kateri* community forest executive committee had no representation from the low-income group while in the executive committee of the *Bhedi chowk* community forest *and Mai Pokhari* religious forest only seven percent and ten percent of members were low income. In terms of caste, the higher-caste and ethnic groups were represented by 56% and 44%, with no representation from the lower-caste in *Bhalu Kateri* community forest. Similar was the case for the *Bhedi Chowk* community forest with no representative of the lower-caste and only one representative in *Mai Pokhari* religious forest. The representation was better in terms of gender: women represented 33% and 27% in both community forests and 27% in the religious forest executive committee (see Figure 16). However, women were not represented in

the Chairperson or Secretary positions as stipulated by the second amendment of the Community Forest Development Program Guideline 2008.

Figure 16: Representation of social groups in executive committee, a decision-making body



A lack of recognition restricted marginalised groups in decision-making. Though most participants felt discrimination of *dalits* was not extreme in the study area, there were concerns of misrecognition. The misrecognition was still felt by some *dalits* who were traditionally discriminated by state and society and deprived of economic opportunities and public amenities (Shrestha, 2002). Everyday exclusions were evident in the following reflection in a discussion group:

> *'People hesitate to sit close to us, especially during the meetings in the public. They do not talk to us unless it is deemed necessary. Even they talk, they are often impolite' (51year old male respondent from lower-caste).*

Most of the *dalits* in the area also reported working as wage labourers for their rich counterparts. Their traditional status in society coupled with their dependency on high-income group and limited education were reported to create inferior feelings and degrade their self-esteem, also noted elsewhere in Nepal (Sunam and McCarthy, 2010). They felt unable to voice their concerns in the public arena during meetings and general assemblies. Limited recognition and respect for the livelihoods of *dalits* was institutionalised through their exclusions from forest committees.

Similarly, limited recognition of women's roles and responsibilities was one of the reasons for their restricted access to decision-making. As illustrated during a men's group discussion, '*It's better for women to stay at home as there are so many things for them to do. Even if they come, they don't speak in the meeting'*. The women's group complained that they were ignored in community forest planning and activities. As an example it was reported that only men from

privileged groups accompanied government officials in preparing a five-year operational plan and received economic and social rewards for their work. As one man explained '*Women are not good for forest survey as this is men's work and we will do it.' (26year old male respondent)'*. This type of attitude failed to recognise female knowledge and contributions, *'Whenever any research team comes here, only men are involved in the activities, as they know about birds and trees in the area. I also know about our forest but we are hardly informed and involved' (32year old female respondent)*.

5.6. Discussions

In what follows we discuss our findings in relation to the three pillars of environmental justice: distribution, participation and recognition.

Distribution

In terms of distribution a key critique of ecosystem services research is the limited focus on how benefits are distributed and accessed across hetereogenous populations (Horcea-Milcu et al., 2016). A failure to address such diversity has challenged the implementation of ecosystem services programs on the ground (Bull et al., 2016). Our case study shows that access to ecosystem services is unevenly differentiated by social categories such as gender, income and caste. Though community forestry policies in Nepal require equal distribution with special provisions to disadvantaged groups (i.e. low-income, lower-caste, and female-headed), our research indicates that benefits are disproportionately captured by socially and economically advantaged groups. Other studies have also highlighted issues of elite capture within community forestry in Nepal (Sunam and McCarthy, 2010) and elsewhere where wealthy households benefit more than their poor counterparts (Dehghani Pour et al., 2017). Disaggregated analysis of the type adopted in this study is essential to identify patterns of uneven distribution.

Our research suggests that some of the mechanisms employed to address equity issues in participatory community forestry processes were experienced as sources of frustration and injustice by disadvantaged groups. For example, one reason for uneven distributive outcomes within the case study derived from the restricted collection times. This policy, as per Forest Regulations (1995), was developed to sustain forest services and quality amidst increasing demand. However the restricted collection rule caused more problems for low-income earners than wealthier households, who could hire labour during these periods. Because of this restriction, some poorer community members could not fulfill their demand for fuelwood,

timber and fodder, and the marginalised had to compromise their daily wage (see section 5.3.1). The regulation, especially the strict collection time, should be made more flexible throughout the year so that community members can meet shifting forest needs whilst still maintaining forest quality. Other possibilities include providing labour to assist poorer households to collect during this period, a more whole-of-community approach to forest product collection and distribution (rather than household level), or places limits on how much one household can collect. A more flexible approach would also allow more marginalised households to schedule their collection time for periods that fit their other responsibilities. Restricted collections times, though successful in increasing forest cover, have not been able to fulfill community demands for forest products and alleviate poverty for low-income and disadvantaged communities (Adhikari et al., 2014, McDermott et al., 2013). Gritten et al. (2015), in this regard, strongly advocates to make community forests outcome-based rather than protection-based so that communities are able to fulfill basic forest demands. Outcome-based approaches would focus more on ensuring sufficient production of forest products and encourage small-scale forest enterprises. While protection based are more focused on increasing forest cover and maintaining its quality, without extraction of forest products.

Participation

Focusing on participation provides insights into some of the reasons why distribution is uneven and emphasises the challenges of overcoming inherent biases in decision-making processes. While community forestry in Nepal can be considered progressive for its explicit focus on gender, caste and income, the current approach of imposing fines for not participating in community forestry meetings, ostensibly oriented at encouraging representation of marginalised groups, caused ill feeling as these groups had the least capacity to attend meetings or pay fines due to low incomes and other pressures on their time. Nor did attendance equate to active participation, instead in an effort to avoid fines people felt forced to attend and/or attended passively, having little or no impact on decisions (Adhikari and Falco, 2008). Agarwal (2001) termed passive participation as *participatory exclusion*, while Nightingale (2006) noted women's participation as *just sitting-in* the meeting. This is not to suggest that such policies should be abandoned, indeed women's engagement with community forestry appears to be improving as a direct result of such policies, but they do need to be rethought with such findings in mind.

For effective participation, scholars have argued for pro-poor policies and more inclusive-practices with deliberate focus on marginalised groups (Adhikari et al., 2016). In this regard, policies such as 50% representation of women and proportional representation of socially

marginalised groups in community forestry structures are admirable but should be strictly practiced and monitored by the governmental organisations. Research needs to be conducted on why rules are not followed in particular communities with a possible cancellation of the community forest status being an outcome of continual non-compliance. Laws and policies could be amended to consider the provision of incentives, rather than fines, for low-income group participation to compensate time lost on other activities. Shifting from participation fines to incentives (monetary or in-kind such as subsidising fuelwood/fodder etc), providing training to assist participatory processes, and reserving agenda time specifically for representatives of low caste, low income, or female headed households to speak, could have a considerable impact on participation, and result in fairer access to benefits.

Recognition

Recognition in decision-making process has been identified as important for active participation and likely to result in more equitable distributive outcomes. This means an equitable and effective representation not only in the institutional structure but also in decision-making process is important, and can be pursued through mechanisms oriented at ensuring equal rights and responsibilities of marginalised groups in practice. Issues of distribution and participation can be approached initially through the regulations governing community forestry. Issues of recognition, however, stem, from much deeper entrenched forms of socioeconomic discrimination – deriving from education, poverty, and gender relations for example. However their deep roots should not dissuade people from addressing their expressions through community-scale initiatives like community forestry. Despite being deeply embedded in social structures governments, donors, and civil society organisations can seek to influence minds and culture by building the capacity of marginalised groups through awareness raising, training, and education opportunities. Dominant groups can also undergo training to learn about subordinate groups – such as men learning about women's roles, knowledge and contributions to community forests. Livelihood initiatives can target marginalised groups through small agriculture businesses such as tea, cardamom and medicinal plants cultivation (which are already in practice) that reshape dependencies on their rich counterparts. Equally important is road construction and public transportation in the area (desired by almost every household) that could help them to sell their milk and agriculture products to the nearby city. Improving the livelihoods of disadvantaged populations will assist with recognition, and when combined with improvements in decision-making processes contribute to more just outcomes.

5.7. Conclusion

The study adopted an environmental justice lens to analyse differentiated access to ecosystem services within community forestry in Nepal. Community forestry provides a wide range of services (Paudyal et al. 2017) and is under consideration for ecosystem services based initiatives such as payment for ecosystem services and ecotourism. Our findings suggest that ecosystem services based policy and practices would benefit from a closer focus on issues of environmental justice. Unless the quest for justice becomes much more central to ecosystem services, the rapid rise of this approach may ultimately lead to greater inequalities. In this case study community forestry could be seen as increasing inequalities by benefiting the rich much more than the poor. The prominence of economics and ecology and the absence of social sciences in the development of the ecosystem services discourse (Chaudhary et al., 2015) has left gaps in knowledge and policy regarding the differentiated impacts ecosystem services have. Research still tends to be dominated by reductionist analysis and aggregated economic values which tell us little about actual impacts on communities (Lele et al., 2013). If such impacts accentuate inequalities, as this case study suggests, the application of ecosystem services policies may contribute to instability, disfunction, and injustice, ultimately reducing the appeal of the approach, the sustainability of outcomes, and its potential to address patterns of ongoing ecological degradation. The current tendency to focus on aggregated economic values of ecosystem services may assist in making the case for implementing programs where governments or investors are reluctant, and as such is important, however it contributes little to the goal of implementing programs and contributing to social wellbeing. When social differentiation is ignored, the needs and aspiration of the disadvantaged groups are likely to be overlooked and misinterpreted (Dawson and Martin, 2015), thus further marginalising the already marginalised. In contrast if justice in terms of distribution, participation and recognition were embedded into the policies and practices of ecosystem services, and accompanied by careful disaggregated analysis of the type described here, recommendations for more fairer and more sustainable socioecological systems can be developed.

Our disaggregated analysis revealed uneven distributive outcomes among the social groups with the high-income, and higher-caste groups benefiting more than low-income, lower-caste and female-headed households despite the social equity provisions built into policy. Regulations, such as restricted collection time, should be simplified and made flexible to allow the disadvantaged to schedule their collection and other priorities. Policies aiming at ensuring an equitable representation in executive committee, such as 50% representation of women and equal representation of all social groups, should be strictly implemented and monitored.

Outcome-based policies focusing more on production rather than only protection and encouraging small-scale forest enterprises should be formulated to generate local jobs and meet local forest demands. Incentivising participation through monetary or in-kind contribution such as assistance with fuelwood and timber collection, instead of fines for non-attendance, and reserving agenda time during public fora could help the disadvantaged to participate more effectively. Equally important is building the capacity of marginalised groups through education opportunities in order to improve participation in community forestry processes and better recognition of the problems they face. In highlighting entrenched inequities and discussing some possible solutions, we argue that the ecosystem services approach needs to make environmental justice more central to avoid further marginalising the marginalised, and have fair and just outcomes. The current emphasis on aggregation in ecosystem services approaches may contribute little to practically implementing programs that will contribute to sustainable socioecological wellbeing. Therefore, it can be concluded that the access to ecosystem services among different groups are shaped by social characteristics such as caste, class and gender, and that the current tendency to focus on aggregated benefits within ecosystem service research is likely to hide and entrench environmental injustices.

Chapter 6: Spiritual enrichment and ecological protection?: A multi-scale analysis of cultural ecosystem services at the Mai Pokhari, a Ramsar site of Nepal

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Background

This chapter builds on the criticisms highlighted in chapters 3 and 4 that identify the need to explore intangible benefits, especially cultural services, in the area. It focuses at the community scale in the Mai Pokhari – a Ramsar site of eastern Nepal, where a holy pond holds high religious values among the community. The chapter adopts a cross-scalar analysis to examine local cultural services and the recognition of those local cultural values in national and global conservation decision-making. The chapter further analyses how ecosystem services are being prioritised by the conservation policies like Ramsar at the global scale and how the policy is practiced at the national and local scales in Nepal. The chapter, informed by political ecology, draws insights from fortress conservation. The mixed method applied involves three stages: key informant interviews, household interviews, and a review of policy and other relevant documents. These methods reveal spirituality, sense of place, traditional practices, recreation and research as local cultural services important for conserving ecosystems and contributing to the community's wellbeing. However, the analysis further reveals that the locally important values, especially spirituality and sense of place, were marginalised during Ramsar site declaration at national and global scales. As such, the analysis shows how cultural ecosystem

services are marginalized within global instruments like Ramsar and its practice in national and community scales in Nepal.

The chapter demonstrates how the declaration of the Ramsar site placed restrictions upon the local community and affected the human-nature interactions practiced over many decades. The restrictions exposed are the possibility of resettlement of those houses falling in the core zone of the Ramsar area, failed hopes of infrastructure development especially road construction connecting the area to its headquarters, and changing agricultural practices. The chapter shows how these restrictions create disenchantment towards the Ramsar among the local community.

It discusses the possible solutions to avoid such dissatisfactions and involve the community's support for ecosystem management in the future. One of the solutions is to initiate the process of declaring the area as UNESCO's Mixed World Heritage, which not only includes natural but also cultural values of the area encouraging community's involvement for both conservation and development outcomes. Based on these findings, the chapter argues for the need to strengthen the values of local cultural services in national and global policy-making, thus linking local sites to the global Ramsar network. The chapter further argues for more research on intangible benefits like spirituality and sense of place contributing to conservation and community wellbeing but currently less explored compared to provisioning and regulating by ecosystem services discourse.

Contributions

The paper is co-authored with Associate Professor Andrew McGregor, Dr. Donna Houston and Dr. Nakul Chettri. The idea of this paper is based on the spiritual values associated with the holy pond of the case study area. I conceptualised and drafted the paper based on the analysis of data collected from the field. The draft underwent several revisions during fortnightly supervision meetings with my principal supervisor. Dr. Houston and Dr. Chettri provided feedback on the paper. I finalised the paper by integrating the feedback from all the co-authors and preparing it for submission to the journal.

Abstract

Ecosystem services, a globalising discourse referring to both material and non-material benefits humans gain from ecosystems, has been rapidly mainstreamed into scientific and political thinking of environmental management. However, non-material benefits, also known as cultural services, have been rather subsumed within the dominant ecosystem services discourse. This paper identifies local cultural services in the Mai Pokhari, a Ramsar site of Nepal and adopts a cross-scalar analysis to explore the implications that the global Ramsar listing produces at the local scale. The research, informed by political ecology, applies both qualitative and quantitative methods to address the aim. Spirituality, sense of place and traditional practices were some of the important local cultural values identified as contributing to ecosystem management. But such local values were marginalised in conservation policymaking at national and global levels. The institutionalisation of Ramsar listing at the case study site imposed restrictions on community activities and the possibility of resettlement, thus creating disenchantment among the local community. It shows the need to strengthen the value of local cultural services in policy-making, that links specific local sites into the global Ramsar network. This is important not only for refining the global conservation policy and discourse like ecosystem services, but also for securing just conservation and sustainable development outcomes.

Keywords: cultural services; level; cross-scalar analysis; fortress conservation; Ramsar; Nepal

6.1. Background

Ecosystem services is a globalising discourse that prioritises the material and non-material benefits humans gain from ecosystems (Chaudhary et al., 2015). Services are classified according to four types: provisioning (for services such as food and water); regulating (climate stability, disease control); supporting (pollination, nutrient cycling) and cultural (spiritual, aesthetic benefits) (MEA, 2005). Proponents draw on these categories to emphasise the importance of ecosystems for the survival of human societies and economies (Kull et al., 2015). The concept has spread rapidly within environmental science and policy (Lele et al., 2013). Today, over 126 governments have signed up to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) oriented at strengthening the science-policy interface of ecosystem services for conservation and sustainable development (IPBES, 2017). A number of different international conventions and initiatives including the Convention on Biological Diversity (CBD), the Ramsar Convention on Wetlands, The Economics of Ecosystems and Biodiversity (TEEB), and Ecosystem Services and Poverty Alleviation (ESPA) now focus on ecosystem services. As a global discourse, ecosystems services is transforming how humans construct and value non-human processes (Chaudhary et al., 2015).

Though mainstreamed, the approach has been heavily criticised (Schröter et al., 2014). One of the criticisms concerns limited understanding regarding the intangible benefits of ecosystems (Lele et al., 2013). The intangible or non-material benefits are generally classified as cultural ecosystem services (henceforth referred to as cultural services) and include benefits related to spirituality, recreation, aesthetic experience, and traditional knowledge (MEA, 2005). Such intangibles are considered essential for shaping wellbeing, conservation and development but remain overshadowed and largely unexplored in ecosystem services research when compared to provisioning, regulating and supporting services (Hirons et al., 2016). Recently cultural services research has gained momentum with research on tourism, recreation, education and heritage values (Hirons et al., 2016), however relatively little focuses upon cultural identity, spirituality or religious significance linked with ecosystems protection or landscape conservation (Daniel et al., 2012). This is reflected in practice where spirituality and cultural identity are often not integrated into ecosystem services assessment, decision-making and governance processes (Hirons et al., 2016). The conceptual barriers in defining ‘cultural services’, a lack of consistency in assessment, the domination of economic and biological academic disciplines within ecosystem services research (Chaudhary et al., 2015), and the complexity of measuring the subjectivity of human-nature relationships are some of the reasons for its limited attention.

Local cultural services are integral to everyday life and people's wellbeing (Chan et al., 2012) and are the influential motivators of local ecosystem management. Integrating local values into national and global policies is hampered by the focus on technical and political concerns at higher levels of governance rather than local socio-cultural concerns (Robbins, 2012). Disconnections exist between local communities who manage ecosystems, and those at national and global levels who make and implement policies and approaches often through top-down approaches (Hirons et al., 2016). It is important to understand this disconnection and the varied interests that exist at different levels as ecosystem services grows into an influential globalising discourse (Chaudhary et al., 2015). Currently, however, there is limited multi-level analysis exploring local-global dynamics in ecosystem services research (Hirons et al., 2016), particularly when focused on cultural values. Scholes et al. (2013) strongly advocate for cross-scale analysis of ecosystem services decision-making to provide insights on the links between local level socio-ecological process and national and global level decision-making processes. Cross-scale understanding helps to effectively contextualise ecosystem services and improve decision-making (Cash et al., 2006).

In this paper, we explore how cultural services are valued at the local level and how they are incorporated or ignored at higher levels of decision-making. We are interested in examining how ecosystem services or its types are prioritised in the Ramsar policy and practiced at national and local scales in Nepal. Our case study is the Mai Pokhari, a Ramsar site of Nepal, where a local pond associated with high religious values was declared an area of international significance in 2008. Nepal, being a member of the IPBES, has integrated the ecosystem services concept into its national conservation framework and increasingly involved in developing ecosystem services policy in pursuit of better conservation outcomes. The Ramsar Convention is one of the global mandates the country has committed to with a focus on conserving wetland ecosystems and their associated services. Using the Ramsar site as an example, our multi-level analysis explores whether local cultural values are being integrated into national and global policy making through the ecosystem services framework.

Our research is guided by political ecology, which has a tradition of looking across geographic scales when analysing the socio-ecological processes driving land degradation, conservation and marginalisation. For the purposes of this paper, we focus on the three most prominent scales used in conservation – local, national and global – positioning them as dynamic institutionally-defined hierarchical levels of governance that are interconnected through formal and informal networks of influence and power (Calgaro et al., 2013, Maciejewski et al., 2015). In adopting a cross-scale approach, we analyse the interests and practices from local to global

and *vice versa*. Such an approach is particularly useful for ecosystem services research where ecosystems, communities, national authorities, international agencies, donors and investors are becoming connected in diverse and unexpected ways. In looking across scales, it is possible to identify which ecosystem services are being valued at what levels and what impacts this has for local communities.

6.2. Theoretical framework

Political ecology is a research approach that explores human-nature dynamics through historical and geographical processes (Kull et al., 2015). It takes a multi-scalar approach –connecting local socio-ecological struggles with broader processes structuring 'ecosystem services' at global, national and transnational scales (Brown, 1998). Political ecologists pay specific attention to 'ecology – the science of the topic at hand' and the 'agency of ideas and the actions of social, economic and cultural factors across scales' (Kull et al., 2015). As an analytical concept, scale helps to analyse local-global dynamics - the interconnections between local and global, and simultaneity of those connections (Howitt, 2003). An empirical focus on scale helps identify the specific interests and influences of different actors at different levels, and how they shape decision-making and subsequent outcomes (Tacconi, 2000). Political ecology has also had a strong focus on justice, with scale providing a conceptual means of identifying who is benefiting and who is being marginalised at different levels from socio-ecological policies and processes. As such political ecology provides a means of developing a more in-depth understanding of the opportunities and risks posed by the rapid growth of global ecosystem services for local livelihoods and conservation initiatives.

Through its progressive approach, political ecology has long been critical of conservation approaches that promote global or national interests above those of local communities. The history of conservation often reflects the control of 'nature' and resources by the state to the exclusion of 'culture' and communities. Territorialising landscapes as protected areas and controlling the surrounding communities has been a prime goal of environmental conservation history (Robbins, 2012). The management of forests by native people in many places was conveniently overlooked (Hecht and Cockburn, 2010), and the environmental resources were made intelligible by capitalising the ecologically significant landscapes to produce a distinctive territorial form created by the 'environmental state' (Peet and Watts, 2000). This conventional conservation approach, also known as fortress conservation (Brockington, 2002), attempts to strictly control local access and use of resources (Brown, 1998) but often had messy outcomes as extraction is criminalised and unregulated (Robbins, 2012). The establishment of national

parks and wildlife reserves in developing nations, especially in Africa and Asia, were often made with the fortress mentality. A relevant example was the establishment of the Koshi Tappu Willdife Reserve (KTWR) in Nepal, traditionally a base of subsistence living for the local communities, in which strict controls were placed upon local access and use of resources. This resulted in serious park-people conflicts, illegal over-extraction of resources and degradation of ecosystems (Limbu and Karki, 2003). Forest ecosystems have decreased by 16% in the 34-years since the establishment of the reserve (Chaudhary et al., 2016).

The failures of the fortress approach has forced conservationists to consider human needs, and recognise that importance of participation by local communities and their cultural values in conservation practices (Mulongoy and Chape, 2004). Once overlooked, local expertise began to be considered and valued through approaches such as community-based approaches involving buffer zones and community forestry (CF). These approaches, unlike fortress conservation, seek to decentralise control from state to local communities, advocating a balance between the needs of locals and nature conservation (Adams and Hulme, 2001). However, there remain a number of critical issues and concerns. For example, the patterns of land uses and the activities performed by the local communities are monitored and conservation outcomes are usually prioritised when conflicts are identified (Bryant, 2000). Even the integrated conservation and development approach, once one of the most pervasive conservation paradigms, is widely criticised for not achieving its prime conservation and development goals (Blom et al., 2010). In many cases, conservation is still thought of as something imposed on the locals by outsiders and of marginal benefit to local interests (Chan et al., 2016). For example, payments for carbon through the Reduced Emission from Deforestation and forest Degradation (REDD) has been criticised for privileging global interests in climate change over local forest uses (McGregor, 2010), resulting in marginalisation of local traditional values and livelihoods (Robbins, 2012). Research has highlighted the need for local human-nature relationship and values to be central when designing global conservation strategies to avoid such marginalisation (McGregor et al., 2015). There is also a need to compensate the communities adequately for their lost access to resources (Loft et al., 2016).

The development of the ecosystem services concept may provide a means of overcoming the divisions pervading previous conservation initiatives (Cumming et al., 2005). Rather than position human wellbeing and environmental conservation as tradeoffs, ecosystem services highlights their inseparability – human wellbeing and environmental conservation are positioned as relying on one another. However research to date has been dominated by economic valuation studies (Chaudhary et al., 2015), risking over-emphasis on economically

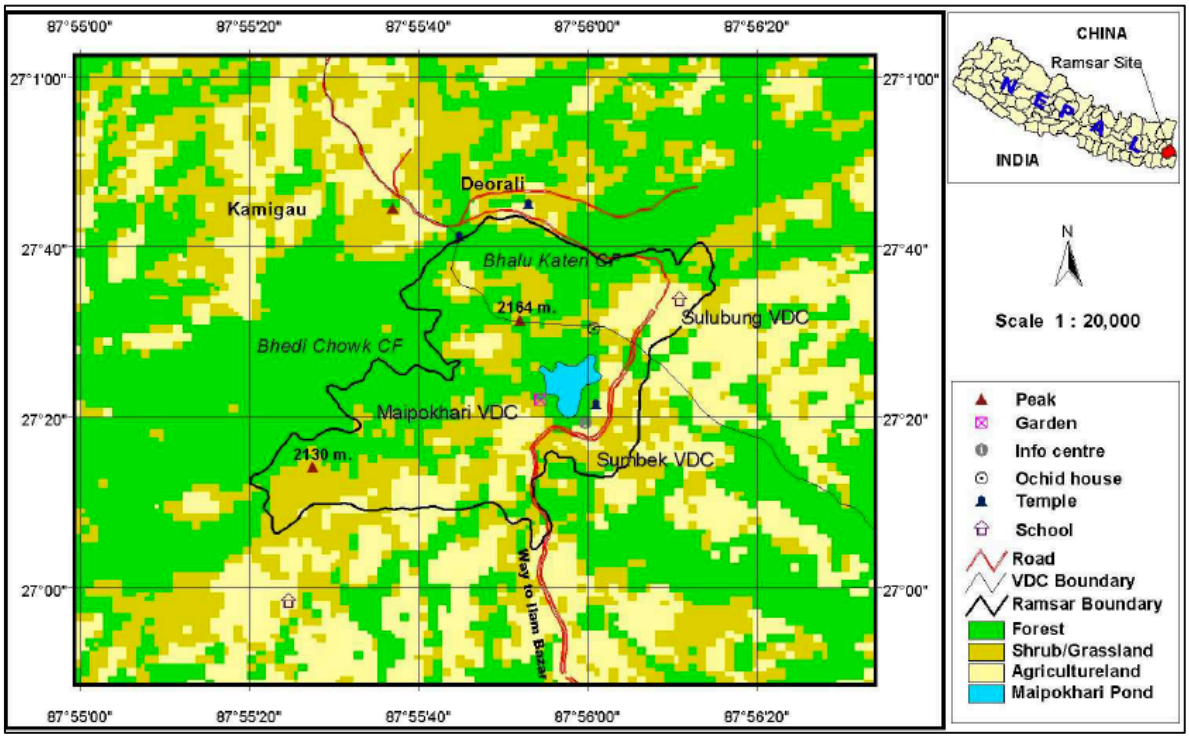
valuable services, which only benefit particular (normally wealthier) interests over more intangible local social and spiritual benefits that are shared more widely (Chan et al., 2012, Lele et al., 2013). If the concept of ecosystem services results only in the further commodification of nature – 'selling nature to save it' (McAfee, 1999) – it is likely to lead to new expressions of fortress conservation and further marginalisation of the already marginalised. If however, it is expanded to map out the diverse interconnections and reliances between human and non-human processes, it may yet provide a means of challenging the human-nature dualisms that pit people against the environment. It is with this rather more hopeful approach in mind, we turn to our case study in Nepal. We begin with a description of the study area and methods, before detailing how cultural services are valued by different actors at different levels and its consequences on the local community.

6.3. Study area

The study was conducted in the Mai Pokhari of Nepal. Situated between 87^0 55' 20" East and 27^o 00' 04" North, the area is at an altitude of 2,080 meters from mean sea level in the Ilam administrative district of eastern Nepal (see Figure 17). Spanning over three villages (*Mai Pokhari, Sulubung and Sumbeak*), the Mai Pokhari spreads over 239 hectares of land with a population of about 2500 living in 500 households. The major occupations in the area are agriculture (medicinal plants cultivation, subsistence and cash crops cultivation like tea and potatoes), livestock (especially for milk production), government services, and an emerging tourism industry (GoN, 2012). Household incomes are bolstered by remittances from absent family members.

The site was chosen for its high cultural and ecological values. Declared as a Ramsar site in 2008, the Mai Pokhari has a core area of 90 hectares with a 12ha religious forest (RF), two community forests of 10ha and 18ha each, and some private lands incorporating 49ha (see Figure 17). The religious and community forests including the holy pond comprise 46% of the total land and is under the authority of Government as per Nepal's Forest Act 1993. The major land covers are forest (42%), agriculture land (49%), grassland (6%) and wetland (3%) (GoN, 2012). A local management committee under the direct supervision from the District Forest Office, Department of Plant Resources and District development Office manages the site.

Figure 17: Location map of the Mai Pokhari of Nepal



Source: GoN, 2008

The site has 231 species of plant, 36 species of herpetofauna, 300 species of bird and 19 species of mammals (GoN, 2012). It has a natural wetland known as the *Mai Pokhari* (*Mai*=Mother, and *Pokhari*=pond), which holds high religious value for different religious groups including *Hinduism, Animism, Shamanism* and *Buddhism.* The pond is accompanied by a range of hermitages, temples and monasteries, and visited by hundreds of pilgrims every year. Before the unification of Nepal in 1774 AD, the *Kirant* people such as *Rai, Limbu* and *Sunuwar,* who comprise indigenous ethnic communities in Nepal, occupied the place. During and after unification, communities from other parts of Nepal such as Shamanist *Sherpa, Gurung* and *Tamang* and Hindu *Bahun, Chettri and Kami* migrated to the area. Each community has their own language, traditions, beliefs and customs (GoN, 2012). Within this socially and biologically rich context, multiple cultural and other services are associated with local ecosystems, providing an ideal site for research.

6.4. Methods

A mixed methods approach involving three stages was adopted to explore how cultural services were valued and incorporated into decision-making at different levels. The field research period took place from November 2014-March 2015. First, we conducted key informant interviews that involved 15 participants from government and community-based organisations, hotels and

local political parties. Older citizens and priests were also interviewed to provide details on the history of the pond, changing cultural values, and the history behind the establishment of Ramsar site. They were interviewed, mostly over cups of tea, and sometimes a glass of local barley wine in the evening, as per the local tradition. Questions such as 'how do you feel living in this area', 'what kind of intangible benefits do you get from this area', 'what is the history of the holy pond', 'what are the negative events or services you have experienced in this area' and 'can you tell me about your experience of the Ramsar site declaration' were asked during the interviews. The Government and non-governmental officials were further consulted about their interests, priorities and mandates for the site. The interviews lasted 40 minutes on average.

Second, we conducted household interviews with a total of 33 participants from three villages (eleven participants from each village living in the area for at least 15-years) during the field research period. A list of household's names was obtained from the District Forest Office, and the selected participants were purposively chosen for the interviews. Closed questions focused on basic household characteristics, while open-ended questions where similar to key informants interviews, focused on non-material benefits and cultural services derived from the site. The household interviews lasted for approximately 45 minutes. The responses from both interviews were first transcribed and those transcriptions were coded with themes such as spirituality, recreation, sense of place and others. These codes were developed deductively according to the themes of cultural services identified by CICES (2011), as well as inductively according to issues arising in the interviews.

To identify interests and priorities at national and international levels, the third method involved analysing national policies, acts and regulations as well as global policy documents, conventions and related project documents (see Annexure 15). Documents relating to conservation and management of ecosystems were prioritised, with a special focus on Ramsar as well as community and religious forests. At the international level, the policy documents of Ramsar Convention and CBD[9] including the national reports and reports of international organisations/donors were reviewed. Within the documents, we focused on the term and concept of 'ecosystem services' i.e. references to the benefits human derive from ecosystems. A categorisation matrix was then prepared to code the segments of text referring to ecosystem services and further according to the categories of ecosystem services identified by CICES (2011), i.e. provisioning, regulating, and cultural services. The analysis focused on which

[9] CBD is a multilateral treaty committed to conserve biodiversity, promote sustainable use, and fair and equitable sharing of benefits arising from genetic resources. The Convention has 196 parties by 2015.

particular ecosystem services categories were prioritised within policy documents, as well as the interests, intentions and practices of national/international actors. The key interviews with officials from government and non-government organisations also aided in exploring interests, practices and mandates at national and local levels.

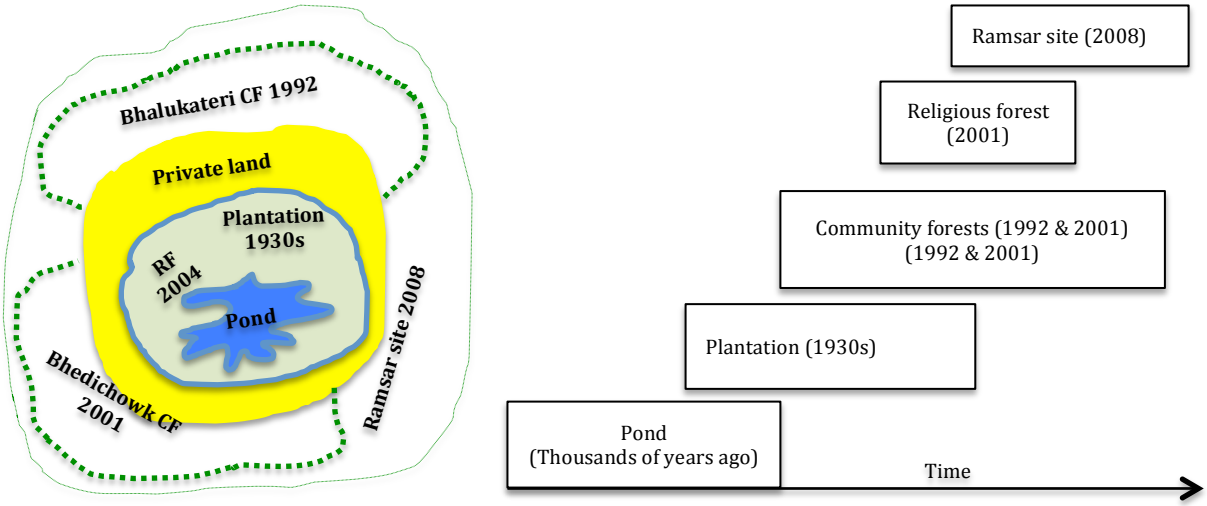
6.5. Findings

6.5.1 History of the Mai Pokhari

The declaration of the Mai Pokhari as a Ramsar site was the outcome of efforts involving actors working at and across local, national and global levels. However, it was the local community that played the most crucial role not only in establishing the Ramsar site but in conserving the area prior to Ramsar listing. The holy pond is deeply attached to community lives and beliefs, and has historically inspired a range of conservation efforts. According to the local community, areas adjacent to the pond were abandoned and degraded when the pond first emerged thousands of years ago. After Land Reformation during 1900s, the pond was fenced as a religious site by the government but was left abandoned with ongoing land degradation. To prevent further erosion of the pond, the local community planted pine seedlings along the pond edge during 1930s. To meet the basic needs of the local communities, forests in the vicinity of the pond under the Forest Act 1973 were declared as *Bhalukateri* community forest in 1992, and *Bhedichowk* in 2001 (GoN, 2012). Community efforts also lead to the pond and its surrounding areas being declared as a religious forest in 2004 (see Figure 18).

The local communities pursued further protection and recognition of their efforts by initiating efforts to designate the area a Ramsar site through the help of some local leaders and NGOs. With international status linked with designation, the local community hoped that Ramsar listing would hasten development. They linked protection of the ecosystems with hopes for physical infrastructure, such as road construction that would connect them to district-headquarters. They also hoped the listing would bring them alternative livelihoods options. While some local people initially opposed the declaration, most approved and expressed their interests for the declaration through local political parties. The Government then assessed the area and proceeded with a formal application to declare the area a Ramsar site. With the government's application, the areas with 239 hectares covering different wards of three villages (*Mai Pokhari, Sulubung, Sumbek*) were declared a Ramsar site in 2008. An area covering two community forests, one religious forest, a holy pond, and some private land was demarcated as a core zone of the Ramsar site (see Figure 18).

Figure 18: Depicting the history of a holy pond to a Ramsar site



6.5.2 Local cultural services

The integral role the Mai Pokhari site plays in community wellbeing has long inspired community conservation. In this section, we focus on the five most highly valued cultural benefits derived from the area. These were: spirituality, sense of place and inspiration, traditional culture, tourism and recreation, and research and education.

6.5.2.1 *Spirituality*

The spiritual benefits and meanings deriving from local ecosystems, and particularly the holy pond, were the most important service mentioned during the interviews. It was primarily linked with spiritual values associated with the holy pond. Each of the nine corners of the pond was believed to represent a goddess, who could assist people with health, fertility, good harvests, and financial security through blessings. Because of its sacredness, no animals or fish were hunted from the pond and pollution was strictly prohibited:

> *'All the living beings in this pond are holy to us, and we never hunt anything from here' (59 year old male from ethnic community).*

People worship the holy pond throughout the year, including a special function on a fullmoon day on October, known as *Haribodhani eakadashi*, as well as on the Nepalese New Year day in April. Some claimed to see dazzling lights in the Northwest corner of the pond on the fullmoon day showing the existence of goddess. As an ancestral god, the ethnic communities, especially the *Kirant* community, worship the pond and pray for favorable weather to have good harvest, and seek blessings for their protection from erosion, landslides, hailstorm and other natural

calamities. They offer some of their harvest to the pond each year. Worshiping the holy pond during marriage and birth ceremonies are ongoing traditional activities.

> *'We cannot think of this area without the existence of the holy pond. She is our ancestral god and this place including forests, our farms and houses are under her protection (29 year old business woman from ethnic community).*

The pond has a long history with many stories emerging from its creation. People explained that the holy pond formed when the holy Mai River[10] (mother) got married with the Tamur River (father) thousands of years ago. The holy pond was first born in a place called *Gorkha kharka*-13 km southwest. After a few years when humans started to pollute the pond, the goddess got angry and shifted to *Barbote*, before settled down in the *Mai Pokhari.* Another story states that there was an old couple known as *Mahi* in a place called *Siddi Thumka*, about 12 km southwest from the current place. After their death, a pond emerged in their homestead to provide drinking water to all. But once the people started to pollute, the pond shifted to other places before it finally settled down to *Mai Pokhari*. In both of the stories, pollution was believed to be the main reason to shift to other places. The locals therefore strongly believe that the holy pond should not be polluted as it may again leave the current place. The visitors, however, were blamed for gradually polluting the pond over time. A perceived decrease in the level of water was a concern for the locals – potentially indicating that the spirits may be planning to leave the area because of pollution in the area. This fear resulted in some local people adopting conservation measures, including the formation of a committee to clean the pond and nearby areas on a regular basis.

6.5.2.2 *Sense of place and inspiration*

A second recurring theme derived from the area was the sense of place and inspiration. People were proud to live in the area known for its international recognition as a Ramsar site. Local community members, particularly those from ethnic animist groups, also showed their attachment with nature by worshipping the rivers, streams, forest, and rocks. While others expressed happiness towards the greenery maintained by the forests and the beautiful scenery of snowy mountains seen from the area. Along with this pride, the place was also regarded as a place of inspiration where they feel at home, relaxed and energised. One of the farmers explained how the attachment with the place brought him back:

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[10] The Mai River and Tamur River in the eastern Nepal are holy to them who practice Hinduism and Animism.

'Once, I left for work abroad. But couldnot continue that journey and came back the next day. I've lived here for more than 40 years. I know each and everything including the soil and rocks here. I feel they know me too. The fear to go to an unknown place forced me to come back home that day' (43 year old farmer).

Similarly, another farmer aged 35-years shared how his attachment to the place brought him back.

'I worked in Qatar for almost 11 years and there was not a single day I did not think about my place and people. The higher-rising buildings couldnot replace the serenity of my village. I got back…. and invested in tea, cardamom and vegetables cultivation with my savings. Today, I am earning more than I was laboring in Qatar in that extreme heat……. this is the place I really belong…..I'm happy and satisfied with my place and people'.

While sense of place and belonging associated with local ecosystems were not easy concepts to articulate, they provided a common thread underlying many of the interviews.

6.5.2.3 *Traditional culture and practices*

Participants also valued the local area for the traditional culture and practices associated with the area. The culture and rituals such as traditional dances, yearly festivals, and traditional healers were some of the important practices. The traditional dance according to local community, also known as *Maruni dance* in a local language, is performed once a year during the festival of lights when males, dressed as females to create humor, dance from house to house. The dance was specifically devoted to the holy pond to gather offerings from the villagers where worship was seen to improve rhythm and melody:

'This is one of my best festivals. I don't miss it - especially to see this dance. Its so much fun and seems like the whole village is happy' (25 year old local shopkeeper).

The dance was one of the ways to thank as well as please the holy pond to stay in the place and bless the area and its people. Similarly, a traditional healer used local remedies to cure illness among the villagers, especially to get rid of evil spirits. He was treated as a traditional priest of the village and offered food, money and clothes: '*I often go to treat my illness. I have been visiting him since last two decades and my grandchildren also visit him. We give him maize, sometimes rice and money*' (*70 year old housewife*). Participants also expressed how they enjoy drinking *Thongba* – a local alcoholic drink made from millet - during gathering and festivals

like New year, *Dashain* and *Tihar* (festivals of lights). Some also appreciated the cultural diversity of the area with diverse ethnic, and non-ethnic communities and their traditions.

6.5.2.4 *Tourism and recreation*

Tourism and recreation were particularly valued by the local business owners running hotels and shops. The opportunities for tourism and recreation were considered to be important cultural services sustained by local ecosystems. The participants valued the features that attracted religious visitors, as well as occasional trekkers, bird watchers and picnickers. The religious visitors were mostly from different districts of Nepal and India, who came to visit the holy pond throughout the year but especially on New Years day. Some visitors were reported to carry back pond water as a blessing, once their wishes come true. Others valued the emerging tourism and recreational activities including sightseeing, trekking and hiking. Community members reported an increased sale of local produce like vegetables and fruits. Picnicking has become a popular emerging recreational activity for the nearby city dwellers, where picnickers could skip city heat during summer, and enjoy *Rhododendron* flowering during spring.

6.5.2.5 *Research and education*

A final less common cultural benefit that derived from cultural services was the provision of research and educational opportunities. National and international research activities were focused on biodiversity assessment, bird watching, and a geological survey of the pond. Educational activities also included forest and wetland management, and community empowerment through capacity building in areas such as goat farming or sewing to support local livelihoods.

6.5.3 Cultural services at national and international levels

The cultural benefits local communities valued, particularly spiritual ones, have long provided the motivation for conservation activities, including, eventually, the Ramsar listing. However locally-prized cultural services are less overtly recognised at national and international levels where other types of services were more readily recognised. In this section, we review national and international documentation related to the area and the low profile afforded to cultural services.

6.5.3.1 *National policies and approaches*

The management of Ramsar sites is largely centralised through the Department of National Parks and Wildlife Conservation (DNPWC). However for the Mai Pokhari, the implementation responsibility was decentralised at district level, to the District Forest Office (DFO). In

collaboration with other line agencies including District Development Committee (DDC), Agriculture Development Office, District Plant Resources Office, Indigenous group representatives, and others (GoN, 2012), the DFO conserved and managed the site through a local management committee. However, local implementation was shaped by relevant national acts and policies, mostly focused on conservation. Some of the major conservation policies were the *National Wetland Policy* 2003, *Forest Sector Policy* 2000, *Forest Act* 1993, and *Forest Regulations* 1995 under the broader National Biodiversity Strategy and Action Plan (NBSAP) 2014-2020.

Analysis of these policies showed that their major focus is on ecological values - reflected through conservation goals. For instance, the goal of the most relevant policy – the National Wetland Policy 2003 - was on regulating services, reflected in its aim to: '*conserve endangered and common wildlife species, aquatic fauna and other genetic sources dependent on wetlands*; *and maintain various sources of underground water, preventing landslides and controlling tons of nutrients'*(GoN, 2003). The aim of the overarching NBSAP is a little more open '*to significantly enhance the integrity of Nepal's ecological systems by 2020, thereby contributing to human wellbeing and sustainable development'* (GoN, 2014).

Within the policy, human wellbeing and sustainable development is mainly linked to regulating and provisioning services, with cultural services barely being mentioned (see Table 14).

Table 14: List of policy documents with their major objectives

Policy documents	Mission and objectives	Priority ecosystem services
National Biodiversity Strategy and Action Plan 2014-2020	"*Conserve biodiversity* for sound and resilient ecosystems and national prosperity". The overall goal is to significantly *enhance the integrity of Nepal's ecological systems by 2020*, thereby contributing to *human wellbeing and sustainable development* of the country.	With the major goal of biodiversity conservation, NBSAP highlights regulating and provisioning services.
National Wetland Policy 2003, and its Revised Plan 2012	*Conservation and management of wetlands*, with *sustainable use* of its resources	Regulating and provisioning services
Forest Act 1993 and Forest Regulation 1995	"*Develop, conserve, use and manage the forest* for collective interest of local community" - forest conservation and poverty alleviation	Utilisation of forest highlights provisioning, while conservation focuses on regulating services

Forest sector Policy 2000	The main aim is to: Meet the *people's basic needs for forest products* on a sustained basis *Conserve ecosystems and genetic resources* *Protect land against degradation and other effects of ecological imbalance*; and *Contribute to local and national economic growth*	Provisioning and regulating services prioritised linking basic needs to ecosystem conservation

Similarly, the forest sector policy - Forest Act and Regulations - prioritised regulating and provisioning services with its aim to '*conserve ecosystems, genetic resources; protect land against degradation; and meet people's basic needs'* (see Table-14). The major focus of community and religious forestry was on regulating services. This has also been noted by others who argued how community forests are primarily declared to halt forest degradation and increase forest cover rather than local people's values and their wellbeing (Thomas, 2008). Retention of cultural services is very much a secondary consideration.

6.5.3.2 *International policies and approaches*

When the Mai Pokhari holy pond was declared a Ramsar site of international significance in 2008, a range of global actors with different interests became involved in valuation. The Ramsar Convention and CBD as well as a variety of regional and international initiatives influenced the institutionalisation and subsequent management of the site. The Ramsar convention, also known as 'The Convention on Wetlands of International Importance', is one of the major multilateral environmental agreements within the international nature conservation system (Mauerhofer et al., 2015). The missions clearly show its priority on the ecological values of wetlands. The mission of the convention is '*conservation and wise use of wetlands through local and national actions, and international cooperation as a contribution towards achieving sustainable development throughout the world'*. Ramsar encourages signatories to designate their significantly important wetland and manage the sites effectively, maintaining their '*ecological character*' (RCS, 2016). Though the Convention includes cultural values such as tourism, research and education, its primary focus is on regulating services, which are well reflected in its criteria to designate sites focusing strictly on ecological values. For instance, one of the criteria is '*on account of their international significance in terms of ecological ecology, botany, zoology, limnology and hydrology',* with a goal to *'formulate and implement their planning so as to promote the conservation of the wetlands and wise use of wetlands in their territory'*. Even the monitoring criteria reviewed by the Scientific and Review panel are focused almost entirely on ecological values. For instance, '*any unsustainable changes in ecological character occurred in the past, are occurring or likely to occur as a result of human*

interference, are regularly monitored after declaration' was the criteria used to review Ramsar sites (Mauerhofer et al., 2015).

Nepal, a signatory to the Convention, formulated the national wetland policy to reflect this commitment (GoN, 2003). Since signing the Ramsar treaty in 1988, the country has designated ten Ramsar sites. The Mai Pokhari site was designated under three main criteria: a wetland with '(i) *vulnerable, endangered, or critically endangered species or threatened ecological communities*; (ii) *population of plant and/or animal species important for maintaining diversity of a particular geographic region*; and (iii) *plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions*' (GoN, 2012). In line with these criteria, the area was designated to conserve endangered species like the White-rumped Vulture (*Gyps bengalensis* - critically endangered according to International Union for Conservation of Nature (IUCN); Bengal Monitor Lizard (*Varanus bengalensis* – Convention on International Trade in Endangered Species (CITES) Appendix I); Eurasian Otter (*Lutra lutra* – CITES Appendix I), Chinese pangolin (*Manis pentadactyla* – Critically engendered IUCN list). Similarly, some endemic flora and amphibians such as Moss (*Sphagnum nepalense*) were considered significantly important for conservation. The area was also designated important as a biodiversity corridor (Myers et al., 2000) to connect protected areas for long term conservation of endangered ecosystems and its species in the region (GoN, 2012). These criteria were set aiming to *conserve global wetland biodiversity* in the region, which clearly showed its emphasis on regulating services at a global scale - focused explicitly upon the ecological values of the wetland and its surrounding ecosystems, rather than local community values. Bounded with these criteria, the ecological values were emphasised in the application to designate the area a Ramsar site by the national authorities. In doing so, the local cultural services that originally inspired the listing were marginal to the application.

After designation, a management plan was prepared under the *National Wetland policy* 2003, with funding from the Ramsar Secretariat. Guided by the rules of the convention and prepared under the National Wetlands Policy 2003, the primary aim of the management plan was '*to conserve and maintain the ecological character of the area to safeguard the rare, endangered and endemic species, while also promoting the wise-use especially non-consumptive use such as ecotourism, and traditional religio-cultural practices* (GoN, 2012). Though the objectives of promoting *ecotourism, green livelihoods and foster cultural harmony* under short-term objectives were part of the management plan*, the wetland conservation, safeguard endangered species, and enhance ecosystems*, were the primary conservation objectives that accord with overall goals of wetland conservation.

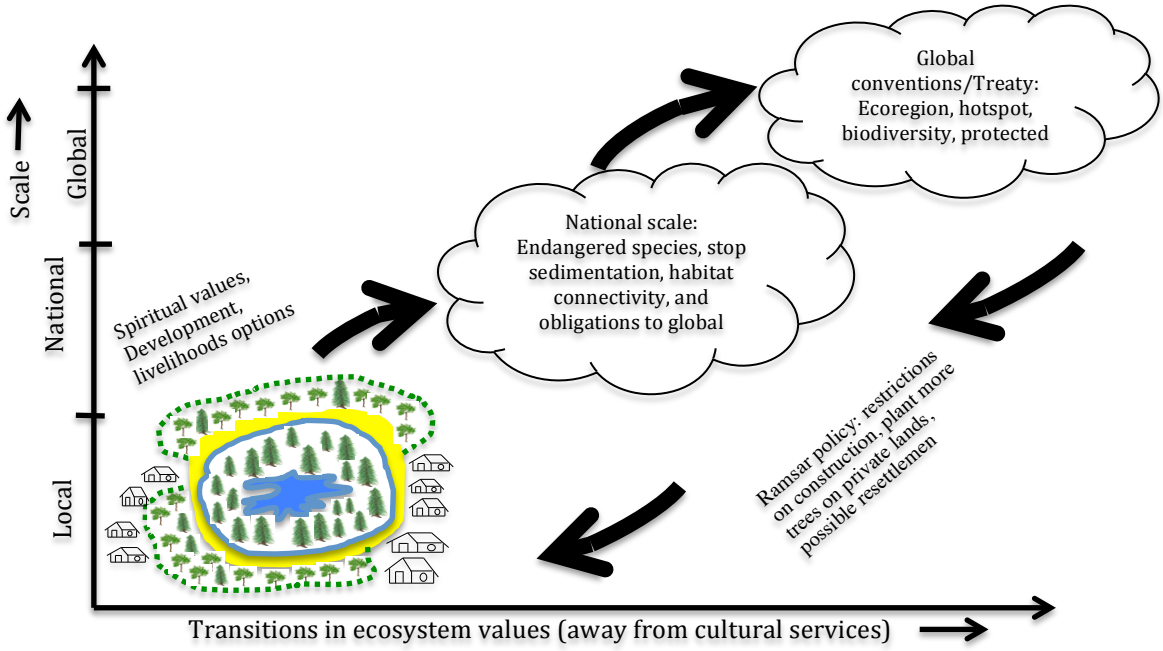
The area including Mai Pokhari is branded for conservation by other global initiatives. It falls under the 'Eastern Himalaya broadleaf and Conifer forests' within the Global 200 ecoregions (Olson and Dinerstein, 2002). Ecoregions are large units of land and water with distinct assemblage of species, natural communities and environment condition. They are identified to conserve the broadest range of species and maintain the complex ecological and evolutionary process comprising webs of life (Schmitt et al., 2009). The region is also part of the Himalayan Biodiversity Hotspot, one of the 34 Global Hotspots (Mittermeier et al., 2004) and falls into an Important Bird Area (IBA) recognised by Birdlife International (Baral and Inskipp, 2005). The hotspots are regions with habitats that house high proportions of globally threatened species under extreme threats from humans, and considered high priorities for conservation (Myers et al., 2000, Marchese, 2015).

The major goal of these conservation initiatives is to conserve biodiversity and maintain ecosystems integrity. For instance, the Critical Ecosystem Partnership Fund (CEPF) was commenced in 2005 to conserve biodiversity at national and local levels. By building capacity and networking with the governmental, non-governmental, and community groups, the project focused on biodiversity conservation and landscape restoration (CEPF, 2011). Similarly in 2012, the International Centre for Integrated Mountain Development (ICIMOD) initiated the Kangchenjunga Landscape Conservation and Development initiative (KLCDI) encompassing areas from India, Nepal and Bhutan including Mai Pokhari, aiming at effective conservation and sustainable use of resources. Though the initiative included a focus on supporting local livelihoods, it primarily focuses on establishing habitat linkages among protected areas to maintain ecosystems in entirety (Chettri and Sharma, 2016). Similarly, the prime mission of different initiatives by The Mountain Institute (TMI) and World Wildlife Fund (WWF) in the region is *conservation of ecosystems through species conservation, habitat connectivity, and protected areas management (TMI, 2016, WWFNepal, 2016)*. While some initiatives, like the Sacred Himalayan Landscape (SHL) launched by WWF Nepal and endorsed by the Government of Nepal, explicitly recognise the sacred values of the region, they are in the minority and their prime focus remains ecological values (GoN, 2006). The Ramsar listing and the other associated conservation initiatives circulating at regional and global scales mostly prioritise regulating services as a means of securing ecological values, rather than the locally important cultural values that have so far driven conservation in Mai Pokhari. This clearly shows how the valued local cultural services were marginalised within Ramsar policy at the Mai Pokhari Ramsar site in Nepal.

6.5.4 Implications of Ramsar listing for accessing local cultural services

The marginalisation of cultural values during the process of applying for Ramsar listing has had implications on access to cultural services at the local scale. As described local cultural services, especially those associated with spiritual values, have been a prime motivating factor for conservation. The decision to apply for Ramsar listing reflected a desire to keep those values intact whilst hoping for associated development benefits such as road construction and the creation of alternative livelihoods options in the area. For the national government, the motives to declare the area were shaped by its commitments as a global citizen, to conserve ecological values, whilst also responding to community interests. However, national policy-making is tailored to fit international mandates, including the Ramsar policy and conservation initiatives such as those territorialising landscapes as 'ecoregion' or 'biodiversity hotspot'. The Ramsar criteria for the declaration prioritises ecological characters and endangered landscapes as do other regional and international initiatives. In declaring the Ramsar site and developing a management plan, these multi-scalar priorities have had implications on local nature-human interactions (see Figure 19).

Figure 19: Marginalisation of cultural services across scales



Some people in the affected communities viewed the Ramsar declaration to have positive impacts. Those impacts were concentrated amongst particular hotels and shops that benefitted through improved tourism revenues. The majority of participants however expressed dissatisfaction over the declaration and the subsequent management restrictions imposed. Local hopes for development projects and improved alternative livelihoods options did not

materialise. The road connecting their villages to the town that would allow their access to hospital and education services has not been built.

> *I really hoped for a better-paved road with this international area declaration. But even after seven years of its declaration, nothing has been done. Our life is so hard with this seasonal mud-road with limited transportation options here especially if someone gets sick. The declaration without any development in this area means nothing for me (45 year old male farmer).*

Some also complained about continuing problems in accessing good education in the area. With the development of road and access to better transportation, many expected to have improved education options for their children:

> *'Two of my grandchildren walk two hours every day to go to an English-medium school. I cannot see them walking like this everyday but don't have any options for their education and better life' (73 year old housewife).*

The local community also hoped for improved tourism revenues through the opening of recreation sites and picnic spots, which could bring revenues to the whole area and create new livelihoods options. But this was not found to materialise in any significant way. Instead, the locals were displeased with the restrictions imposed.

> *Instead of development, we are imposed with so many restrictions. Of course we want to conserve our holy pond, which we have been doing for long but I am annoyed with these restrictions (56 year old private land owner residing inside Ramsar area).*

The restrictions were implemented through the Five Year Management Plan and aimed to deter any negative changes in ecological character of the wetlands and hence conserve ecological values of the area. The private landowners residing inside the Ramsar core area were not allowed to construct concrete houses or build roads, which could harm the area's ecological character. They were also asked to change their ongoing agricultural practices of producing tea, maize, potatoes, and vegetables that could contribute to sedimentation in the water bodies. Instead they were encouraged to plant more trees on farms to halt sedimentation. Such restrictions were found to annoy the private landowners.

> *'Agriculture is the only option for me to survive for six months and I am supposed to compromise my maize and potatoes for trees. Who is going to feed my family?.... Ramsar?' (26 year old housewife)*

As forest connectivity was important to maintain biodiversity in area, communities were encouraged to plant trees beyond their farms. More importantly, the recommendation to merge the private to public land under Ramsar jurisdiction (GoN, 2012) created fear that local people will be resettled:

> *'I cannot think of leaving my land and resettling somewhere else. Even the feeling to leave this land heats my blood…I don't want to get involved in this Ramsar management initiative anymore'*[11] *(45 year old private owner residing inside the Ramsar area)*

These fears and restrictions created antagonism amongst people towards the Ramsar. Some locals felt betrayed that values such as spirituality and sense of place were not sufficiently recognised, thus demotivating them from engaging in conservation efforts:

> *'We have been conserving this area since decades because of our spiritual attachment. But now we are getting betrayed for our spirituality. We do not want to be dragged out' (62 year old farmer).*

6.6. Discussions

This paper has drawn insights from political ecology and work on ecosystem services to track how local cultural services are valued across scales and the implications for local human-nature interactions. Focusing on a journey of a locally-prized holy pond to an area of international significance, we found locally-important cultural services such as spirituality and sense of place under-recognised by the global ecosystem services research and policy (Hirons et al., 2016). Cultural values were found to contribute to both conservation and community wellbeing but were marginalised during policy-making at national and international levels. Influenced by varied interests and priorities at higher levels, the subsequent conservation policy has had negative impacts on local human-nature interactions. Much hoped for infrastructure and livelihood options were not pursued within the listing. Instead community members are worried that they may be resettled if private land is merged into public land as recommended by the Five Year Management Plan of the Government. The pressure to compromise agricultural

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[11] Acquiring the entire private land into Ramsar jurisdiction was recommended in the five-year management plan of Mai Pokhari. This was also confirmed during the key informants interviews from governmental and non-government organizations.

production to grow more trees bans on the construction of houses and roads inside the Ramsar area is contributing to ill will.

The land use activities performed by local communities are experiencing increased control since the listing, suggesting ecological values are being imposed on the community at the expense of other values. This perceived imposition creates risks – including in this case those associated with the fear of resettlement. Private houses inside the Ramsar area are planned to removed outside the Ramsar area and settled elsewhere. This has been exacerbating some initial disenchantment towards the Ramsar, which may result in conflicts and withdrawal of community support for the initiative. The political ecology literature is rife with examples that show how the global imposition in conservation leads to undesirable outcomes including ecosystem degradation (Adams and Hutton, 2007). Current concerns about resettlement, infrastructure and livelihoods remain unaddressed, and improved recognition and engagement with cultural services in policy and management plans is required to prevent similar undesirable outcomes. However, there are difficulties in recognising and articulating local cultural values in national and global policies and discourses. As shown in this study, the actors and their interests at national/global scales prioritise ecological values – falling mostly within the umbrella of improved environmental management in which social concerns are of secondary interest. The non-social orientation of individuals and institutions involved within Ramsar policy-making at national and global levels makes it easy to miss or avoid local cultural values, which require more anthropological or sociological interests and training. Their absence in policy relating to this case study reflects how the global conservation policies and practices like the Ramsar has largely ignored cultural values and practices. Despite the growing influence of the 'ecosystem services' discourse (Chaudhary et al., 2015), including the recent increased attention given to cultural services (Hirons et al., 2016), cultural services are marginalised within Ramsar policy and practices. One of the reasons for this could be the over-dominance of economic and biological sciences as opposed to social sciences on ecosystem services discourse. Put simply, the current articulation of ecosystem services are weighted against the cultural interests of those who rely upon them (Hancock, 2010).

This need not be the case. There are other global policy options, which explicitly value ecological and cultural values including spirituality. For instance, a 'Mixed World Heritage Site' under UNESCO World Heritage nominates sites based on both ecological and community cultural values. In 2016, the Khangchendzonga National Park of the Eastern Himalayas was declared as a 'Mixed World Heritage site' highlighting community held values and unique ecological values (UNESCO, 2016). Policies appreciating the community values and

integrating them into policy is likely to result in more just socio-environmental outcomes (Tengberg et al., 2012).

In this case, the analysis has shown conflicting conservation priorities at different levels. National actors guided by global mandates have come to influence the site through the Ramsar listing, bringing with them echoes of fortress conservation approaches. While contemporary conservation approaches and global policies do consider local human-nature relationships, the prioritisation of other ecosystem values is steering landscapes towards conservation goals and posing the same sorts of unwanted restrictions and land uses of previous eras. However, despite limited recognition of values like spirituality in formal policy, these values remain vitally important to the local community and it is this, rather than global mandates and national policies, that inspire local conservation actions more than anything else. Local people continue to worship the pond and follow traditional practices, seeking to preserve these as much as possible. The study has shown that cultural services such as spirituality and sense of place are important for conservation and local wellbeing and needs to be mainstreamed into global ecosystem services discourse where they are currently marginalised compared to provisioning and regulating services (Hirons et al., 2016).

6.7. Conclusions

In sum our research suggests there are new opportunities and risks as the idea of ecosystem services grows in influence. The discourse can further marginalise local intangible benefits by overly prioritising economic and biological benefits. The marginalisation of local cultural services means marginalisation of local nature-human interactions, thus enabling the imposition of locally undesirable restrictions. However, there are opportunities embedded in the ecosystem services discourse. The approach potentially provides a holistic view incorporating both direct and indirect benefits of ecosystems, and a platform for seeing the interconnections between conservation and development (Bull et al., 2016). Our study shows that the cultural services provided by ecosystems are important not only for shaping human wellbeing (MEA, 2005) but also for conservation goals (Chan et al., 2012, Tengberg et al., 2012, Plieninger et al., 2013). Ecosystem services discourse has the currently under-realised potential to highlight intangible benefits more strongly into conservation and development debates by exposing often-marginalised local cultural values. As ecosystem services knowledge develops an enhanced focus on cultural services can provide opportunities to recognise local cultural values in national and global decision-making and policy arenas, including Ramsar policy and practice. If

cultural services can be strengthened and prioritised, the benefits for societies and ecologies through the growth of ecosystem services could be significant.

Chapter 7: Synthesis and conclusions

7.1. Introduction

This thesis explored the evolution of the ecosystem services concept and analysed some of the issues raised by the globalising discourse for ecosystems governance at different scales in Nepal. It provided an understanding of how the concept evolved and became institutionalised, the actors engaging with it, and the ways it is being interpreted at the global scale (chapter 3). In doing so, it offered critical insights into how and why ecosystems discourse evolved in the way it did, the appropriateness of the current articulation, and various issues that are arising in Nepal. At the national scale, the thesis investigated how the global discourse is unfolding and influencing ecosystems governance amongst experts in Nepal (chapter 4). At the local scale, an environmental justice framework was adopted to analyse issues of access to ecosystem services among a heterogeneous society in a community forestry case study in Mai Pokhari (chapter 5). A multi-scale analysis was adopted to examine the local cultural services of the case study area and the risks that emerge when these values are sidelined at higher levels of decision-making (chapter 6). Overall, the thesis offers a better understanding of the global, national and local dynamics underpinning ecosystem services, and discusses the risks and opportunities afforded by ecosystem services discourse at different scales.

The research approach, influenced by political ecology, drew on concepts of justice, discourse and scale to provide new insights into ecosystem services. Most importantly, the thesis considered social issues in the context of ecosystem services, looking at how dominant discourses affect and are affected by socio-political contexts at various scales. This is important as the contextual factors are often neglected in ecosystem services discourse, despite being central to the production of place-based ecosystem services knowledge (Barnaud and Antona, 2014). By adopting multi-scale analysis, the thesis explains how ecosystem services discourse evolved and the issues arising in the context of Nepal. This became possible only through the lens of the post-structural approach to political ecology. The thesis has highlighted the challenges produced when a globalising discourse encounters a particular location and discussed the risks and opportunities brought by the global-national-local encounters in Nepal. The types of insights generated would not have been possible with the tools, methods and frameworks from ecology and economy disciplines - the dominant disciplines shaping ecosystem services discourse. This thesis brought elements of political ecology (discourse, justice and scale) into conversation with ecosystem services to produce new knowledge that can

strengthen ecosystem services knowledge and make the discourse more just and appropriate for both developed and developing countries. In doing so, it deconstructed the dominant idea behind the ecosystem services concept to understand different values, assumptions, and perspectives, and its implications for ecosystems management in Nepal. As such, this thesis has responded to several calls (Kull et al., 2015, Barnaud and Antona, 2014, Sikor, 2013, Martin et al., 2015) and critically engaged with ecosystem services for just conservation and development outcomes.

The remaining section of this chapter synthesises the key findings and discusses the opportunities of approaching ecosystem services discourse through political ecology. The chapter concludes with the discussion of the contributions of the thesis, its limitations and directions for future research.

7.2. Synthesis

The thesis explored how the ecosystem services discourse has evolved and the implications for Nepal. It investigated the history of the concept, traced its growth across multiple disciplines (*research objective 1*), analysed the influence of the western-centric discourse in a non-western context (*research objective 2*), explored community access issues (*research objective 3*) and analysed community cultural services (*research objective 4*). These objectives were explored in four empirical chapters (chapters 3,4,5 and 6). These have been produced as four stand-alone journal articles (two published, one accepted and one under-review) but each is linked to the others and contributes to the overall aim of the thesis: *to investigate the evolution of ecosystem services as a globalising discourse and analyse the frictions that emerge when encountering with Nepal*. The thesis gathered critical understandings and contributed to the knowledge of ecosystem services as well as to the policy and practice of ecosystem services in Nepal. It explored some of the risks, opportunities and challenges emerged through the encounters of global ecosystem services discourse with Nepal, applying the key concepts of political ecology: discourse, scale and justice.

7.2.1 Discourse

This key concept was used to trace how the global ecosystem services discourse formed and was engaged within Nepal, from its Western roots to its progression in a non-Western context. The Western emphasis on ecology and economics does not ‘fit’ easily in the complex socioecological systems of Nepal, which are diverse. At the national scale an economic interpretation has been articulated that is creating issues of concern for community forestry

approaches (chapter 4) and which may give rise to problems regarding access, justice, marginality, and intangible ecosystem benefits (chapters 3 and 4) at local scales. This is particularly important in non-Western rural contexts where people's livelihoods are often directly linked to access to ecosystem services. By focusing on discourse, the thesis has exposed some of the actors promoting the concept at different scales and some of the frictions that are emerging in Nepal. The thesis has also shown that dominant interpretations of ecosystem services – its current 'truths' – are negotiated and the result of ongoing deliberations. This suggests that more socially inclusive approaches may be adopted in the future.

7.2.2 Scale

Another key concept that has informed the thesis is scale. The thesis is structured around the most common scales of ecosystem decision-making – global, national and local. Other scales could have been used but these were thought best to connect with policy and practice. The thesis has shown how ecosystem services is likely to have different impacts and engagements at and across scales of governance. While some aspects will appeal to national scale actors, others such as intangible services will be much more valued at the local scale. By emphasising these differences, the thesis makes the case for cross-scale approaches to ecosystem services and asks how actors positioned at different scales can come into better dialogue and understanding of one another. A vital insight has been the differentiation at the local scale. The thesis has shown that issues such as caste and gender affect what people value, and how and what services they access (chapter 5). The aggregated analysis that dominates valuation approaches in the ecosystem services literature cannot capture this differentiation, raising the risk that asymmetrical power dynamics of access and control of natural resources may be repeated, echoing the earlier 'fortress' approaches that were embedded in the modern conservation paradigm and one of the reasons responsible for the Himalayan environmental crisis.

7.2.3 Environmental justice

The third key concept was environmental justice. Throughout the thesis, I have been concerned to draw attention to the impacts of ecosystem services discourse on people and place. The omission of justice concerns in most global ecosystem service research is significant and raises the prospects of poor outcomes for humans and non-humans (chapter 3). This is being borne out in Nepal, where ecosystem services is interpreted as economic valuation at the national scale (chapter 4), in current community forestry programs (chapter 5), and through Ramsar initiatives where an emphasis on conservation may result in people being evicted from their lands (chapter 6). I have shown how and why people are being marginalised at the local scale in

terms of distribution, participation and recognition (chapter 6). The disaggregated analysis provided finer-scale understandings of some of the tensions surrounding access to ecosystem services within community forestry programs and the social determinants of winners and losers at the local scale. It is vitally important that ecosystem services discourse, policy and practice engage with issues of environmental justice and grapple with the complexities embedded in access to ecosystem services amongst heterogeneous societies, which are shaped by the politics of exclusion and inclusion of social groups (chapter 5).

The analysis suggests that some opportunities are emerging from this encounter with ecosystem services. Popular interpretations based on economic valuation and PES, for example, could be utilised to halt degradation and conserve ecosystems. National actors believe that valuation could make the general public and policy makers more aware of the value of ecosystems and the need to conserve them. It could play an important role in convincing policy makers in non-environmental sectors to allocate more funding for the conservation sector. More importantly, PES has been an important tool not only for conserving ecosystems but also making conservation schemes financially sustainable (chapter 4). The ecosystem services discourse, encouraging conservation and development outcomes, could bring multiple actors including the private sector and the conservation and development sectors together to work for a common goal of 'conservation and development'.

However, there are also many risks. chapters 5 and 6 discussed the risks that are likely to emerge at local scales through an analysis of the Mai Pokhari Ramsar site and community forestry systems. As economic valuation and PES are the dominant articulations of the ecosystem services discourse in Nepal, there is a risk that further commercialisation of valued services such as timber, water and tourism (chapter 4) will contribute to marginalisation of non-economic but valued services like spiritual wellbeing and sense of place (chapter 6). This could also lead to over -extraction of those economically valued services or elite capture, and exclude or disempower some people (often disadvantaged) and empower the already advantaged (chapter 5).

Commercialisation requires an aggregated approach that has been normalised in global discourse, heightening the likelihood of injustice and further marginalisation of disempowered groups (see also Daw et al., 2011). Chapter 5 demonstrates that inequities in a community already in place, especially in a community forestry system (Maharjan et al., 2009), could be further exaggerated through ecosystem services-based policy and practices if aggregated approaches are adopted. There is a risk of exclusion or marginalisation of socio-cultural values,

as valuation studies may treat 'culture' as a commodity to be exchanged (Small et al., 2017), leading to the separation, commodification and exploitation of environment rather than closer relationships between humans and nature (Jackson and Palmer 2014). Chapter 6 shows how local cultural values are marginalised which may have negative impacts on local human-nature interactions. These understandings are important: such critical insights can help to facilitate better conservation and development policies and actions (Bennet et al., 2017), especially where dual conservation and development outcomes are sought (McShane et al., 2011) in a country like Nepal. These types of issues are central to political ecology and have provided new perspectives to approach ecosystem services.

7.3. Summary of findings

Research objective 1*: Explore the evolution of ecosystem services concept at the boundary of science and policy*

This research objective was addressed in chapter 3, also published in *Environmental Science and Policy*. In this chapter, the thesis explored how the discourse of ecosystem services evolved at a global scale, how it has become institutionalised, who is engaging with it, and what types of criticisms have been associated with the concept. This was important given the rapid rise of ecosystem services within science and policy. The paper explored the history and emergence of the ecosystem services concept and traced the rapid growth of the concept across academic disciplines and amongst organisations working at the boundary of science and policy. The thesis applied discourse as a lens to focus on the roles and influence of different actors, disciplines and institutions in shaping the concept. It found that ecosystem services emerged in the United States during the 1980s as an economic and ecological response to ecosystem degradation. The response emphasised human dependence on nature, and the services nature provides. The discourse has continued to grow across disciplines, with more than 7,000 articles in 180 journals identified, covering 29 different subject areas. Most of the articles originated from developed countries, with very few from developing nations, highlighting the western bias shaping the discourse.

Through a discursive-institutional analysis, following den Besten et al. (2014), the thesis shows four key moments of institutionalisation: 1997 when PES was initiated; 2001 when MEA was officially launched; 2005 when the MEA (2005) synthesis report was published; and 2010 when agreement to establish the IPBES was reached. The spiral reflected an ecological and economic response to ecosystem declines, culminating in the establishment of IPBES. Each spiral reflected the successful efforts of proponents of the previous period and subsequent academic

and policy responses to that moment of institutionalisation. Throughout this period ecosystem services discourse became more and more influential and attracted an increasingly broad array of interests. The spiral showed an increasing array of disciplines and institutions engaged in the discourse with organisations from global to local across the world seeing an opportunity to promote their interests. Collaborations between academia, policy makers and the boundary organisations pushed the ecosystem services concept to an issue of widespread interest and concern. The study showed the heavy influence of ecology and economics in the evolution of the discourse, leading to an emphasis on the economic valuation of ecosystem services. Other disciplines, including social sciences, critical geography and political ecology, were less evident, resulting in less attention being devoted to issues of equity, poverty, justice, and governance, or to the intangible benefits attached to ecosystems. The subsequent chapters of the thesis sought to focus explicitly upon these neglected elements in order to better understand the socio-political challenges raised when considering ecosystem services approaches in Nepal.

Research objective 2*: Analyse the advancement of ecosystem services discourse at national scale and its likely implications on ecosystem governance*

I addressed this objective in chapter 4, analysing the explicit integration of the 'ecosystem services' term in environmental policies and amongst actors involved in environmental governance in Nepal. This was important as the ecosystem services discourse, as explained above in section 7.3.1, is rapidly advancing into policy communities at national and local scales (ICIMOD, 2016). My analysis of policies, media, social media and interviews shows that the concept is increasingly being integrated into environmental policies of Nepal, with explicit recognition in seven different policy documents. The policies were generally focused on improved ecosystems management, especially forests and wetlands, to support rich biodiversity and the subsistence livelihoods of people. This is changing how people view human-nature relations. For example, policy concerning forest-people has traditionally focused on the extraction of forest products to meet their basic forest needs, however newer approaches now value intangibles like carbon, air purification, water retention and biodiversity management. Both tangible and intangible ecosystem services are now often linked to valuation and payment systems – reflecting the dominant PES-influenced interpretation of ecosystem services within policy communities. This brings both opportunities and challenges to the country. As an opportunity, the concept may provide means to better govern ecosystems and foster development thorough the economic valuation of services, an approach through which non-environmental agencies can gain better understanding of the values of ecosystems. The

establishment of PES has been regarded as an opportunity for sustainable conservation and development (Bhatta et al., 2014, GoN, 2014).

However, the limited understandings of the concept among the policy makers establishing payment systems, and dependence on international aid, create challenges for practicing the concept. Several actors were found to be influential in advancing ecosystem services discourse, including the government, academia, media, local non-governmental organisations (NGOs), civil society and private sectors. However, international actors were found to be highly influential, as reflected in the contributions they made in different scientific publications, media articles, reports and science-policy dialogues and projects in the country.

The ecosystem services discourse was simplistically articulated in terms of economic valuation of services and establishment of PES – reflecting the increasing commodification of ecosystem services embedded in global ecosystem services discourse. I discussed the possible risks of such articulation for Nepal, including the likely commodification of nature, leading to over-extraction of valued services and marginalisation of cultural values that are economically less valuable. I focused on the justice issues that are likely to arise with the establishment of PES, benefiting some and marginalising others, especially the poor and other disadvantaged groups. This is important for Nepal, as there are already pre-existing inequities and injustice issues entrenched within the system, for example, in the famous community forest system (Maharjan et al., 2009). The ecosystem services discourse in its current articulation (PES and valuation) could further trigger social justice issues and lead to elite capture and/or inequitable outcomes. In this regard, the study suggests contextualising the practice to consider national priorities and issues with a proper institutional design, organisational capacity, and a balanced interplay of actors and their interests to achieve sustainable conservation and development outcomes.

Research objective 3*: Analyse how ecosystem services are accessed by disaggregated populations (based on caste, income and gender) and explore the associated justice issues at community scale*

I addressed this objective in chapter 5, adopting a disaggregated approach differentiated by income, caste and gender to analyse how ecosystem services are accessed by a heterogeneous community. I followed an environmental justice framework and focused on distribution, participation and recognition to identify justice issues associated with access to ecosystem services through a case study of the community forestry system in the Mai Pokhari area of Nepal. This was important, both because ‘aggregation’ has become a norm of ecosystem services discourse, and because community forestry in Nepal is one of the most important

ecosystem governance systems and has been successful in conserving forests and supporting livelihoods of millions of people.

I chose to focus on community forestry of Nepal as a case study for this thesis because of the justice and equity issues associated with the community forestry system and the speed of integration of the ecosystem services concept in community forestry policy. With the rapid advancement of the ecosystem services concept in Nepal, valuing the ecosystem services associated within community forestry is one of the top priorities of the country in ecosystem services policy and programs. The concept has already been integrated into the amended Community Forestry Policy 2015 (chapter 4), and community forestry is increasingly under discussion for ecosystem services-based implementation projects (BCN, 2016).

Although ecosystem services programs are not yet implemented throughout community forestry in Nepal, it is important to analyse justice issues through a disaggregated approach. The study showed that current access to ecosystem services is differentiated by social categories such as gender, income and caste. The disaggregated analysis revealed uneven distributive outcomes amongst the social groups, with the high-income, and higher-caste groups benefiting more than low-income, lower-caste and female-headed households, despite the social equity provisions built into community forest policy. The research stresses the importance of developing disaggregated approaches within ecosystem service approaches. While community forestry in Nepal is considered highly progressive for its explicit focus on gender, caste and income, some of the rules, such as fines for not attending a meeting (aimed to encourage representation of marginalised groups) were found to cause resentment as these groups had the least capacity to attend meetings or pay fines because of low incomes and other pressures on their time. Injustices were also apparent in terms of 'recognition' – most evident in the executive committees with less or no representation from disadvantaged groups, especially low-income and lower-caste groups. Limited and sometimes lack of recognition created inferior feelings and undermined the self-esteem of the marginalised, which restricted them in the decision-making process. These results of the study showed injustices associated with uneven access to ecosystem services.

In chapter 5, I discussed the possible solutions to address injustice issues associated with distribution, participation and recognition. For instance, the restricted collection time should be simplified and made flexible to allow the marginalised to schedule their collection time and other priorities. Policies aiming at ensuring an equitable representation in executive committees, such as 50% representation of women and equal representation of all social groups,

could be more strictly implemented and monitored by the authorities concerned. Outcome-based policies focusing more on production of timber, fuelwood and other products and encouraging small-scale forest enterprises could be formulated to generate local jobs and meet local forest demands. Incentivising participation through monetary or in-kind contributions, such as assistance with fuelwood and timber collection, instead of fines for non-attendance, and reserving time to speak during public fora could help the disadvantaged to participate more effectively. But more importantly, capacity building of the marginalised groups through educational opportunities to improve their participation in community forestry processes, and better recognition of the problems they face could help them to better access services from community forestry. In highlighting the entrenched inequalities and discussing some possible solutions, I argued that the ecosystem services approach needs to make environmental justice more central to avoid marginalising the already marginalised, and achieve fair and just outcomes. The current emphasis on aggregation in ecosystem services approaches may contribute little to practical implementation of programs that will contribute to sustainable socio-ecological wellbeing. While exploring the community-scale justice issues in the Mai Pokhari area, the case study found cultural services, especially spiritual values linked to the Mai Pokhari – a holy pond in the area – extremely important for the communities. Seeing the community's attachment to the pond, I decided to focus on assessing the local cultural services to contribute to the limited research that is focused on intangibles in the global ecosystem services discourse (see next section).

Research objective 4: *Explore the contributions of cultural services to community wellbeing and conservation, and how those local cultural values become embedded or ignored at higher geographical scales of decision-making.*

This objective was addressed in chapter 6. I adopted a multi-scale analysis to explore local cultural services and analyse whether these are incorporated or ignored at higher levels of decision-making. This was important for three reasons. First, the limited focus on cultural services in global ecosystem services research, which is partly due to the dominance of ecology and economics while less attention has been paid by social scientists, has led to less focus on intangible benefits (chapter 3). Second, valuation and payment for ecosystem services is the most desired interest associated with the advancement of the ecosystem services discourse in the national arena, thereby marginalising more intangible cultural services (chapter 4). Third, the focus on economic valuation of ecosystem services and establishment of PES within national arenas led to marginalisation of cultural services in the country. Fourth and most importantly, the case study in the Mai Pokhari area (chapter 5) showed that cultural services,

especially spirituality, are the most important in the area after fuelwood as a provisioning service (see chapter 5). I adopted mixed methods to address this objective in the Mai Pokhari, a Ramsar site in Nepal where a local pond associated with high religious values was declared an area of international significance in 2008.

The study found spirituality, sense of place, recreation, research and education as the important cultural services for the local community. However, these community values were marginalised at national and global level conservation decision-making. That is, local values, especially spirituality and sense of place, were not considered in the decision to declare the area as a Ramsar site. National policy-making was tailored to fit international mandates, including the Ramsar policy and other conservation initiatives such as those that territorialise landscapes as 'ecoregion' or 'biodiversity hotspot', prioritising ecological characteristics and endangered landscapes more highly than local values. These multi-scalar priorities have implications for local nature-human interactions.

Although some had experienced positive impacts, especially business owners near the holy pond, the majority of the local community expressed dissatisfaction with the Ramsar declaration. Restrictions on constructing houses and roads inside the Ramsar site, failed hopes of development initiatives especially alternative livelihood options for the local community, and a planned resettlement of private houses outside the Ramsar area to avoid possible ecological degradation caused consternation in the local community. This perceived imposition created disenchantment towards the Ramsar declaration, which may result in conflicts and withdrawal of community support for the conservation and management of the declared area. The results suggest that global imposition of conservation policies at local scales that do not recognise cultural services may have negative impacts for local communities. In this regard, I argued for strengthening the values of local cultural services in policy-making as ecosystem services becomes more influential. This is important to refine global conservation policy and discourses of ecosystem services to make them more tailored towards just conservation and sustainable development outcomes.

7.4. Contributions in theory, policy and practice

This thesis has made several contributions to theory, policy and practice, and makes an important contribution to ecosystem services knowledge. The thesis brings justice, scale and discourse concepts together to explore the evolution of ecosystem services, its translation into national contexts, and associated justice issues, particularly in relation to community forestry and cultural services. It highlights the history of the concept, types of actors engaging with it, particular ways of articulation, its effects and the likely effects for governing ecosystems at national and local scales. The thesis has pushed the boundary beyond ecology and economics by providing perspectives from social science and political ecology informed by rich qualitative and quantitative data. This thesis represents one of the first attempts to employ political ecology in investigating the history of ecosystem services discourse and analysing its effects at national and local scales (note exception). In doing so, I have discussed the implications this global discourse has and can have for ecosystem governance in Nepal (chapter 4, 5 and 6). I have shown how global discourse, driven by international actors, is influencing and has the potential to influence human-nature interactions and grappled with the issues of justice and community values at local scales (chapter 5 and 6). In doing so, this thesis has advanced scholarly thinking in the domain of ecosystem services.

The discourse analayis at the global scale enriches the existing knowledge on ecosystem services showing how ecosystem services shift from an academic concept to an established intergovernmental panel advocating evidence-based policy. The thesis further highlights how multiple disciplines have shaped science, policy and practice, while highlighting the roles of boundary organisations. With this, the thesis calls for social scientists, geographers and other marginalised disciplines to contribute to the development of ecosystem services. The investigation on discursive analysis at the national scale has generated new knowledge on ecosystem services science in Nepal by providing critical information on the implications, significance, opportunity and risks emerging from global-national encounters of ecosystem services. As such, the thesis has contributed to a better understating of how ecosystems governance is unfolding in the country. Using a justice framework, the thesis mapped out the distribution of ecosystem services and discussed the injustice issues of uneven access at intra-community scale (chapter 5). The thesis aids in the understanding of community level access to ecosystem services and associated intra-community justice issues. In discussing the injustice issues, the thesis criticised the notion of ‘aggregation’ embedded in the ecosystem services framework and advanced the understanding of access to ecosystem services across a heterogeneous society, responding to the need to disaggregate beneficiaries of ecosystem

services (Small et al., 2017). As such, the thesis enriches the existing knowledge on community forestry in Nepal and the associated justice issues. It has provided new insights on how ecosystem services can grapple with justice issues, and warns on the possibility of entrenching the already existing equity issues embedded in community forestry systems in the country.

The thesis further aids in the understanding of intangibles such as spirituality and sense of place. Cultural services research has recently been advanced through assessment of cultural values like recreation and urban greenery (Small et al., 2017) but has not really focused on spirituality and the sense of place attached to ecosystems and their contribution to conservation. This thesis explored spirituality and sense of place as important local cultural services and sheds light on how these intangible benefits, currently under-researched in ecosystem services discourse, contribute to ecosystem conservation and community wellbeing. By doing so, the thesis provides new insights on global conservation policy and practice, and the implications for human and non-human beings at local scale – hence contributing to multi-scaled understanding on the links between local scale socio-ecological process to national and global scale politics.

The findings of this study are important for ecosystem services-based policy and programs. The research, highlighting the barriers, challenges and opportunity of ecosystem services discourse in Nepal could be used to frame a new policy approach to guide the implementation of ecosystem services-based programs. A national framework should be developed to guide policy-making, strategies and implementation of ecosystem services concept at national and local scales in the country. Policies should emphasise the importance of context, disaggregation, social differentiation, access, cultural services and justice. Community forestry policy, in particular, could benefit from the findings of this thesis in terms of revisiting the policies and refining the 'rules regarding fines' and 'collection time' to increase the active participation and recognition of the marginalised groups. The drafted PES policy should especially focus on equity and justice issues and consider the risks associated with commodification of valued services underpinning PES. Similarly, conservation policy could be strengthened to allow for greater consideration of community values. Both tangible and intangible values should be integrated into policies and programs to avoid the possible negative implications of the global policy on local-nature interactions identified in chapter 5 and 6. For instance, the global policy options such as UNESCO's World Heritage Site or Man and Biosphere Reserve could be initiated that appreciate both ecological and spiritual values of the community in the Mai Pokhari Ramsar site. But more importantly, the ecosystem services

concept should be integrated into the development agendas of Nepal, as the conservation and development outcomes are closely tied up with each other.

In terms of research practice, the thesis employed mixed methods by using both quantitative and qualitative techniques to analyse and understand complex natural-human interactions across scales. In doing so, the thesis shows the importance of mixed methods to approach ecosystems services research. The research incorporated household surveys, in-depth interviews and focus group discussions that not only provided quantitative data but a deeper qualitative understanding of the subjectivity of the issues embedded in complex human-nature interactions. The qualitative and quantitative methods used were complementary and provided a deeper understanding of these issues, however, this is rare in ecosystem service research. In chapter 5, for example, I used household surveys to gather quantitative data on distributive outcomes of provisioning services like fuelwood and fodder, while qualitative focus group discussions and key informant interviews were conducted to get a better understanding of the processes influencing those distributive outcomes, as well as justice issues associated with participation and recognition. Mixed methods helped to complement and crosscheck the findings (Hattam et al., 2015). For instance, in chapters 4 and 6, the content analysis of both academic (peer-reviewed articles) and non-academic literature (policies, reports, media, social media) was complemented with in-depth interviews. This comprehensive approach is recommended for future researchers.

7.5. Future research

The findings of this research provide some foundations for future research. The thesis showed the issues ecosystem services raises arising at different scales in Nepal and considered the types of actors involved, dominant interpretations and likely influences at community scale. However, as the implementation of ecosystem services is very contextual, similar research may find very different outcomes elsewhere in the world. Future research could focus on other contexts in both developed and developing nations to better understand the challenges that emerge in place.

In the context of Nepal, future research could focus on the analysis of implications of ecosystem services based policies and programs at local scale once it is more fully implemented in the country, and analyse the politics of ecosystem services and identify the losers and winners of the policies and programs at local scales. It would be interesting to analyse how power relationships are reworked, as ecosystem management is fundamentally social and political (Neumann, 2004) with ecosystem services potentially reinforcing unequal power

relationships (Corbera et al., 2007) and contributing to social injustices (Daw et al., 2011). Further, private sector interests in ecosystem services management and their role in improving ecosystem governance of the country could also be analysed and explored. Recently, the involvement of private sector actors, especially in water-based conservation and hydropower development programs has been rising (ICIMOD, 2016a). At the community scale, research on the contribution of ecosystem services of private, public and community forests to differentiated wellbeing could explore the links between multidimensional poverty and ecosystem services.

Using a disaggregated approach, future research could focus on assessing the varied perceptions of multiple actors and analysing the inclusion and exclusion of those perceptions in decision-making. A particular emphasis on recognition would be of value in identifying human justice issues, considering age, religion and other variables. In conducting this research, I hope that more social science and critical geography researchers will grapple with ecosystem services in pursuit of fairer outcomes. Further research could help to ensure that national social priorities and justice issues are central to ecosystem services based policy and practice in Nepal.

7.6. Concluding remarks

The thesis approached ecosystem services as a globalising discourse and adopted a political ecology lens as it set out to *investigate the evolution of ecosystem services and analyse frictions that emerge when encountering with Nepal*. In particular, the thesis explored the evolution of the concept internationally (chapter 3), and its advancement at national scale (chapter 4), highlighting the importance of disaggregated analysis to pursue intra-community justice (chapter 5) and recognise cultural services in decision-making (chapter 6).

No matter how ecosystem services discourse comes to be expressed, there will always be acceptance, ignorance, strengths and weaknesses. Discourse will always have different articulations and impacts when it touches particular locations or contexts – producing frictions – and discourses are always evolving in response to the frictions they produce. The frictions identified in this thesis in the context of Nepal were around the values of PES, justice, and cultural services. This thesis has told a story of ecosystem services and the challenges it raised in the Nepalese context, highlighting its evolution, articulations, contestations and the likely implications.

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List of Annexures

Annexure 1: Human Ethics approval letter

Dear Associate Professor McGregor,

RE: Ethics project entitled: "Environmental Justice and ecosystem services: distribution participation and recognition and recognition in socio-ecological system of Nepal."

Ref number: 5201400957

The Faculty of Science Human Research Ethics Sub-Committee has reviewed your application and granted final approval, effective 5th November 2014. You may now commence your research.

This research meets the requirements of the National Statement on Ethical Conduct in Human Research (2007). The National Statement is available at the following web site:

http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/e72.pdf.

The following personnel are authorised to conduct this research:

Associate Professor Andrew McGregor
Dr Donna Houston
Mrs Sunita Chaudhary

NB. STUDENTS: IT IS YOUR RESPONSIBILITY TO KEEP A COPY OF THIS APPROVAL EMAIL TO SUBMIT WITH YOUR THESIS.

Please note the following standard requirements of approval:

1. The approval of this project is conditional upon your continuing compliance with the National Statement on Ethical Conduct in Human Research (2007).

2. Approval will be for a period of five (5) years subject to the provision of annual reports.

Progress Report 1 Due: 5th November 2015
Progress Report 2 Due: 5th November 2016
Progress Report 3 Due: 5th November 2017
Progress Report 4 Due: 5th November 2018
Final Report Due: 5th November 2019

NB. If you complete the work earlier than you had planned you must submit a Final Report as soon as the work is completed. If the project has been discontinued or not commenced for any reason, you are also required to submit a Final Report for the project.

Progress reports and Final Reports are available at the following website:

http://www.research.mq.edu.au/for/researchers/how_to_obtain_ethics_approval/human_research_ethics/forms

3. If the project has run for more than five (5) years you cannot renew approval for the project. You will need to complete and submit a Final Report and submit a new application for the project. (The five year limit on renewal of approvals allows the Committee to fully re-review research in an environment where legislation, guidelines and requirements are continually changing, for example, new child protection and privacy laws).

4. All amendments to the project must be reviewed and approved by the Committee before implementation. Please complete and submit a Request for Amendment Form available at the following website:

http://www.research.mq.edu.au/for/researchers/how_to_obtain_ethics_approval/human_research_ethics/forms

5. Please notify the Committee immediately in the event of any adverse effects on participants or of any unforeseen events that affect the continued ethical acceptability of the project.

6. At all times you are responsible for the ethical conduct of your research in accordance with the guidelines established by the University. This information is available at the following websites:
http://www.mq.edu.au/policy/

http://www.research.mq.edu.au/for/researchers/how_to_obtain_ethics_approval/human_research_ethics/policy

If you will be applying for or have applied for internal or external funding for the above project it is your responsibility to provide the Macquarie University's Research Grants Management Assistant with a copy of this email as soon as possible. Internal and External funding agencies will not be informed that you have final approval for your project and funds will not be released until the Research Grants Management Assistant has received a copy of this email.

If you need to provide a hard copy letter of Final Approval to an external organisation as evidence that you have Final Approval, please do not hesitate to contact the Ethics Secretariat at the address below.

Please retain a copy of this email as this is your official notification of final ethics approval.

Yours sincerely,
Richie Howitt, Chair
Faculty of Science Human Research Ethics Sub-Committee
Macquarie University
NSW 2109

Annexure 2: Semi-structured interviews

2.1. Questions for policy makers, practitioners, scientists and others at national scale

1. What do you understand by 'ecosystem services'?
2. Are there any projects focusing on 'ecosystem services'? and what kind of projects are they?
3. Has the concept of 'ecosystem services' been included in any policies in Nepal?
4. How those projects and policies focusing on ecosystem services are changing ecosystem governance in Nepal?
5. How do you perceive this 'ecosystem services' discourse for Nepal?
6. What are the opportunities and challenges of this discourse?
7. What must be done to overcome these challenges?
8. Has it changed the way the government values or approaches different ecosystem conservation and management in Nepal?
9. Do you know any organisations (pubic/private) focusing on ecosystem services?
10. Is there anything more you would like to add?

Thank you so much for your time.

2.2. Questions for key informants at community scale

1. How does the local population perceive conservation and management in this area?
2. How do you meet the forest needs?
3. How effective is the current government to conserve forests and biodiversity of the Ramsar site?
4. How many groups (social groups in terms of caste) are residing here?
5. How are the minimum criteria for categorising social group? Any ideas?
6. Are there satisfactory outcomes in terms of forest cover?
7. What are the challenges to conserve ecosystems and involve people in conservation?
8. How many organisations are working in this area?
9. Are people also the focus of their programs?
10. What are issues related with the Ramsar, community forestry?
11. Any issues of recognition and misrecognition?
12. Tell something about the history of this area, pond, and Ramsar.
13. Others

Annexure 3: Household Questionnaire

Household Survey			
Enumerator: _____	Time _____:_____ to _____:_____	Date (YY/MM/DD): 20____/____/____	
Village:	Ward no.:		
Household ethnic group:	Household type:	Household no./code:	Consent: _____
Respondent's age:____ Gender: *M/ F/Other*	Head of household's age:____ Gender: *M/F/other*		
Head of household's marital status: *Married* | *Single* | *Divorced* | *Widowed*	Education level	Members in family	

1 What are the main occupation/livelihoods strategies of your family?

Farm		Non-farm	
Cereals		Wage labour	
Vegetable		Business	
Others		Remittance	
		Others: ……	

2 Do you have land?

Yes	No

Land characteristic			
Own land	Land type	Area (ha)	Crop type/yield
Leased land			
Encroached			
Others			

3 Do you have livestock?

Yes	No

No. & Type of livestock	Use	Who graze them?	Where do they graze?
			Community forest
			Stall feeding
			Private land
			Any other?

4 Is food grown from your agriculture land enough for you for the whole year?

If yes, how long can you use your produce?

3 months	6 months	1 year	Others

If no, what are other means to consume food for rest of the year?

5	How do you purchase non-food basic goods and for how long? Where do you go to purchase?
6	(i) Do you use anything from forest, wetland, wasteland, grassland from this area? – y/n (ii) Are they private or public or community land? (iii) What are they and for what purpose?

Provisioning services	Use	Need	Quantity	Importance	Any remarks
Fuelwood?					
Animal dung					
Fodder					
Wild animals use					
Leaf litter					
NTFPs harvest					
Water (surface water/ground water)					
Others					

7	What are non-material/intangible services provided by forests, wetlands, grassland and others? (Please give examples of this to clarify in detail like landslides, fresh air etc)

Regulating services	Importance
Erosion control/flood protection	
Bees pollination	
Pest and disease control	
Fresh air	
Others	

8	How do you feel living in this area? What are the non-material benefits that you get from this area such as spiritual values, attachment to the place?

Cultural services	Importance	Remarks
Physical interaction		
Educational		
Spiritual		
Others		

9	How long does it take, in minutes, for the school-age children (age 5 to 14) in your

		household to go to school (one-way, by any means: for example, walking, bicycle, scooter, bus)?	
		Can your household afford your children's school fees and school supplies?	
10		What is the highest level of schooling for males and females?	Any other remarks
12		In the last 16 months, how often have members of your household been ill (meaning they were so ill that they stayed in bed, or lying down, for 2 or more days)?	
13		How long does it take for the members of your household to reach the nearest health centre?	
15		Can your household afford professional treatment for serious illness or injury?	
16		What is your house made of? (roof and walls)	
18		Does your household have access to land for agriculture, orchards, livestock or the holy pond?	
19		Does your household usually have enough people to work/manage your farm? (crops, orchards, forestry, livestock and/or aquaculture)	
20		What kind of ownership of your land does your household have?	
21	What are the negative events (natural) that occurred in the last 24 months or even before, and that caused bad or damaging impact on your household, which 3 are you most worried about? …… …… ……		
22	How do you feel about your community and living with them?		
23	Have you ever been discriminated by any one in this community? Or have you seen anyone discriminating anyone? If yes/no, why?		
24			

Do you have rights to use community forest?	Yes		No	
How far is your house from the near by forest?	1 km	2 km	3 km	4 km
Do you use any resources?	Community	Religious	Wetland	Others
How do you access those resources				

	Any other issues					
25		Do you participate in any activities by the community forest, religious forest or both? How and why do you participate? To avoid fees, maintain membership etc Attend and raise my concerns Attend but do not speak Was there any meetings/activities you didn't participate last year? Why didn't you participate? How do you feel in the meeting? Do you get a chance to speak in the meeting?				
26.		Beside these, anything you would like to say today?				

Survey completion time: _____:____

Annexure 4: Focus Group Discussions

(i) What do they think of living in Mai Pokahri area

(ii) What are their perceptions on the current legal statuary system of forests and other ecosystems in the area?

(iii) What are the strengths and weakness related to the current governance system?

(iv) Do your values and needs are recognised by the management committee of the area? If yes, what and if not why?

(v) What are issues related to access to ecosystems and distribution of resources?

(vi) Do you have noticed any changes in your wellbeing (dependency) on services from forest and wetland ecosystems?

(vii) What are your recommendations for improving your access, and use of services from the area?

(viii) What are the major changes in ecosystem over the last 2 decades?

(ix) How the changes in ecosystem impacts which social group?

(x) Who posses what rights and bear responsibilities in ecosystem management?

(xi) Who has access to decision-making? If not, why?

(xii) What are barriers/enablers for access to benefit from ES?

(xiii) How decisions are made?

(xiv) Do you care about nature?

(xv) What improvements can be made to make distribution of and access fair and equitable?

(xvi) Any other issues:

Annexure 5: List of highly cited articles (upto five) according to timeframes

S.N.	Authors	Key publication/Title of articles	Citation	Year	Ideas/Contribution
Before 1997					
1	Leopold, A.	A Sand County almanac, and sketches here and there.	5486	1989	Relationship existing between people and the land they inhabit. Implications on ecosystem by human activities.
2	Marsh, G.P.	Man and Nature	783	1965	Effects of human action on environment showing the links between deforestation to soil erosion and subsequently to soil productivity.
3	Westman, W. E.	How much are nature's services worth?	442	1977	Importance of accounting nature's services to benefits of society and difficulties in accounting.
4	Ehrlich, P. R., & Mooney, H. A.	Extinction, substitution, and ecosystem services	316	1983	Loss of services to humanity depends on extinction of elements (population, species, guild) and degree of control exerted on ecosystem. Substitution for those lost services areas is unsuccessful and conservation approach should be applied to maintain those services and minimize anthropogenic activities.
1997-2000					
1	Costanza, et al.	The value of the world's ecosystem services and natural capital	11179	1997	Ecosystem services are critical to functioning of life support system, human welfare and represent a part of total economic value with an estimated US$ 33trillion per year.
2	Daily, G.	Nature' services: Societal dependence on Natural ecosystem	4210	1998	Examples of benefits that ecosystems can provide for societies and ideas on how to quantify the value of these services. Ecological foundation of flow of services from ecosystems.
3	Bolund, P., & Hunhammar, S.	Ecosystem services in urban areas	962	1999	Urban ecosystem services, its impact on quality of life in urban areas, and the need to integrate it into land use planning.
4	Rapport, D. J., Costanza, R., & McMichael, A. J.	Assessing ecosystem health	653	1998	Assessing ecosystem health in relation to ecological, economic and human health. And understanding this interaction requires active collaboration between social, natural and health science.
5	Daily, et al.	The value of nature and the nature of value	651	2000	Ecosystems are capital assets and provide vital goods and services. However, ecosystems are under rapid degradation and poorly understood but this can be improved through economic valuation with financial instruments and institutional arrangements.
2001-2004					

	M.				linking these ecosystem functions to the main ecological, socio–cultural and economic valuation method.
3	Tilman et al.	Forecasting agriculturally driven global environmental change	1671	2001	The rapid expansion of agriculture land in coming 50 years would destroy terrestrial, aquatic and other ecosystems and its ecosystem services. Significant scientific advances and regulatory, technological, and policy changes are needed to control the environmental impacts of agricultural expansion.
4	Folke et al.	Resilience and sustainable development: building adaptive capacity in a world of transformations.	1307	2002	Resilience framework for understanding how to sustain and enhance adaptive capacity in a complex world of rapid transformations. Two useful tools for resilience building in social-ecological systems are structured scenarios and active adaptive management. These tools require and facilitate a social context with flexible and open institutions and multi-level governance systems that allow for learning and increase adaptive capacity without foreclosing future development options.
5	Balmford et al.	Economic reasons for conserving wild nature	1067	2002	An estimation of an overall benefit: cost ratio of an effective global program for the conservation of remaining wild nature is at least 100:1.
2005-2009					
1	Costanza et al.	The value of New Jersey's ecosystem services and natural capital	11108	2006	Economic values of 7 different ecosystems worth of $19.4 billion per year.
2	Island Press	Ecosystems and human well-being	5035	2005	Analyzes the state of the Earth's ecosystems and provides summaries and guidelines for decision-makers. It concludes that human activity is having a significant and escalating impact on the biodiversity of world ecosystems, reducing both their resilience and bio-capacity. The assessment measures 24 ecosystem services concluding that only four have shown improvement over the last 50 years, fifteen are in serious decline, and five are in a stable state overall, but under threat in some parts of the world
3	Foley et al.	Global consequences of land use	2763	2005	Land use has been changing to meet the requirement of human needs undermining the capacity of ecosystem to provide services. Challenge of managing trade-offs between human needs and provision of ecosystem services.
4	Worm eet al.	Impacts of biodiversity loss on ocean ecosystem services	1917	2006	Increased marine biodiversity loss has degrading the ocean's capacity to provide services but the trends are reversible.
5	Balvanera et al.	Quantifying the evidence for biodiversity effects on ecosystem functioning and services	917	2006	Clear evidence about the positive effects of biodiversity on the flow of ecosystem services.
2010-2013					
1	De Groot, R. S., Alkemade, R., Braat, L., Hein, L., & Willemen,	Challenges in integrating the concept of ecosystem services and values in landscape planning, management and decision-making.	408	2010	Ecosystem service approach and ecosystem service valuation efforts have changed the terms of discussion on nature conservation, and natural resource management. Nature conservation and conservation management strategies do not necessarily pose a trade-off between the "environment" and "development" but investment in conservation, restoration and sustainable

	L.				ecosystem use are increasingly seen as a “win-win situation” which generates substantial ecological, social and economic benefits.
2	Muradian, R., Corbera, E., Pascual, U., Kosoy, N., & May, P. H.	Reconciling theory and practice: An alternative conceptual framework for understanding payments for environmental services.	292	2010	A conceptual framework on PES taking into account complexities related to uncertainty, distributional issues, social embeddedness, and power relations permits acknowledging the variety of contexts and institutional settings in which PES can operate.
3	Gómez-Baggethun, E., De Groot, R., Lomas, P. L., & Montes, C.	The history of ecosystem services in economic theory and practice: from early notions to markets and payment schemes	269	2010	Historical development of the conceptualization of ecosystem services to market and payment schemes.
4	Norgaard, R. B	Ecosystem services: From eye-opening metaphor to complexity blinder	248	2010	Ecosystem services approach can be a part of a larger solution, but its dominance in our characterization of our situation and the solution is blinding us to the ecological, economic, and political complexities of the challenges we actually face.
5	Kosoy, N., & Corbera, E.	Payments for ecosystem services as commodity fetishism	247	2010	Narrowing down the complexity of ecosystems to a single service has serious technical difficulties and ethical implications on the way we relate to perceive nature. The commodification of ecosystem services denies the multiplicity of values, which can be attributed to these services, since it requires that a single exchange-value is adopted for trading. And the process of production, exchange and consumption of ecosystem services is characterised by power asymmetries, which may contribute to reproducing rather than addressing existing inequalities in the access to natural resources and services.

Annexure 6: List of critiques and concerns

Concerns/critiques	Authors (year)
Economic concerns	
1. There are serious limitations in economic valuation techniques and these techniques do not adequately take into account of uncertainty and irreversibility.	Chee, Y. (2004)
2. Economic production metaphor of ecosystem services could promote an exploitive human-nature relationship.	Raymond et al. (2013)
3. Ecosystem services might encourage exploitative approaches whereby consumers will be increasingly separated and alienated from nature	Brockington et al. 2008
4. Economic valuation may lead to selling off of nature.	McCauley (2006); Turnhout et al. (2013)
5. Ecological functions and services can overlap, leading to the possibility of economic double counting.	de Groot et al. 2002
6. No consensus on a particular definition and classification of ecosystem services as several definitions by MEA 2005, Daily 1997, Costanza et al. 1997, de Groot et al. 2002, Fisher et al. 2008, Wallace et al. 2007 and others exist.	Fisher et al. (2009); Young and Potschin (2009)
Ecological concerns	
7. Ecosystem services concept has an anthropocentric focus but the intrinsic values of different entities on nature are excluded.	McCauley (2006) Sagoff (2008) Redfords and Adams (2009)
8. Ecosystem services might encourage exploitative approaches whereby consumers will be increasingly separated and alienated from nature.	Brockington et al. (2008)
9. There is a growing concern that ecosystem services and biodiversity are separate entities and their	Cardinale et al. 2006;

empirical proof of relationship is perceived weak. Planning and conservation strategies based on ecosystem services might not safeguard biodiversity, as ecosystem services can be used as a conservation goal at the expense of biodiversity.	Ridder (2008)
10. Indicators are needed to describe the interaction between ecological process, components, and services of ecosystem.	International Council for Science (ICSU) (2008)
Social/political/institutional	
11. The complex relationship between ecosystem services and human wellbeing need the integration of scientists from different disciplines including sociology, ecology, economics, humanities and others.	Carpenter et al. (2009)
12. Contributions of ecosystem services to poor people, and their access to ecosystem services have not been well studied	Fisher et al. (2013)
13. Ecosystem services concept is an interconnected socio-ecological system and the questions such as how the change in flow of ecosystem services affects the vulnerable communities are still poorly understood.	Carpenter et al. (2009)
14. How to integrate ecosystem services concept into policy and decision-making is still a vast question for policy makers and the practitioners.	Business for Social Responsibility (BSR) (2013)
15. Ecosystem services concept is dominated by ecologists and economists	Lakerveld (2012)
16. Ecosystem services is still a concept and moving from a concept to action is a big challenge due to limited information available on effective approaches and tools for applying the concept on the ground. For instance, how to make better capital decision, manage risks, address needs of people and enable efficient operations. Moreover, there is no direction on how to make tradeoffs and which ecosystem service is to be prioritized over other.	BSR (2013)
17. Social sciences have been under-represented with MEA 2005 under-emphasizing social issues.	Daw et al. 2011

Annexure 7: List of policy documents with explicit and implicit recognition of ecosystem services

Name of the Policies	Type of document	Year	Goals/purpose	Explicit	Implicit	Responsible Ministry
National Biodiversity Strategy and Action Plan 2014-2020	Strategic action plan	2014	A principal instrument for implementing CBD at national level. The convention requires the countries to prepare a national biodiversity and to ensure that this strategy is mainstreamed into planning and activities of all those sectors whose activities can have impact on biodiversity (CBD, 2017)	Incorporation of value of mountain ES in National development planning, economic valuation of ES of all Pas, GDP accounting and decision-making. Development of a system for economic valuation of ES provided all protected areas. Lack of valuation of ecosystem services		Ministry of Forests and Soil Conservation
Aquatic Animal Protection Act 2017	Act	1960	An act to protect aquatic animals and other matter pertaining thereto	No	Yes (ecosystem and its processes)	Ministry of Forests and Soil Conservation
Natural Disasters Rescue Act	Act	1982		No	No	Ministry of Environment
Mines and Minerals Act	Act	1985		No	No	Ministry of Industry
Solid Waste Management Policy	Policy	1996	Solid wastes management	No	No	Ministry of Environment

Solid waste (management and resource mobilisation act)	Act	1987	Manage solid waste and mobilise resources related there to ensure the health convenience of the common people by controlling the impacts of pollution from solid waste	No		Ministry of Environment
Buffer Zone Management Rules 1996	Regulations	1996	Conservation and utilisation of forests through buffer zone committee	No	Yes (Collection and utilisation of forest resource)	Ministry of Forests and Soil Conservation
National Parks and Wildlife Conservation Act	Act	1973	Conservation of protected areas and wildlife	No	Yes (Conservation and community development)	Ministry of Forests and Soil Conservation
Wildlife Compensation Policy	Policy	2008	Compensate the local people for the damages incurred by wildlife	No		Ministry of Forests and Soil Conservation
National Adaptation Programme of Action (NAPA) to climate change	Strategic action plan	2010	Identify vulnerable communities at district level	YES (Ecosystem services for adaptation, rural economy, agriculture)	Yes (Dependency of people on services from Nature especially forest, river)	Ministry of Environment
Climate Change Policy	Policy	2011	Address adverse impacts of climate change and utilise the opportunities created from it to improve the livelihoods, and achieve climate-friendly physical, social and economic development.	No	Yes (Enhance adaptive capacity of ecosystems, livelihoods, REDD, River basin approach, forests benefits)	Ministry of Environment

Community Forestry Development Program Guideline 2071 (Third Revision)	Guideline	2015	ES as a way to achieve MDGs. Equitable access to ES (poor, women, indigenous, disadvantaged)	Yes	Yes (Collection and utilisation of forest resources)	Ministry of Forests and Soil Conservation
Environmental Protection Act	Act	1997	Maintain clean and healthy environment by minimising, as far as possible, adverse impacts likely to be caused from environmental degradation on human beings, wildlife, plants, nature and physical objects, and to protect environment with proper use and management of natural resources taking into consideration that sustainable development could be achieved from the inseparable inter-relationship between economic development and environment protection.	No		Ministry of Environment
Environment Protection Rules	Regulations	1997	Protection of environment	No	Yes	Ministry of Environment

Forest Policy 2000	Policy	2000	Conservation, management and utilisation of forests and its services to benefit the marginalised groups	No	Yes (Meet people's basic needs of forests, food production, protect land, conserve and use of biological diversity in a sustainable way)	Ministry of Forests and Soil Conservation
Forest Policy Amendment 2071	Policy	2015	Conservation, management and utilisation of forests and its services to benefit the marginalised groups	Yes(Economic valuation of ES, PES policy and implementation. Forest management for ecosystem services and sustainable development)		Ministry of Forests and Soil Conservation
National Strategy for Disaster Risk Management in Nepal	Strategic action plan	2009	Guide, encourage, and ensure development and implementation of organised approaches for managing and minimising disaster risks and for effective preparedness at all levels.	No	Yes (Food security, water services, forest management)	Ministry of Home Affairs

National wetland policy	Policy	2003	Conserve and manage wetlands resources and in a sustainble way with local people's particiaption. Aims to put conservation and management aspects of wetland conservation within the framework of broader environmental management.	No	Yes (Natural heritage of ecosystems and human wellbeing)	Ministry of Forests and Soil Conservation
National Biosafety Framework	Strategic action plan	2006		No	Yes (no adverse effect to ecosystems and human health, use of resources for humanity)	Ministry of Forests and Soil Conservation
Nepal Biodiversity Strategy	Strategic action plan	2000	Protection and wise use of biologically diverse resources of the country, the protection of ecological processes and systems, and the quitable sharing of all ensuing benefits on a sustainble basis, for the benefits of people and to honour obligations under the CBD	No	Yes (Equitable sharing of all ensuing benefits on a sustainable basis, livelihoods)	Ministry of Forests and Soil Conservation
Nepal Environmental Policy and Action Plan	Policy	1992	Incorporate environmental concenrs into country's development process	No	Yes (Conservation and human development, economic development)	Ministry of Environment

Plant Protection Rules	Regulations	2010		No	Yes (GMO, pharmaceuticals)	Ministry of Forests and Soil Conservation
REDD+ Social and Environmental Standards	Guideline	2013	Promote high social and environmental performance of government-led REDD+ programmes that contribute to human rights, poverty alleviation, and biodiversity conservation. They support development of a country-led, multi-stakeholder safeguards information system and are complementary to carbon accounting standards.	Yes (REDD+ enhances ES, assess impacts on ES)		Ministry of Forests and Soil Conservation
Soil and Watershed Conservation Act	Act	1982	Land and watershed conservation by controlling natural calamities such as flood, landslide and soil erosion and maintain convenience and economic interests of the general public	No		Ministry of Forests and Soil Conservation
Terai Arc Landscape Nepal: Strategy and Action Plan 2015-2025	Strategic action plan	2015	to conserve the ecosystems of the Terai and Churia hills in order to ensure integrity of ecological, economic, and sociocultural systems and communities.	Yes	Socio-economic wellbeing of people	Ministry of Forests and Soil Conservation

Tiger Conservation Action Plan	Strategic action plan	2007	Preserve, recognise, restore and increase the effective land base that supports tigers in Nepal in order to maintain viable tiger population	No	Conservation and fulfillment of basic needs of people	Ministry of Forests and Soil Conservation
Snow Leopard Action Plan (2005-2015) - Revised 2012	Action Plan	2012	Conserve snow leopard and its habitat	Yes (PES schemes)		
Environmental Impact Assessment Nepal	Act	1993	No	No		Ministry of Environment

Annexure 8: List of ecosystem services projects in Nepal

S.N.	List of projects	Period
1.	Conservation and Sustainable use of wetlands in Nepal (CSUWN)	2010-2014
2.	Darwin Initiative: Mainstreaming biodiversity ad ecosystem services in community forestry of Nepal	2015-2018
3.	Ecosystem services assessment in Important Bird Areas (IBAs) of Nepal	2011-2013
4.	Ecosystem Services for Poverty Alleviation (ESPA) project: Adaptive governance of mountain ecosystem services for poverty alleviation enabled by environmental virtual observatorie.	2015-2018
5.	Evaluation the impact of irrigation on ecosystem services and smallholder resilience in Nepal	2013-2015
6.	Expanding Forest certification at landscape level through incorporating additional ecosystem serves by Asia Network for Sustainable Agriculture and Bioresources (ANSAB)	2011-2017
7.	Forest Certification for Ecosystem Services (FoRCES)	2011-2017
8.	HarioBan program	
9.	Himalayan Climate Adaptation Program (HICAP)	2011-2017
10	ICIMOD's Kailash Scared Landscape Conservation and Development Initiative (KSLCDI)	2012-2017
11	ICIMOD's Kangchenjunga Landscape Conservation and Development Initiative (KLCDI)	2013-2017
12	International Climate Initiative	
13	Koshi Basin Program (KBP)	2012-2016
14	Program for Aquatic Natural resources Improvement (PANI) project	2016-2020
15	The Rural Livelihoods and Climate Change Adaptation in the Himalayas (HIMALICA)	2012-2017
16	United Nation's Environment Program (UNEP)'s Ecosystem Based Adaptation in Mountain Ecosystems"	2012-2015

Annexure 9: List of peer-reviewed articles

Title	Author	Year	Main claim	Short
A total economic valuation of wetland ecosystem services: an evidence from Jagadishpur Ramsar site, Nepal	Sony Baral, Bijendra Basnyat, Rajendra Khanal and Kalyan Gauli	2016	Economic values of wetlands are high and need to be conserved	Valuation
Assessments of ecosystem service indicators and stakeholder's willingness to pay for selected ecosystem services in the Chure region of Nepal	Pratima Bhandari, Mohan KC, Sujata Shrestha, Achyut Aryal, Uttam Babu Shrestha	2016	Willingness to pay for ecosystem services of Chure region	Valuation
What benefits do community forests provide, and to whom? Arapid assessment of ecosystemservices from a Himalayan forest,Nepal	Birch et al	2014	Benefits from Community forests	Conservation
Implications of land cover change on ecosystems services and people's dependency: A case study from the Koshi Tappu Wildlife Reserve, Nepal	Chaudhary et al.	2016	Implications of land cover change on ecosystem services and people's dependency	Conservation, Livelihoods
Understanding the relationships between ecosystem services and poverty alleviation: A conceptual framework	Fisher et al	2013	ES, poverty alleviation	Poverty reduction
Prospect of Financing Protected Areas through Payment for Ecosystem Services in Nepal	Kamal Thapa	2015	PES	PES
Economic valuation of ecosystem services in protected areas: A case study from Nepal	KC et al	2013	Economic valuation	Valuation
PES in Kulekhani Watershed of Nepal: An institutional analysis of mechanisms for sharing hydroelectricty revenue	Khatri, DB	2011	PES like scheme in Nepal	PES
Payment for Environmental Services in Nepal (A Case Study of Shivapuri National Park, Kathmandu, Nepal)	Kamal Jung Kunwar	2008	PES: Upstream and downstream	PES

REDD+, forest transition, agrarian change and ecosystemservices in the hills of Nepal	Marquardt et al	2016	Impacts of agrarian economy changes on ES provisions	REDD+
Assessing community values to support mapping of ecosystem services in the Koshi river basin,Nepal	Oort et al	2014	Community's perception of ES	Assessment
Participatory assessment and mapping of ecosystem services in a data poor region:Case study of community-managed forests in central Nepal	Paudyal et al	2015	Participatory assessment of ES in CF	Assessment
Local actions for the common good: Can the application of the ecosystem services concept generate improved societal outcomes from natural resource management?	Paudyal et al	2016	ES from community forests	Natural resources management
Synergies between biodiversity conservation and ecosystem service provision:Lessons on integrated ecosystem service valuation froma Himalayan protected area,Nepal	Peh et al.,	2016	TESSA toolkit for ES assessment	Valuation
Differences in demand for watershed services: Understanding preferences through a choice experiment in the Koshi Basin of Nepal	Rai et al	2015	Payment for water services	Valuation
The economic value of wetland ecosystem services:Evidence from the Koshi Tappu Wildlife Reserve,Nepal	Sharma et al.	2015	ES valuation of KTWR	Valuation
Using information on ecosystem services in Nepal to inform biodiversity conservation and local to national decision-making	Thapa et al.	2016	Biodiversity conservation	Conservation

Annexure 10: List of reports

Report	Organisation	Type	Date	Theme	Views	Short form
Conserving biodiversity and delivering ecosystem servicse at IBAs in Nepal	Birdlife International	INGO	2012	TESSA for assessing ecosystem services at site scale in Nepal	Conservation	Conservation
PES: Developing forest carbon projects in Nepal	USAID, TERRA Global Capital, Enterprise works, ANSAB	Donor, NGO	2009	Report on assessment of developing carbon projects in Nepal	Payment for conservation and poverty reduction	PES
Protected areas and PES	ICIMOD	IGO	2011	Protected areas, its services and payment	PES for better protected areas management	PES
Developing PES policy in Nepal	ICIMOD	IGO	2016	Science-Policy dialouge on payment for ES	Policy on Ecosystem services	PES
PES: A guide book for planning PES projects	GoN, Finnland, SDC, UKAID	Donors	2015	Multistakeholders forestry programme	Guidebook for PES	PES

PES in Nepal: Prospect, Practce and Process	GoN, IUCN, UNEP, UNDP, BMU	Donors	2013	PES in Nepal	Explore existing practices and prospects of PES in Nepal	PES
Piloting PES in Lamjung	Hariyoban: WWFNepal, CareNepal, USAID, FECOFUN, NTNC	INGO, Civil society	2014	Piloting PES in Lamjung	Piloting PES for water services	PES
Designing a PES scheme for Sardukhola Watershed in Nepal	Sandee and ICIMOD	INGO, IGO	2016	PES	Designing PES to improve water services	PES
Proceedings of the national workshop on PES: Opportunities and Challenges in Nepal	ICIMOD, WWF and IUCN	INGO, IGO	2015	Discussion on Opportunities and Challenges for PES in Nepal	PES: Opportunities and Challenges	PES
Regional stakeholders workshop on valuation and options for PES of mountain forests	Indian National Science Academy and ANSAB	Academy, NGO	2006	ES valuation, PES	ES valuation and PES, Mountain forests	Valuation
PES in Nepal	USAID	Donor	2007	Watershed-based PES in Asia	Watershed management	Watershed management
Ecosystem services	UNEP	INGO	2014	Ecosystem services	Ecosystem services for conservation and climate change adaptation	Conservation and Adaptation
ANSAB initiates result based payment for ES on drinking water in Nepal	ANSAB - Local NGO	Local NGO	2017	PES on drinking water	Payment for water services: Implementing	PES

					PES	
Assessment of benefits and evaluation of ecosystem services in Langtang National Park, Nepal	Individual	INGO	2015	Economic valuation of ES	ES valuation	Valuation

Annexure 11: List of media articles

Article title	Date	Actors (Who)	Affiliation	Subject/Theme (What)	Interests/Views
Is forestation bad for environment?	2015	Scientist (Veldman)	Research organisation	Nature conservation	Not only forests but grassland biomes should be conserved for high biodiversity
Agroforestry in Nepal: Multiple benefits	2016	Diwakar Sapkota (Forester)	Academy	Forestry, conservation, livelihoods, climate change	Agroforestry should be promoted for multiple benefits
Nepal to submit sixth biodiversity report	2016	Himalayan News Service	News	Biodiversity conservation	Conservation of biodiversity, indigenous people
Scientific forest management: For resource utilisation	2016	Diwakar Sapkota (Forester)	Academic	Forestry, poverty, climate change	Better management of forests
Climate change affecting ecosystem	2015	News Service	News	Climate change	Addressing climate change for conserving ecosystem services
Rethinking governance: Stories of Nepali families devasted by eathquakes, floods, droughts an dother hazards will proliferate in the future	2016	Ajaya Dixit (Engineer)	NGO	Climate change, Natural disasters, Adaptation	Local institutions should be given rights in providing social security measures to help the vulnerable to deal with impacts
Wetlands for our future: Political commitment and cooperation from locals can help conserve wetlands	2015	Maheshwor Dhakal (Ecologist)	Government	Wetlands conservation for multiple benefits	Local action needed for conservation and sustenance of ecosystem services
Trees or electricity?	2017	Hari Krishna Uprety (Socio-envrironmental expert)	NGO	Conservation vs development	Hydropower projects are slowed down by environmental policies

Redrawing the boundaries: People can reap ecological benefits by including mountains, hills, and plains in a province	2016	Jagannath Adhikari (Human Geographer)	Academy	Ecosystem services: Federalism good for ecosystem services?	Including mountain, hills and plains in a province can generate multiple ecological benefits
Panel to assess quake's impact on environment	2015	Kantipur	News	Environment: Rapid Environment Assessment	Impacts of earthquake on ecosystem services
Climate crisis: Will federalism make it easier for the government to implement climate resilient policies, or will it complicate matters?	2015	Navin Singh Khadka (Environmental correspondent)	BBC	Payment for Ecosystem Services (PES) Can federalism help to sustain ecosystem services based payments?	PES in the context of changing political scenario (federalism)
Green Shield	2015	Navin Singh Khadka (Environmental correspondent)	BBC Londond	The Economics of Ecosystems and Biodiversity (TEEB)	Economic values of ecosystem services should be of interest not to the national government but also its neighbor India
Why we need to be really worried if snow leopards are under threat	2017	Navin Singh Khadka (Environmental correspondent)	BBC	Species conservation: Ecosystem services for conservation of species – snow leopards	Mountain ecosystem and its services conservation
Beyond the trees: Forests for human security should be the theme in all practices of forest governance	2016	Hemanta Ojha and Jagannath Adhikari (Forester and Human Geographer)	Academy	Forest for multiple ecosystem services: beyond production of timber	Local governments to strengthen forest landscape governance in a decentralised way
Rich in Biodiversity	2011	Sohan Ghimire (Engineer)	NGO	Ecosystem services	Conservation of ecosystem and its services, and its payments for conserving
Climate change and human	2013	Anil Chitrakar	INGO	Climate change, Human	Ecosystem functions

rights: Nepal taking the lead		and Kashish Das Shrestha (Environmentalist)		rights: Nepal taking the lead	
Vatawaraniya sewa Bhuktani	2016	Laxmi Dutta Bhatta	IGO	PES	Payment for Ecosystem services

Annexure 12: List of social media posts

1. International conference on biodiversity, climate change assessment and impacts on livelihoods: Incentivising mountain communities for ecosystem services in a changing climate
2. Research article: ES from community-based forestry in Nepal
3. Designing a PES scheme for Sardukhola Watershed in Nepal
4. Ban Chautari: Discussions on Ecosystem services certification in Nepal
5. Brief press release article: PES (Watawaraniya sewa bhuktani)
6. Workshop on Sustaining ecosystem services
7. Research paper: Assessing community values to support the mapping of ES in the Koshi River basin of Nepal
8. National sharing workshop on ES assessment and action research under HIMALICA
9. Regional workshop on 'mainstreaming biodiversity and ES in community forestry (Jan5, 2016)
10. Expert consultation workshop on mainstreaming biodiversity and ES in CF in Nepal: BCN Nepal (March 6, 2016)
11. Newspaper article in Annapurna: Paristhikiya pranali upabhog gare sulka tirnu paren (PES) (25 Jan, 2016)
12. Mountains as the water towers: A call for action on SDG(safeguarding mountain ES): 26Dec 2016
13. Our mountains Our future: ES in the mountains (Jan 19, 2014)
14. Capacity Development course on land-use and green growth: Concepts and approaches for payment for ecosystem services", held in Kathmandu, May 2016
15. Research paper: Mountains under pressure: Evaluating ES and Livelihoods in the Upper Himalayan region of Nepal
16. Personal views from experts
17. UK Darwin initiative: ES project in Nepal through BCN 2012
18. Research paper: What benefis do CF provide and to whom?

19. Research paper: ES and Land use change in KTWR
20. PES workshop in Dhankuta bazar
21. Training on INVEST by Sandee, 2012

Twitter search: #ecosystemservices#Nepal

1. Research paper on ES in the Chure region of Nepal
2. Publication: Participatory assessment and mapping of ES
3. Community-scale workshop on water services in Panauti Nepal through ESPA project
4. Research paper: Synergies between biodiversity conservation and ES provision: Lessons on integrated ES valuation from a Himalayan Protected areas of Nepal
5. Darwin's Initiative project in Nepal focusing on ecosystem services
6. Improving biodiversity, ecosystem govt priority: PES by Forest Minister , 13 Dec 2016 (Jaggannath Bhandari)

Annexure 13: Differentiated importance of ecosystem services

Ecosystem services	Total (%)	High-income	Medium-income	Low-income	Ethnic	Higher-caste	Lower-caste	Male-headed	Female-headed
Provisioning services									
Fuel wood	94	90	91	100	93	90	100	92	95
Fodder	88	94	88	83	93	91	81	91	85
Leaf litter	53	51	47	61	52	46	60	52	54
Timber	30	40	35	15	35	40	15	43	16
Water	26	23	24	29	29	20	30	26	25
Bamboo	19	11	12	33	14	11	33	20	17
Wild food	10	0	3	26	11	0	19	10	10
NTFPs	6	9	7	4	5	9	4	9	3
Cultural									
Spiritual and religious values	93	93	92	89	98	93	87	97	98
Sense of place	21	20	18	25	23	22	20	20	22
Ecotourism	21	30	22	10	24	30	10	31	11
Traditional culture and practices	7	6	8	6	8	6	6	6	8
Research education	7	15	5	1	8	11	1	11	4
Greenery	5	3	5	7	6	4	7	2	3
Regulating services									
Habitat for Biodiversity	32	45	30	20	42	40	15	33	32
Fresh air	31	33	36	23	37	30	25	33	32

Water regulation and purification	27	24	27	29	27	25	28	27	26
Erosion control	21	15	17	30	19	15	30	23	19

Annexure 14: Rules and regulations of community forests and religious forests of the Mai Pokhari Ramsar site

Membership rule:			
Name	**Distribution**	**Participation**	**Recognition**
Bhedichowk CF **Bhalu Kateri CF**	Timber: A committee makes decision on distribution of timber based on annual demand from members. Timbers can be collected only between November-May. Low-income groups, and families suffering natural disasters should be given priority and timber can be provided in a subsidised rate (half of the current price). Fuelwood: Dried wood, twigs and branches can be collected throughout the year, but fuelwood extracted through thinning/pruning can be distributed only between Dec-Jan on a price, fixed by the committee. No special provisions for disadvantaged groups. Fodder can be collected in May-June, and grass on July-Aug on a price fixed by community. Leaflitter can be collected between March-April Medicinal plants can be collected only for household use and not for sale. Wildfood can be collected for household use and not for sale Pro-poor initiatives: At least 35% of the total income of community forests should be invested in poverty reduction based programs. Special programs for women and lower-caste groups can be initiated. Community forest's funds can be provided to the disadvantaged groups with low-interest.	Forest guarding: Each user-household should participate in forest patrolling. Penalty for failure in patrolling is Rs. 50 (first time), Rs. 100 (second); and Rs. 200 (third). Attendance in monthly meeting, general assembly, and community development meetings: Failure to attend each of the specified meetings would penalise Rs. 50; Rs. 100 and Rs. 200.	Capacity-building training: At least 50% representation from women, lower-caste, ethnic and low-income groups, and the remaining 50% can be decided by the committee.
Mai Pokhari RF	Forest products can't be collected for household use.	Same rules as of community forests	Inclusive committee should be formed but no specification on representation of disadvantaged groups
1. Membership rule: Any new households wanting to join community forests users group need to pay high fee (Rs. 10000). 2. Any member who disobeys the above mentioned rules can be penalised with fines up to Rs. 200 depending on situation and can be eliminated from the users group.			

Annexure 15: List of national and global documents (policies, acts, regulations, conventions and related project documents)

S.N.	List of document	Scale	Details
	Management Plan of Mai Pokhari Ramsar site of Nepal 2012	Local/National	GoN, (2012) Management Plan of Mai Pokhari Ramsar site, Illam, Nepal. Government of Nepal, Kathmandu.
	Forest Act 1993	National	HIS MAJESTY'S GOVERNMENT OF NEPAL (HMGN) 1993. Forest Act 1993 (official translation). HMGN, Ministry of Forests and Soil Conservation, Kathmandu.
	Forest Regulations 1995	National	HIS MAJESTY'S GOVERNMENT OF NEPAL (HMGN) 1995. Forest Regulation, 1995 (official translation). HMGN, Ministry of Forest and Soil Conservation, Kathmandu.
	National Biodiversity Strategy and Action Plan (2014-2020)	National	GoN (2014). Nepal National Biodiversity Strategy and Action Plan 2014-2020. Ministry of Forests and Soil Conservation, Kathmandu, Nepal.
	Wetland Policy of Nepal 2003	National	GoN, (2003) National Wetland Policy, in: (DNPWC), D.o.N.P.a.W.C. (Ed.). DNPWC, Kathmandu, Nepal.
	Nepal Fifth National Report to Convention on Biological Diversity 2014	National/Global	MoFSC (2014). Nepal Fifth National Report to Convention on Biological Diversity 2014. Government of Nepal, Kathmandu. https://www.cbd.int/doc/world/np/np-nr-05-en.pdf
	Nepal's Report to Ramsar Convention 2015	National/Global	DNPWC (2015). National report on the implementation of the Ramsar Convention on Wetlands. Department of National Parks and Wildlife Conservation, Government of Nepal, Kathmandu. http://www.ramsar.org/sites/default/files/documents/library/cop12_nrf_nepal.pdf
	Convention on Biological Diversity	Global	CBD, (2016) Convnetion on Biological Diversity (CBD), in: Secretariat, C. (Ed.). CBD Secretariat, Montreal, Canada. www.cbd.int
	The Ramsar Convention	Global	RCS, (2014) The Ramsar Convention and its Mission, in: Secretariat, T.R.C. (Ed.). Ramsar Secretariat, Geneva, Switzerland.
	Sacred Himalayan Landscape, Nepal:	National	GoN, (2006) Sacred Himalayan Landscape, Nepal: Strategic Plan 2006-2016,

	Strategic Plan 2006-2016		in: Division, P.a.H.R.D. (Ed.). Ministry of Forests and Soil Conservation, Kathmandu, Nepal.
	Proceedings of Technical Consultative Meeting on Regional Programme Implementation Plan (2016-2020) for Kangchenjunga Conservation and Development Initiative (KLCDI), Kathmandu, Nepal: Internal report, KLCDI, 2015	Regional	ICIMOD (2015). Proceedings of Technical Consultative Meeting on Regional Programme Implementation Plan (2016-2020) for Kangchenjunga Conservation and Development Initiative (KLCDI), Kathmandu, Nepal.
	Assessing Five Years of CEPF Investment in the Eastern Himalayas Region 2011	Global	CEPF (2011). Assessing Five Years of CEPF Investment in the Eastern Himalayas Region. Ciritical Ecosystem Partnership Fund, Kathmandu, Nepal. http://www.cepf.net/Documents/Final_Assessment_Eastern_Himalayas_July2011.pdf
	Kangchenjunga Landscape Nepal: from conservation and development perspectives.	Regional	Chaudhary, R.P., Uprety, Y., Joshi, S.P., Shrestha, K.K., Basnet, K.B., Basnet, G., Shrestha, K.R., Bhatta, K.P., Acharya, K.P., and Chettri, N. 2015. Kangchenjunga Landscape Nepal: from conservation and development perspectives. Ministry of Forests and Soil Conservation (MoFSC), Government of Nepal; Research Centre for Applied Science and Technology (RECAST), Tribhuvan University; and International Centre for Integrated Mountain Development (ICIMOD). Kathmandu, Nepal.