“Changing water use and management in the context of glacier retreat: a case study of the Peruvian village of Huashao”

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Abstract

In Peru´s Callejón de Huaylas, the physical and social dynamics of water use and management are changing rapidly. A shift from subsistence to commercial crop production in *comunidades campesinas* is leading to intensive water use, compounding the impacts of glacier retreat on water availability. The 2009 Water Resources Law aims to address water scarcity and conflict though 'formalising' water use and management, bringing increased state control over water user organizations. This study explores how villagers in a water user organization in Huashao interacted with state discourses and practices of 'formalization'. It uses discourse analysis to examine 'formalization' and its relationship to changing policies at the national and global levels. Through an ethnographic case study, it explores villagers' everyday water use practices and the outcomes for social and institutional relationships. It investigates changing water use and management, the role of water users in shaping these changes and the influence of historical interactions with the market and NGO initiatives.

The thesis shows that globalized discourses of water scarcity and climate change adaptation travel from global to local levels to subtly disperse state control over local water use and management. Yet, local water users interact with wider processes of social, historical and economic change in ways that respond to new commercial opportunities outside global management discourses. By asserting ways of thinking and acting around water based on flexible, opportunistic judgements to reproduce livelihoods, they challenge understandings of water and life in *comunidades campesinas* in 'formalization' policies. An ethnographic approach appreciates that people live with and negotiate contradictions in everyday life as they react to new water governance arrangements that defy simple interpretations of change in such contexts. I argue that understanding water users' interactions with wider social change, and the outcomes for water use practices and management institutions, illuminates apparently contradictory behaviour.

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Glossary of Spanish terms

This list is confined to the terms used in everyday interactions in Huashao, from life in the village to irrigation-specific terms that are used frequently in the text. For the purposes of consistency, I use the Spanish translations throughout the thesis, however I do not take for granted the historically constructed nature of these concepts, many of which are deeply rooted in Peru´s colonial past.

Acequia. Irrigation ditch.
Bocatoma. Water outlet for irrigation.
Chacra (Quechua *chakra*). A generic name for a field or plot of land.
Colectivo. Shared taxi or bus.
Comunero. Male member of a *comunidad campesina.*
Comunera. Female member of a *comunidad campesina.*
Comunidad campesina. Literally ´peasant´ community, institutionalized since the 1969 Agrarian Reform. These may be organized around communal land administration and social relations like work sharing and reciprocity.
Faena (Quechua: *phayna*). Historically a form of reciprocity between an individual and the community, engaged in by everyone in return for the use of a vital resource.
Hacendado. Large estate/landowner, of colonial descent.
Hacienda. Large estate organized around Spanish property system, exported to the Americas during colonization.
Lliklla. Rectangular, handwoven traditional shawl worn by women in the Andes.
Olluco. From the Ullucos plant, this is an Andean root tuber and one of the most widely consumed after potato.
Peón. Waged labourer (this also has colonial connotations, in that historically peones worked to pay off a debt and had little control over employment conditions).
Pollera. Ornate traditional skirt, made from wool and microfiber, still worn by women in parts of the Andes.
Puquio (Quechua: *pukyu*). A spring used as a source of irrigation water.

Sector. A term given to a grouping of family plots or villages and its territory when the state became involved in distribution.

Turno. A sequencing rule that governs the distribution of water between community sectors, still in operation in some *comunidades campesinas.*

Usos y costumbres. Commonly referred to as ´customary´ practices used by water authorities to refer to ´indigenous´ normative systems that are not normally recognized by law.

Abbreviations

AAA	*Autoridad Administrativa de Agua* (Administrative Water Authority)
AACH	*Autoridades Autónomas de las Cuencas Hidrgraficas* (Autonomous Authorities of Hydrographic Watersheds)
ALA	*Administración Local de Agua* (Local Water Administration)
ANA	*Autoridad Nacional de Agua* (National Water Authority)
ATDR	*Administrador Técnico del Distrito de Riego* (Technical Administrator for Irrigation Districts, now ALA)
BID	*Banco Interamericano de Desarrollo* (Inter-American Development Bank)
IPCC	Intergovernmental Panel on Climate Change
IWRM	Integrated Water Resources Management
JNURDP	*Junta Nacional de los Distritos de Riego de Perú (*National Irrigation User Board of Peru)
MINAM	*Ministerio de Ambiente* (Ministry for the Environment)
MINAGRI	*Ministerio de Agricultura* (Ministry for Agriculture)
NGO	Non-Government Organization
NWRMS	National Water Resources Management Strategy
NWRPS	National Water Resources Policy and Strategy
PROFODUA	*Programa Extraordinario de Formalización de Derechos de Uso de Agua* (Extraordinary Programme for the Formalization of Water User Rights).
SERNANP	*Servicio Nacional de Áreas Naturales Protegidas por el Estado, Ministerio del Ambiento* (National Service of Natural Areas Protected by the State, Ministry for the Environment)
UNFCCC	United Nations Framework Convention Climate Change

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The cold smell of potato mould, the squelch and slap

Of soggy peat, the curt cuts of an edge

Through living roots awaken in my head.

But I've no spade to follow men like them.

Between my finger and my thumb

The squat pen rests.

I'll dig with it.

(Seamus Heaney, *Digging* from *Death of a Naturalist*, 1966)

Chapter 1 : Introduction

1.1. Introduction

Many villages in the Peruvian highlands are interacting with state authorities in the transformation of the state's water sector while striving to maintain their livelihood activities. For the first time in Peruvian water legislation, the state has recognized the role and practices of *comunidades campesinas* in the thrust towards Integrated Water Resources Management (IWRM) in Peru's water management approach under the 2009 Water Resources Law. State authorities are using the 'formalization' of water rights to address what they see as the country´s 'limited water culture' and management capacity. At the same time as people in highland villages encounter new state legislation and policy, they are increasingly involved in commercial crop production in their livelihood activities due to complex political economic influences affecting both how water is used and managed locally, as well as the demand for water (Bury et al., 2013). I posit that peoples' agency to engage with these economic forces, as well as with development organizations, are creating commercial livelihood opportunities in rural areas, driving social change in small-scale and incremental ways and influencing how people use and manage their water supply.

Given an apparent move away from subsistence livelihoods, how then are people interacting with the expectations held by water authorities of their role in new policies of 'formalization'? If, as other authors argue (Bebbington, 2000), change in highland communities can be understood by embracing the complex ways that people interact with the practice and outcomes of development initiatives, external interventions and economic dimensions of livelihoods while they seek to control their livelihoods, this raises important questions about how they negotiate new water governance arrangements in the thesis. I explore how and why the livelihood and water use/management decisions and actions of the people of the village of Huashao in the valley of the Callejón de Huaylas in Northern Peru interact with the new institutional rules and norms being produced by water authorities in different ways and the effects of new arrangements, both state-imposed and

the result of their own actions, on pre-existing water management institutions. I use the case study of Huashao to examine empirically the villagers' everyday water use practices, and the outcomes for institutional and social relationships emerging in the context of the 2009 Water Resources Law. I suggest that the concept of agency can be useful to explore how people shape water use practices, institutions and social life in the Andes, which can deepen understandings of the complexity of ongoing social change into which new water governance arrangements are introduced.

In this chapter, I provide the rationale for the thesis and research questions. I start by giving a brief introduction to my own motivation for the study, followed by the geographical and socio-economic setting into which state water authorities are introducing new governance arrangements. This gives a sense of the physical environmental change – glacier retreat and water scarcity – and water intensive development that has brought increased attention to water use and management in the Callejón de Huaylas. I follow with the central puzzle of the thesis, based on empirical observations from fieldwork, followed by an explanation for my focus on place, and an introduction to the case study. The chapter culminates with my research questions and a breakdown of the thesis structure.

1.2. A word on background

I came to the PhD with a personal, as well an intellectual interest in understanding how people deal with rapid changes in their environment. During my first year at the University of East Anglia, I had been intrigued by the physical science literature on climate change that looked at the recession of glacial tongues in the Cordillera Blanca, and preliminary work on the predicted effects on water supplies downstream (Vuille et al., 2008; Baraer et al., 2012; Bury et al., 2013). I quickly learned the difficulty that climate change researchers had in attributing physical changes in water availability to glacier retreat specifically, in a context such as the Andes that is heavily influenced by harsh and unpredictable climate events. Studies such as these led me to ponder how people living near to the glaciers were thinking about the issue; were *they* perceiving – even experiencing – changes in water availability

and relating these changes to the retreat of the glaciers? Were they as concerned about scarcity and loss as the aforementioned researchers?

The 2010 book by environmental historian, Mark Carey, set out in detail the political economy of water management in the context of historical disasters in the region. Given the context of increasingly powerful hydroelectricity companies and coastal irrigation projects, his concluding comments led me to question the fairness of proposed policies that asked small-scale users in the highlands to use less water, while large-scale users expanded their use as the glaciers continued to melt. Why do "those who lose control of their glaciers because of outside management suffer the most?" (Carey, 2010, p. 191). Unsurprisingly, I was drawn into some of the more critical literature that questioned the discursive and practical meanings of climate change adaptation and the assumptions underlying associated approaches (Orlove, 2009a; Turner, 2010; Jennings, 2011; Adger et al., 2012; O'Brien, 2012). Studies such as these called for a re-examination of climate change from the interpretative social sciences and more critical reflection on the political implications of dominant discourses. I thus set about reconnecting adaptation and associated concepts (see Chapter 2) with everyday experience of change, to "focus on how climate change is adapted to human lives, rather than how humans adapt to climate change" (Rasmussen 2015, xv). I saw new water governance arrangements, partially motivated by global discourses of climate change adaptation, and peoples' interactions with these, as an opportunity to do such a study.

1.3. Accelerated glacier retreat & water-intensive socio-economic development in the Cordillera Blanca

The retreat of the glaciers, subsequent climate studies predicting water scarcity and the 2009 Water Resources Law have meant that the state and state policy has increasingly turned its attention to the Callejón de Huaylas to apply water efficiency measures and implement institutional changes under IWRM.

The Cordillera Blanca (White Mountains) is Peru´s highest and most glaciated mountain range. The range runs 180 kilometers north-south and parallel to the nonglaciated

Cordillera Negra (Black Mountains) to the west. The two ranges extend high above the channel separating them, a valley that Peruvians call the Callejón de Huaylas, with the Santa River running through it. Seventy percent of Cordillera Blanca glacier meltwater drains into the Santa, which carries more water to the Pacific Ocean than any other river in Peru (Kaser et al., 2003). The Cañon del Pato located at the northern-most point is the site of one of Peru´s most important hydroelectric stations. In total, nearly half a million people live on the slopes and in valleys surrounding the Cordillera Blanca.

According to the Fifth Assessment Report (AR) of the Intergovernmental Panel on Climate Change (IPCC) (2014), which reviews and assesses the most recent scientific, technical and socio-economic knowledge on climate change globally, the rate of glacier retreat in the tropical Andes mountains has accelerated since the 1970s (area reduction between 20 and 50%), a rate unprecedented in the past 300 years. According to Mark et al. (2010), highland populations in the Callejón de Huaylas engaged in agricultural activities are affected by accelerated melting in the Cordillera Blanca mountain range due to a heavy reliance on glacier water for consumption and irrigation. Glacial meltwater provides year-round water supply and is used to buffer the seasonally arid climate, which is particularly important for irrigation as it has historically enabled the extension of agricultural production (Bury et al., 2013). However, highland populations are noticing a decline in supplies during the dry season, increasing short-term weather variability and shifts in the regularity of year-round water supply due to increasing local and regional demands on water supplies (see Mark et al., 2010).

> Highland populations have increasingly lost control of their resources or at least progressively shared resource management decisions with an increasingly coast-oriented national and international community (Carey, 2010, p. 193).

Rabatel et al. (2013) and Baraer et al. (2012) found that many of the tributaries of the Santa River had crossed a critical transition with regard to water yield and suggested that glacier retreat is accelerating and impacting water supply in the Cordillera Blanca (further melting reported since the Fourth Assessment Report, AR4). In the short term, this means that glaciers will increase river flow, whereas in the longer term, the authors predict that this will produce water scarcity.

Water scarcity is about more than just physical availability, however. There is growing acceptance that water scarcity in marginalized communities is not so much related to the absolute availability of sufficient fresh and clean water, but rather to the differences in distribution brought about by unequal power structures, affecting who has access to and control of the benefits that water resources provide and how (Boelens and Seemann, 2014). In other words, it is both "natural and produced" (Budds and Hinojosa, 2012). The 2006 UNDP report emphasized that "poverty, power and inequality are at the heart of the problem" in an effort to quash the belief that global water crises are a result of scarcity. Yet, the threats to smallholder agriculture and livelihoods in a globalizing society are on the rise and are motivating governments, including the Peruvian government, to 'formalize' water rights and 'modernize' water management systems to make water more materially secure globally (Martinez-Alier, 2002; Swyngedouw, 2005). In the Cordillera Blanca, Carey (2010) argues that the construction in current policy of melting glaciers as diminishing water resources and consequent pressure on highland communities to adapt to scarcity is misplaced. He argues that development agendas and vested political-economic interests in the Cordillera Blanca drive this focus, as opposed to concerns for conserving water, and do not reflect actual water use. While the definition of melting glaciers as diminishing water resources in water legislation and policy has come to mean less water to use for highland populations (because they are considered the most negatively affected population in policy), the use of glacial water by hydroelectric companies and coastal irrigation projects, large scale users, has actually increased[1] (ibid.). The constructions of glaciers and water in water policy discourses in the context of the country's political economy of water use and preference for coastal irrigation, are important to bear in mind as I attempt to explore and understand how the people of Huashao negotiate their control of water resources in interactions with water authorities.

The Peruvian state's approach to water management since 2009 is characterized by a drive to 'formalize' and 'modernize' existing water use practices (Boelens and Vos, 2012; 2013b; Boelens and Seemann, 2014; French, 2016). The state has also created new water institutions, including the National Water Authority (ANA), in the shift from a centralized to an integrated approach to water management on the basis that this will enhance water

[1] Between 1958 and 2002, the hydroelectricity output at Cañon del Pato rose from 50 megawatts in 1958 to 256 by 2002 (Carey, 2010).

security (Chapter 2). In practice, this has meant the material allocation and (re)distribution of water rights (Boelens and Vos, 2012) and the spread of concepts such as water efficiency and productivity that give normative meaning to particular water practices. These have material and discursive impacts in local water user organizations and put pressure on local water users in places like Huashao to assume new ways of viewing water and change their practices (ibid.).

Alongside claims of accelerated glacier retreat and associated decreases in glacier run-off, as well as new water governance arrangements, rapid socio-economic changes are afoot in the Callejón de Huaylas that include changes in human agricultural activities that have led to rapid and water-intensive economic development, transforming water use (Bury et al., 2013). Over three decades since the 1960s, Bury et al. (2013) found that the cultivation of livelihood subsistence crops declined while commercial and export crop production has increased. They argue that this is due to complex political economic influences, including the expansion of commercial and export crop production in large-scale agricultural projects along the coast. I wished to explore how people in the highlands may also be involved in the expansion of commercial crop production in the move away from subsistence agriculture. I posit that developing an understanding of how and why people are moving away from subsistence agriculture in the context of glacier retreat may throw light on, not only the implications for water use and management, but also on how and why people are responding and reacting to new state water use and management norms and discourses in different ways.

It is within these different sets of arguments related to diminishing water supplies, new state water governance and the shift from subsistence to commercial crop production in the Cordillera Blanca that I couch this research.

1.3.1. Central puzzle of the thesis

Listening to government officials in Huashao advising local water users "to take advantage" of the water while they still could, I remembered how Vuille et al. (2008) and Mark (2008) had claimed that some downstream users would quickly adapt to increased water availability, raising "serious sustainability concerns" (Vuille et al., 2008, p. 91). These authors touched on a puzzling set of circumstances that emerged from my fieldwork observations and echoed some of the wider contradictions described above: the people of Huashao appeared to be increasingly involved in water-intensive commercial activities while dealing with new state-imposed processes aimed at curtailing how much water they could use to address water scarcity and accelerated glacier retreat. I wondered how and why downstream users used water in different or new ways in the immediate pursuit of their livelihoods, as glaciers retreat and lose mass, and while negotiating new governance arrangements. How and why were peoples' livelihood and associated water use and management decisions and actions interacting with new water policies and norms in the context of wider socio-economic change in Peru? What did this say about how they perceive and value their water?

1.4. A focus on place

In recent years, studies prioritizing vulnerability and the impacts of glacier retreat have overshadowed lived or place-based experiences of change in the Cordillera Blanca. Findings on the vulnerability of households and livelihoods to changing water availability show the challenges posed by climate change in the region (see Bury et al. 2013; Bury et al. 2010; Carey et al. 2014; French & Bury 2009). They are subsumed into large systems-based studies concerned with understanding the biophysical and socio-economic conditions affecting risks and opportunities posed by accelerated glacier retreat (see Bury et al. 2013; Bury et al. 2010; Carey et al. 2014; French & Bury 2009). While the importance of interdisciplinary work cannot and should not be underestimated, such broad scale studies driven by systems thinking cannot account for the lived or place-based experience of change in communities and villages. They tend to take for granted aspects of the social

context that deserve more focused consideration, such as why people are becoming increasingly involved in commercial trading in the context of accelerated glacier retreat. Nor do they make room for an appreciation of the complexities of a place and the diverse activities people engage in. Such foci provide a way-in to understanding social change that reflects the social priorities and concerns of different groups, which, in turn, affect how different groups respond to policy efforts to address climate change and water scarcity.

Indeed, it is crucial not to assume that climate change and/or water scarcity are of most concern to those most directly affected by glacier retreat. As noted in Drenkhan et al. (2015), focusing on glacier retreat alone as an aspect of change may have the effect of filtering out other societal aspects of change that might be considered more pressing to the local population, "often more potent than only climate change impacts" (ibid., p. 725). By not starting out with an assumption of vulnerability, they leave the door open to alternative explanations of change. Rasmussen (2015), for example, puts concerns about the effects of glacier retreat on water availability into larger, historically-produced societal contexts, conceptualizing the urgency underscoring discourses of (future) water scarcity alongside societal forces he found to be as, if not more powerful than the effects of climate change for *campesino*s, such as state abandonment and unstable rural livelihoods. Another example is Dunbar and Medina Marcos (2012) work that shows the value placed on maintaining local livelihoods, and how economic expansions, cultural preferences, and environmental pressures transform consumption and the commercialization of opportunity. In a similar vein, my study zooms the lens out on glacier retreat and casts the net wide in an empirical and ethnographic study of change in Huashao. This is an attempt to understand how and why people act and interact (make decisions and take actions) at the intersection between their everyday livelihood practices and the state's new 'formalization' approach to water management, while also considering the influences of wider market forces, and development organizations (Bebbington, 2000). It explores the ways they discuss and make meaning of their actions to understand how they understand and value water in their everyday lives. I posit that understanding the social dynamics around water use and management that follow and surround these actions and interactions, as well as their outcomes, in a place-based approach helps to elucidate how and why people react and respond to the state´s new approach to water management in

particular ways. Employing case study methodology allows me to empirically situate and understand changes in water use and management within the wider policy change context.

1.5. New governance arrangements – understanding the consequences for local water user organizations

The juxtaposition between the drive to 'formalize' water rights and practices and the state's commitment in the 2009 legislation to respect existing water use and management practices in *comunidades campesinas* (Chapter 2) has drawn considerable critique. Some argue that state authorities are advancing a technical-economic approach to water that risks homogenizing socio-cultural and historical ways of thinking and acting, belittling the long history of cultural and social diversity in water management practices in Peru (Lynch, 2012; French, 2016). Furthermore, in cases where new laws appear to recognize pre-existing practices, others contend that they only do so insomuch as they adhere to wider privatizing trends meaning that communities continue to be marginalized (Vera Delgado and Vincent, 2013). The study interrogates this apparent juxtaposition by exploring how water users in Huashao interact with the state's approach to water management. I posit that recognizing diversity in existing water use and management practices, as well as embracing agency in understanding how people interact differently with new practices and institutions, reveal complex interactions that help to shed light on seemingly contradictory behaviour and defy simplified interpretations of change.

As Boelens and Vos (2012) and others (see Joy et al., 2014) argue, the push to 'formalize' is partly due to the adoption of globally-accepted norms of water management that can have the effect of removing definitions of water problems and solutions from their specific socio-economic and historical context and marginalizing pre-existing ways of using and managing water. I explore the origins of the current emphasis on 'formalization' at national level and explore the extent to which globally defined water concepts and ideas travel to, and correspond with issues of concern in, a local water user organization. The concept of discourse as it relates to scale is useful to understand how global ideas and associated knowledge forms travel from global to local contexts and to explore the extent to which,

and to what effect, dominant ideas at global level interact with national interests, as well as how global policy ideas might affect everyday practices locally. The latter adds to the limited work that has been carried out on the effects of global water policy discourses in local contexts (Boelens and Vos, 2012; Boelens and Seemann, 2014).

1.6. Introducing the case study - the village of Huashao

Nestled between the highest peaks of the Cordillera Blanca, Mounts Huascarán and Huandoy, and located approximately 10km from the nearest valley town of Yungay, the village of Huashao (3,100m) is home to both members, hitherto *comuneros* (male members) and *comuneras* (female members) and non-members of a *comunidad campesina* called *Unidos Venceremos* or 'Together we Will Conquer' (Chapter 5). *Unidos Venceremos* has over 400 families living on land extending over 931 hectares and stretches over a vertical terrain ranging from 2,200m to 3,500m, enabling different livelihood activities. The village lies just twenty minutes' drive from the entry point of the most popular adventure tourism route in the Cordillera Blanca: the Llanganuco gorge. In the village, livelihood activities have changed from largely agricultural to a mix of both agricultural and commercial occupations over the past fifty years, now consisting of a mix of commercial and subsistence crop production, pastoralism and tourism-driven opportunities. *Unidos Venceremos* is also part of a state-recognized water user organization called *Yurac Uran Atma* Water User Committee. Water users rely on the waters of the *Yurac Uran Atma* canal for irrigation and the canal is fed by the glacier meltwater of Mt Huandoy. The Committee holds a state license under the new water governance arrangements since 2013.

This village offers a rich opportunity to explore some of the pressures facing highland water users adapting to new water governance arrangements, the contradictions that these pressures raise in their everyday lives and the ways that their historical interactions with entities outside of new state water governance influence the approach of different social groups towards new governance arrangements. In the thesis I investigate dominant views of social relations in the state's new institutional arrangements around water and draw out

empirically the negotiations of everyday social life in Huashao, including a consideration of changing livelihood activities and pre-existing water use and management practices.

1.7. Research questions and thesis structure

Drawing on the central puzzle of the thesis indicated above, my overarching research question is how and why do people make decisions and take action in relation to livelihoods and rural water use and management in the context of state water 'formalization' processes. The goal is to explore lesser recounted understandings and values that underpin peoples' everyday livelihood and water use/management decisions and actions in a context where legal and scientific discourses about climate change and water scarcity abound, often driven by beliefs and expectations that highland communities need to change important aspects of their everyday lives. In scrutinizing local livelihoods and water governance, the thesis explores how rights and governance frameworks defined globally combine and interact with existing local institutions in the village of Huashao.

My research sub-questions are:

1. What is the nature and origin of the water discourses prioritised in policies of water user rights 'formalization' at national and regional level in Peru, considering historically and socially-embedded relations of power, and how do they interact across scale?
2. How and why do people value and engage in commercial livelihoods locally and how do decisions to undertake commercial activities influence pre-existing institutional arrangements structuring livelihoods and water use?
3. What are the political and social consequences of new discursive practices and institutional changes in water use and management espoused by state water authorities for how people make meaning of and respond to physical changes in water availability and the management of water infrastructure locally?

In Chapter 2, I critically explore the broad context of the study: the historical background to water governance in Peru, the global influences on recent changes nationally, including the global discourse and policy environment, and the diversity of water management locally in the Andes. In Chapter 3, I present my conceptual framework. This develops the concepts I draw upon to explore my research questions: place, agency and bricolage as these relate to how social and institutional change occurs in rural places and discourse across scale in water governance. In Chapter 4, I discuss the methodology I use to examine the research questions, showing the overall approach used and specific methods. Chapter 5 spotlights Huashao. It gives context-specific detail about the different groups of people, activities, water use and management practices, as well as recent and historical relationships with water and development organizations. This contextualized detail helps to deepen understandings of livelihood decisions and actions within new state-imposed processes aimed at addressing water scarcity and accelerated glacier retreat.

In Chapter 6, I scrutinize national and regional water policy discourses and the prioritised aspects of institutional changes with consequences locally in order to investigate the ways new management arrangements were constructed and interpreted by the water authorities working at regional and local levels in the Callejón de Huaylas (research sub-question 1). The latter builds upon the complex context of institutional and legal arrangements for water governance set out in Chapter 2 by examining the discourses of 'formalization' in operation regionally and locally, which in turn sets the scene for understanding the consequences in Huashao (Chapter 8). I then investigate new commercial livelihoods in Huashao by focusing Chapter 7 on flower production and the outcomes that this had for water use and management (research sub-question 2). In Chapter 8, I explore diverse perspectives, discourses and beliefs about water to show how people were making meaning of the effects of infrastructural and institutional change, and, if they were responding, how so. The latter provides insights into the socio-political consequences of new governance arrangements (research sub-question 3). Chapter 9 applies my place-based approach to the findings of the thesis in order to discuss the coincidences and apparent contradictions of water discourses and understandings in Huashao that emerge from across the thesis. This chapter elucidates the decisions and actions of different groups of people in response to, sometimes in defiance of, institutional changes under the 2009 Water Resources Law and, in turn, the social and political

complexity of water control and governance. The thesis ends with the concluding meta themes that emerged from taking a place-based approach, which include my considerations of how new livelihood interactions may contribute to institutional change in local water governance and wider social change, the challenges presented to water user rights 'formalization' by different groups' interactions with water management institutions and the spread of state control.

Chapter 2 : Water governance in Peru and interactions with water use and management practices in the Andes

2.1. Introduction

The passing of the 2009 Water Resources Law (no. 29338), and other political and environmental developments in Peru, have led to increased scrutiny of local water governance by authors in recent years (e.g. Oré & Rap 2009; Boelens 2013b; Boelens & Vos 2012; Lynch 2012; French 2016). Bury et al. (2013) draw attention to "an increasingly unclear" context of "overlapping institutional and legal arrangements for water governance" (p. 372). French (2016) and Oré & Rap (2009) argue that the current arrangement has its roots in the state's enduring engineer-led technocratic approach to water management established in the early 20th century and an assimilation and adaptation of aspects of the IWRM paradigm as strategic alternatives to the privatization of water.

This chapter joins this critical body of work that scrutinizes local governance by analysing the nature of Peru's water governance and drawing out the legal and institutional complexities and contradictions that the 2009 Water Resources Law, associated regulations and concepts raise for water users in rural places. To this end, firstly, I analyze the historical national and regional water governance context to elucidate recent developments in the control and management of water in Peru. Secondly, I explore the global influences on current arrangements in order to contextualize the conceptual origins and practical complexities of national and regional policy that have direct influence on water use and management practices and structures locally, therefore setting the stage for a discussion of implications in Huashao. In the final section of the chapter, I give some brief background into understanding local highland contexts, the diversity of water management in the Andes, historical marginalization of *comunidades campesinas* and some of the key arguments from recent studies that have investigated the implications in local communities. I consider these contexts because they appreciate institutionalized social inequalities in state water management interventions that are important to consider at

local level. For the latter, I focus on authors whose scholarship on the consequences of new governance arrangements locally relate to issues that emerged as insightful in Huashao.

2.2. Towards the transformation of Peruvian water management

The focus of this section is to understand the historical processes, and their nature, that preceded the transformation of the state's approach to water management under the 2009 Water Resources Law, to investigate the institutional changes being implemented by water authorities and the implications for water users. I start by defining governance and institutions and the most important aspects of these concepts in my study. There follows a historical account of the state's early attempts to limit the power of large landowners, to more recent efforts to centralize state power in the Peruvian adaptation of IWRM. It investigates the nature of the history of state withdrawal and intervention in the control and management of water in Peru and state attempts to transfer control to water user organizations. In doing so, it elucidates the kinds of changes embedded and envisaged in the 2009 Water Resources Law. The final section examines the current approach to water management, and highlights some critical research on the Peruvian approach.

2.1.1. Governance and institutions: the role of water user organizations and the spread of state control

The increased circulation of the concept of governance in political ecology follows the move from government to governance in public policy and regulation of the environment (Bridge and Perreault, 2009; Budds and Hinojosa, 2012). It observes changing state power in economic, political and social life, in a move from centralized authority to multiple occurrences of regulations and/or a contracted role of the state in certain aspects of public policy, as well as an increase of non-state actors in political arenas. Specifically, it is defined as "the organizational structures, institutional arrangements and decision-making processes and practices through which environments and resources are accessed, used,

managed and regulated, which involves multiple formal and informal actors at different scales" (Budds and Hinojosa 2012, p. 121). Its use is apparent in the study of transforming relations between the people, the state and the environment currently happening in the Andes (Lynch, 2012; Pærregaard, 2013; Rasmussen, 2015).

In the water sector, the emergence of governance has been associated with structural shifts, such as the preference for local water management in the turn towards the watershed as the most appropriate unit of water management (Budds and Hinojosa, 2012). These kinds of structural changes have drawn attention to "new configurations of principles, structures and discourses and to the participation of non-state actors with different scalar dimensions" (ibid., p. 122) . Due to a repositioning of state power in processes of water governance, there is increased interest in the (potential) role played by non-state actors in using, managing and supervising water and in the need to include a wide range of actors in water management and decision-making.

As I will discuss further below, there is a discursive trend in global and national water policies that more responsibility should be passed to water user organizations locally under IWRM. To understand how water governance is forming in Huashao, it is important to appreciate the role of water user organizations as a non-state actor, as well as that of state authorities. Water user organizations play a key role in governing water locally, regulating how water is used and managed, based on socio-economic priorities and complex and diverse culturally and historically-embedded practices, understandings and knowledges that contribute to decision-making institutions. The role of these actors needs to be understood in the context of the implementation of the 2009 Water Resources Law as water users negotiate new legal frameworks influencing pre-existing institutional arrangements. As French (2016) notes, how these negotiations transpire and new configurations of principles, structures and discourses form, will also depend on the history of relations with the state, the involvement of non-government organizations (NGOs) and the ways in which civil servants internalize and develop public policy objectives.

An understanding of institutions is also required to explore the ways these negotiations take shape between water users and the state authorities. Institutions are sets of rules, rights, practices and values embedded in social and cultural structures that organise human activity by enabling cooperation in everyday interactions but also setting structural

constraints in society (Giddens, 1984; Turner, 1998). Institutions can take the form of intangible institutional structures, such as unwritten rules that emerge from daily practices underscored by relationships of trust between households. They can also constitute bureaucratic arrangements, such as 'formalized' arrangements based on explicit and tangible organizational structures, contracts and legal rights, often introduced by government and development agencies (Cleaver, 2003). Both tangible and less tangible institutional forms reproduce themselves through the intentions and actions of individuals in large part because they identify with the institutional ends and social norms that are definitive of those institutions, and therefore make relatively long-term commitments to institutions and induct others into those institutions, making them increasingly ingrained over time. It is useful to make the distinction between tangible and less tangible institutional forms in the context of the 2009 Water Resources Law to explore the effects of new legal frameworks on everyday practices and the ways that people interact with these in the context of their pre-existing water use and management institutions. In my conceptual framework (Chapter 3), I provide a more thorough explanation of institutions, their interactions and the important role of people in understanding these interactions.

Conceptually, the use of governance has transformed ways of understanding power. This relates to Foucault's (1980) development of a new and wider understanding of power, one defined not only in terms of hierarchical, top-down power of the state but also in terms of the constitutive power of social control apparent in knowledge forms. Foucault (1980) stresses the political-strategic nature of the production of knowledge that organizes and pursues control, via "effective instruments for the formation and accumulation of knowledge" or "apparatuses of control" (Foucault, 1980, p. 102). The concepts of power and knowledge, according to Foucault (1980), are mutually dependent on one another. The exercise of power constantly produces/renders knowledge and in turn, knowledge produces and reinforces the effects of power, thus "power cannot be exercised without knowledge, and knowledge necessarily engenders power" (Boelens and Vos, 2012). This understanding gains traction where power is decentralized and where members of societies play an active role in their own self-government, as is characteristic of neoliberal societies, where market mechanisms predominate and state action is restricted. Understanding power as dispersed in knowledge forms therefore sheds light on the ways

the state can spread control in the rescaling of water governance and in the promotion of decentralization of decision-making responsibilities in Peru.

2.1.2. A complex water bureaucracy with technocratic origins

In the early 20th century, the Peruvian government was attempting to limit the power of *hacendados* (large landowners) based on a technocratic model of water management (Trawick, 2003; French, 2016). At the time, water management was organized by the relationship between *hacendados* and communities, with the former exercising the control and management of water, while the latter carried out maintenance works. Under the government of president López de Romaña, the first engineer who served as president in Peru, the Mining and Water Engineering Group (*Cuerpo de Ingenieros de Minas y Aguas*) was formed, led by American engineer Charles Sutton. Sutton carried out a series of hydrological studies of the coastal valleys of Peru that were the first attempts to quantify and rationalize water use in the Pacific slope and led the development of a number of large irrigation projects on the coast, under the government of Leguía (1919-1930). Both Sutton and Leguía were driven by a belief in the use of state power, together with agricultural expansion and the reorientation of production inwards, to further state control and limit the power of the *hacendados*. However, this clashed with the policies of the 1902 Water Code that granted water use rights based on land ownership. Efforts to change the system involved the development of new volumetric schemes and the appointment of state engineers in charge of Technical Commissions in important coastal valleys to replace the *hacendados* that led the irrigation unions. However, the technocratic proposals created conflict with landowners who were reluctant to give up their prioritized access to both water, under the 1902 legal framework, and cheap labour. The reforms were thus discontinued. However, the influence of engineering in water policies and the state orientation towards the development of large infrastructural projects to expand the agricultural frontier on the coast remained an important legacy of the ambitions of Sutton and Leguía.

The 1969 General Water Law, enacted one month after the passing of the Law of Agrarian Reform under General Velasco Alvarado, transformed the landscape of water governance created by the 1902 Water Code that had generally prevailed before then. The new law

declared water property of the state, separating it from land ownership and bringing it under government control. The prioritization given to agricultural water use aligned with the goals of agrarian reform. As well as abolishing private ownership of water, the law brought about other important changes to the water sector, including the creation of organizations of water users by irrigation districts and initial procedures for allocating 'formal' water user rights to these groups. These state-defined groups water user organizations were called user boards (*juntas de usuarios*) and operated alongside *comunidades campesinas* water governance systems, run by irrigation committees (*comités de regantes*) (see Section 2.4.1.) (Budds and Hinojosa, 2012). These changes indicated the beginnings of a bureaucracy in the governance of water, as the Peruvian government attempted to centralize its control of water (Oré and Rap, 2009; French, 2016). However, the 1969 General Water Law did not include any formal role for the participation of these local water user organizations in water allocation, management or regulation (ibid.).

The Ministry for Agriculture (MINAGRI) also assumed new functions with regard to the management and control of water, in conjunction with those implemented under the Agrarian Reform. The General Water Management was created within the MINAGRI, together with a new regulatory authority. This was called the Technical Administrator for Irrigation Districts (*Administrador Técnico del Distrito de Riego - ATDR*), that was responsible for allocating and administering water in the new districts and concentrated on procedures for allocating rights based on scientific distribution methods and coastal irrigation needs (Lynch, 2012; Vera Delgado and Vincent, 2013). The system of water distribution promulgated by the General Water Law, and in the interventions of the ATDR, was based on a technocratic model imported from the agricultural universities of the United States and functioned by allocating water, determined volumetrically, according to the needs of specific crops (Trawick, 2003; French, 2016). In theory, these crops would be identified annually in a Crop and Irrigation Plan developed by the ATDR, based on information provided by users. While the system failed to function as planned due to the limited reach of the ATDR and a lack of measurement infrastructure (Trawick, 2003), the creation of these agents within the MINAGRI and the interventions of the ATDR in local water management contributed to the growth of the state´s water bureaucracy and the promotion of a national water policy at different levels.

The government of president Fujimori made extensive efforts to privatize water through neoliberal reforms during the 1990s. However, despite repeated attempts to promote a market model, including with the support of the World Bank and Inter-American Development Bank (BID), Fujimori's attempts to weaken the state control of water management and to dissolve the 1969 General Water Law failed. This was due to strong opposition from water users and agrarian organizations, particularly irrigators organized in the National Irrigation User Board of Peru (*Junta Nacional de los Distritos de Riego de Perú* – JNURDP) (Trawick, 2003). As such, the control of water remained under central government.

Yet, while direct privatization did not happen, numerous, less extreme changes were introduced and gradually accumulated, modifying the water policies established by the General Water Law, dispersing the state´s power over water and leading to a generally complex legal landscape and overlapping responsibilities across institutions (French, 2016). These changes seemed to relate to the decentralization of management responsibilities from higher to lower levels of government, on the one hand, and the transfer of responsibilities for the administration of irrigation infrastructure to civil society organizations, on the other. Efforts to decentralize management included the establishment of Autonomous Authorities of Hydrographic Watersheds (*Autoridades Autónomas de las Cuencas Hidrgraficas – AACH*) under legislative decree 653. However, despite its title, state representatives largely managed the AACH, under the watchful eye of the ATDR. The Regulation for the Organization of Water Users (*Reglamento de Organización de los Usuarios del Agua)* was enacted by Supreme Decree 037-89-AG in 1989 and created the Irrigation District User Organizations of Peru (*Organizaciones de Usuarios de los Distritos de Riego del Peru*), represented in commissions (*Comisiones*) and user boards (*Juntas de Usuarios*) in each valley and at national level. These were dependent on the *Dirección Nacional de Aguas* (National Water Management) of the Ministry of Agriculture. The regulation stipulated that the state functions of operating, maintaining and administering irrigation infrastructure were to be transferred to the regional User Boards, assuming a role that the ATDR had previously held. Despite being "the first rupture with the state interventionist model" (Oré and Rap, 2009, p. 45) of the government at the time, the potential for self-administration of the user boards foreseen in the legislation was prevented, because, among other reasons, the ATDR, responsible for supervising them, did

not allow control to be passed to the irrigation districts, according to Oré and Rap (2009). There was no preparation, planning or progressive process in place to delegate authority to the users; no consultation had happened with users, meaning that it was unclear what the impact was for them, and there was a sense that the state wanted to free itself of the responsibility of carrying out these functions (ibid.).

The creation of water user organizations locally and regionally theoretically transferred some authority for maintaining infrastructure from central government, including charging a tariff for maintenance and improving irrigation systems with the aim of achieving financial autonomy from the state. However, this was a complicated task as local and regional authorities had not been consulted on how to do this, and it had been introduced "overnight" (Oré & Rap, 2009 p. 47). Further, the potential for self-administration of the user boards foreseen in the legislation was prevented because, among other reasons, the ATDR, responsible for supervising them, did not allow control to be passed to the irrigation districts. Together with the processes of decentralization initiated in 2002 (French, 2016), numerous normative changes like those mentioned changed the role of the state, fragmenting and dispersing its authority, producing a complex legal landscape and institutions with confused and overlapping responsibilities. This situation paved the way for a major transformation in national water politics (ibid.).

In 2009, the Water Resources Law was passed on the foundations of IWRM. A new framework was necessary due to processes of decentralization that had commenced in the late 1980s and to changes in the nature and scale of water use that were not well accounted for in the existing framework (Del Castillo, 2011; Budds and Hinojosa, 2012). The latter included increases in demand for water, the exploitation of new sources and the development of new infrastructure brought about by growth in water-related industries, including export-oriented agriculture, extractive industries and hydroelectric power production, promoted by a liberalized economic framework and governance structure.

Alongside the new law, a state water institution, the National Water Authority (ANA) was created in 2008, which was supposed to be cross-sectoral, autonomous and decentralized. Regionally, ANA is present through an Administrative Water Authority (*Autoridad Administrativa del Agua - AAA*) in 14 regions and a Local Water Administration (*Administración Local del Agua - ALA*) in each major river basin. In this way, the new

framework replaced the ATDRs with the ALAs (for other aspects, see Del Castillo, 2011; Budds and Hinojosa, 2012). In the shift from a centralized approach to an integrated framework based on the watershed unit, the new law decreed the establishment of river basin councils (*consejos de cuenca*), intended to incorporate all water user organizations with substantial decision-making powers.

This section thus gives an insight into the complex legal and institutional landscape produced by state withdrawal from, and intervention in the control and management of water in Peru from the early 20th century to the early 2000s. Early attempts were characterized by state efforts to extend water control and to limit the power of the *hacendados*, whereas later attempts have been (and continue to be, albeit indirectly) marked by efforts to implement a market model. This section also shows the technocratic and bureaucratic origins of the Peruvian approach that persist over time. The technocratic roots of earlier attempts to extract power from *hacendados* re-emerged in the 1969 General Water Law, with the creation of a water rights system based on scientific distribution methods. Furthermore, despite its limitations in practice, the creation of authorities such as the ATDR, assigned to implement the measurement system, was only the beginning of a series of bureaucratic creations that would disperse and fragment state water control. While efforts to transfer responsibilities to non-state entities had some effect at national level, the ATDR largely prevented the transfer of control to the districts, hampering efforts to self-administer. Since the passing of the 2009 Water Resources Law, however, the institutional architecture has changed under an IWRM model, raising questions about whether issues with the transfer of control, historically between ATDR and water user organizations, would continue or change under the new supervision of ALA.

2.1.3. IWRM – global influences and critique of the Peruvian approach

> Much of the impetus for reforming Peru's water regime has come from international institutions, bilateral assistance providers, the World Water Council and the private sector, which have sought to influence Peruvian water policy by offering grants and loans, providing consultants, generating and legitimating environmental knowledge, and lobbying (Lynch, 2012, p. 369).

In the early 2000s, in the wake of failed attempts at privatization, the state water bureaucracy was exploring concrete strategies, with the technical and financial support of multilateral organizations. The Food and Agricultural Organization (FAO), the World Bank and the BID, helped promote an agenda of 'modernization' of the water sector through a new political framework based on an IWRM policy approach to water management. Since the 1990s, the international community has focused increasingly on water in recognition of, for instance, past failings of infrastructural developments in societal and environmental terms, a decrease in availability for exclusive sectoral use and the competing needs and demands for a limited resource (Savenije and Van der Zaag, 2008), due to the predicted impacts of climate change (Lynch, 2012), among other influences. The Peruvian Ministry of the Environment (MINAM) has been part of the global climate change discussions since the 1990s and research findings from these discussions have legitimized the current focus on IWRM in the Andes by defining it as an adaptation measure to climate change.

IWRM was developed to promote a balance between the diverse social, environmental and economic values and uses of water through multisector coordination and participative management organized at the level of the watershed. In its theoretical definition, IWRM is "a process which promotes the coordinated development and management of water, land and related resources in order to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems and the environment" (Global Water Partnership, 2011). The paradigm is deeply rooted in the Dublin Principles agreed at the International Conference on Water and the Environment in 1992; in 2002, the World Summit on Sustainable Development in Johannesburg called for all countries to establish national IWRM and efficiency plans. The Global Water Partnership (GWP) was charged with implementing the paradigm globally and continues to be the most active

global network with responsibility for implementing the paradigm with more than 3,000 organizations in 182 countries, including Peru.

The Dublin Principles constitute the guiding principles for the management of fresh water globally (Lynch, 2012). The first principle defines water as a finite and vulnerable resource, demanding holistic management and protection of natural ecosystems, and as essential to sustain life, development and the environment. The second principle calls for participation, including users, planners and policy-makers at all levels, specifically the devolution of decision-making to "the lowest appropriate level, with full public consultation and involvement of users in the planning and implementation of water projects" (ibid., p. 370). The third principle recognizes the central role played by women in the provision, management and safeguarding of water, but does not recognize the needs of other social groups, like ´indigenous´ groups. The fourth principle defines water as an economic good in a move away from an earlier understanding of water as a fundamental, if implicit human right (Conca, 2006). Having access to clean water at an "affordable price" is considered a basic right of all human beings under the fourth principle, thus managing water as an economic good is necessary to ensure its "efficient and equitable use" to prevent wasteful and damaging uses, and encourage conservation and protection.

Lynch (2012) argues that the international water governance principles promoted by the World Bank and the BID are particularly evident in the Peruvian approach. In a review of World Bank programs and policies involving the Peruvian water sector[2], she found a strong economistic bias (principle four) and a focus on devolution in the decentralization of institutions (principle two). For example, the 2006 World Bank Country Environmental Analysis for Peru advocates water pricing. Regarding decentralization, international policy recommendations are ambiguous, as are World Bank documents, as Lynch (2012) claims; there is little indication of how user involvement would happen, nor is it clear which powers would be devolved, or to what levels.

Article 3 of the Preliminary Title of Water Resources Law refers to the "the principle of decentralization of public management and of the unique devolved authority", which

[2] These included the World Bank Country Environmental Analysis (2006), De la Torre et al.'s (2009) Latin American Responses to Climate Change, the World Bank Water Resources Management Modernization Project (2009), the World Development Report on Climate Change (2010).

brings to light an immediate contradiction and one of the central paradoxes of the new bureaucracy (Del Castillo, 2011; Lynch, 2012; French, 2016). New institutional arrangements are driven, on the one hand, by the decentralization of public management to new authorities; on the other, the national government was given a central role, with the creation of ANA (Del Castillo, 2011). As French (2016) shows, the new institutions of AAA and ALA are devolved authorities, meaning that they are answerable to a higher level of administration. In this case, the devolved entities are ultimately dependent upon and responsible to ANA as the final decision-making authority in the institutional landscape. This contrasts significantly with the idea behind decentralization that promotes the establishment of democratically-elected entities, responsible to their electorate. Therefore, despite the appearance of IWRM in the creation of new water authorities, ultimate responsibility for decisions and actions remains with ANA, consolidating the power of water in the hands of the state and its centralized bureaucracy (Lynch, 2012; French, 2016).

IWRM has become "the discursive framework for international water policy" (Conca, 2006, p. 126) and has been heavily criticized for its appeal to technical authority, among other aspects. In Peru, Oré and Rap (2009) have written extensively about the role played by engineers and civil servants in normative, political and institutional moments of change. They argue that this group has historically played an influential role in interactions with water users and the direction of neoliberal regulations, institutions and politics of water in Peru due to their technical, legal and institutional knowledge in water management and intermediate position between international demands of multilateral organizations and domestic interests. This role of civil servants working in ALA is important to consider locally in the context of decentralized water management, where pre-existing practices come into contact with civil servants charged with disseminating new legal and technical norms.

To exemplify if/how decentralization was occurring in practice, Lynch (2012) analyzed ANA's supervision of the formation of new river basin councils as part of an BID and World Bank-funded project, in which decentralization of responsibility to the regional level was encouraged. She found little evidence to suggest that ANA were interested in working with existing community water management institutions, despite encouraged decentralization, and she traced this lack of interest to a delegitimization of knowledge in *comunidades*

campesinas apparent in the 2010 World Development Report. The 2010 World Development Report argues that the impacts of climate change:

> …may be so rapid and unpredictable that traditional agricultural and water management practices may no longer be useful. This is already the case for the indigenous communities in the Cordillera Blanca in Peru, where farmers are facing such rapid changes that their traditional practices are failing (World Bank, 2010, p. 137).

Lynch (2012) argues that the threat of climate change is framed in a way that delegitimates the knowledge and management of water by *comunidades campesinas*, which suggests that they lack the capacity to respond themselves without relinquishing management to a central authority. This assumes that shifting the power to a central agency to manage water would be more 'useful' and underplays the subtle ways that people take action in their everyday lives to respond to changing conditions, climatic or otherwise.

If decentralization is meant in its IWRM sense of both devolution of responsibility to lower levels of government and wider civil society participation, then the argument that sub-national levels are, in fact, consolidating centralized power, raises the question about how existing water management practices were accounted for in Huashao, alongside the normative weight of ALA and ANA. To understand the contradictory ways that a rhetoric of decentralization under IWRM and a centralization of power in ANA were playing out, as in Lynch (2012), in the thesis I try to understand the interest of ANA and ALA in working with existing institutions and the nature of such interest.

To kickstart the process of 'modernizing' the water sector through the implementation of a new political framework based on IWRM, the ambition of a "new water culture" in Peruvian water management was raised in the 2004 National Water Resources Management Strategy (NWRMS) (French, 2016, p. 73) and, subsequently in the World Bank's 2009 Water Resources Management Modernization Project. According to the NWRMS, the country was facing a general "limited water culture and scant capacity for its management" (French, 2016, p. 6) which could be tackled by making various institutional changes. As French (2016) notes, the understanding that the country has a "limited water culture and scant management capacity" (p. 71) is a partial one in light of Peru's long history of diverse cultural and social practices in the management of water. This approach,

French (2016) argues, reflects the influence of a technocratic approach to management that values results of efficiency and productivity over and above social and cultural aspects. Furthermore, the predominance of "a" water culture shows an inclination towards cultural homogenization in state policies, which appears contradictory to IWRM principles of integration, participation and inclusive management. Together with the points raised by Lynch (2012) above, the idea of a 'new water culture' raises concerns about how local ways of thinking and acting would or could be recognized in such a homogenizing climate and seems to contradict any discursive recognition of water management practices in *comunidades campesinas*.

The institutional changes set out to achieve the 'new water culture' in the NWRMS were promoted with the financial support of multilateral banks and carried out on the premise of earlier technocratic processes introduced by the state bureaucracy in the 1969 General Water Law (Lynch, 2012). One of the key strategies to promote the planned changes was the expansion of the 'formalization' of water user rights, a process that had already been established under the General Water Law. The latter was based on the technocratic approach to management introduced during the Agrarian Reform as described earlier, but with limited impact on registration numbers by the beginning of this century. The Extraordinary Programme of Water User Rights Formalization with Agrarian Aims (*Programa Extraordinario de Formalización de Derechos de Uso de Agua - PROFODUA*) was set up in 2004 to urge a more extensive granting of licenses, financed by the Public Treasury. The World Bank financed an extension of the Programme, which also became a component of the World Bank's Water Resources Management Modernization Project. A further series of loans[3] were obtained from the BID and the World Bank to finance the reforms of the NWRMS. With a shared 'modernizing' agenda, these organizations became instrumental in the planning of results such as the passing of a new Water Law, the implementation of an economic payment that reflected the economic value of water and

[3] The Programme of Water Resources Politics (*Programa de Políticas de Recursos Hídricos PE-L 1024)* was financed by a IDB loan of USD 200 million in 2007 and aimed to improve the efficiency, equity and sustainability of water use through changes in the institutional and normative changes (with aforementioned planned results). The goals of the Programme were continued in the agenda of the World Bank's (2009) Water Resources Management Modernization Project, that received a further USD 20 million from the (PE-L1070) and the World Bank (P107666) to support the development of multi-level water bureaucracy and promote the new water culture (Autoridad Nacional del Agua, 2008).

the installation of a new Water Authority at central level, with watershed authorities (Lynch, 2012; French, 2016). The reforms (that were promoted with minimal agreement with civil society) significantly consolidated the central state's power over water and pre-empted the passing of the 2009 Water Resources Law.

It is clear from this section that multilateral banks were behind IWRM policy in Peru as a way of 'modernizing' the water sector. The form that this has taken in Peru has focused on decentralization and on water as an economic good, however how decentralization is supposed to happen is unclear and its promotion is at odds with the recommendation of the need for a central coordinating agency. Recent research on decentralization in the country (Lynch, 2012; French, 2016) has shown that efforts have merely consolidated power in the creation of a centralized authority, with little evidence of devolved authorities working with existing water management practices and institutions, compounded by a delegitimization of existing water knowledge and practices in the Andes coming from influential global development policy. This delegitimization of knowledge is furthered by the goal of instigating a so-called 'new water culture' at national level, again as an effort to 'modernize', which denies the country's long history of diverse water use and management practices and institutions. Promoted by multilateral banks, the ´formalization´ of water user rights is one of the key institutional changes recommended to achieve the so-called 'new water culture' in rural places that are interacting with new water authorities in the introduction of institutional change.

2.3. Dominant constructions of water in policy – origins and critique

This section examines the origins of the concepts of a 'new water culture' and the ´formalization´ of water user rights in national and regional policy in Peru. Understanding global influences enables a discussion of how universalized and globalized constructions of water travel, sometimes uneasily, across the water governance scale, and require constant re-interpretation as they are applied to different spatial contexts (Hulme, 2008; Jennings, 2011) with local consequences. Drawing on literature that is critical of the consequences of

universalized and globalized constructions of water and climate across scale and the meanings and assumptions of ´formalization´ of water user rights, this section prepares the study for an analysis of how regional and local levels of water governance have adopted and adapted global language. This also sets the scene for understanding the potential consequences of new governance frameworks for communities, for example, the power that the latter exerts over local ways of understanding water and responding to changes in water availability.

2.3.1. Water security and the 'formalization' of water user rights

The 'formalization' of water user rights can be traced to global policy debates related to how to deal with the distribution of water in contexts of unequal power. With increasing acceptance that water scarcity and water insecurity are less to do with the absolute availability of water, and more to do with the ways in which it is distributed so that the less well-off can gain access, the recognition of water rights has become a core theme in water security debates (along with issues of distribution) (Boelens and Seemann, 2014). The form that this recognition of water rights has taken has often favoured modernistic, technical-economic water laws, following dominant trends in law and policy schools and intervention programs as opposed to empirical work on how these rights take shape in real life. As a result, knowledge about water has concentrated on how to align local systems with policy-driven ideas about water governance. In recent years, this recognition has shifted to trends to 'formally' recognize 'customary' rights to enhance water security. This has meant the incorporation of local ideas of rights into legal frameworks, often backed by international financing institutions, as shown above to be the case in the World Bank's support of the ongoing expansion of the 'formalization' of water user rights happening in Peru.

The concept of water security is often the goal in national water policy. Since first emerging in the 1990s, the concept has become increasingly common with its promotion by different international organizations, particularly the Global Water Partnership and the World Economic Forum and UNESCO's Institute for Water Education (for an evolution of definitions, see Cook and Bakker, 2013). Conca (2006) and others have called for research into how the concept has come to be framed in policy and the reasons for its increased uptake to explore the agendas it might serve and linkages with reforms that centre on

processes of decentralization, devolution and greater participation of communities in water governance. I explore how water security is framed at national level in Peruvian water policy to examine the agendas and interests behind it and IWRM and what the norms prioritized mean for the recognition of pre-existing rights and practices in *comunidades campesinas*.

A review by Zeitoun et al. (2016) examined the social implications of different policy approaches to water security. On the one hand, they found that quantified risk analysis and simplified assumptions about national economy and society, tend to characterize a reduction of complexity in 'security through certainty' approaches. Rooted in economic and engineering schools of thought, these approaches offer specific and generalizable ways forward that have been most valued by policy-makers to date. However, the authors argue that, in practice, actions deriving from 'reductionist' policy recommendations may miss imaginative solutions, be ill-equipped to deal with environmental variability and be of little benefit to the most vulnerable communities. For example, the adoption of clear and simple policy recommendations can reinforce interests already invested in the water and development sector because of the very different influences that different groups have over the translation of science to policy (ibid.). This approach concentrates on increasing water supply and narrow conceptions of water use efficiency, which are behind recommended actions of investment in hydraulic infrastructure. The latter have been particularly favoured by financial institutions, according to Zeitoun (2016), ushering in a preference for dams, canals, storage schemes but avoiding pitfalls like the inability to adapt infrastructure to changing water and social conditions or a lack of fit with existing distribution infrastructure and hidden social and economic costs. This review also raises questions about how to deal with issues of overcapacity of infrastructure that has been designed for specific conditions.

The flexibility of such an approach is therefore inadequate and is further limited by virtue of its focus on water that is easily measured, like surface water. According to Zeitoun et al. (2016), this has the effect of leaving out groundwater, crucially important for agriculturalists relying on groundwater for irrigation, not to mention for the vast populations that rely on it for drinking water. It is not surprising then that the authors also charge 'reductionist' approaches with underplaying diversity and power relations; that they

fail to recognize that not everyone conceptualizes water and its issues in the same way, nor has the same influence in society.

'Security through pluralism' approaches, tend to be more attuned to particular challenges or communities, complex water-society processes, and to be more focused on social/distributional issues of justice (the 'who benefits?' question). Authors such as Joy et al. (2014) and Boelens (2012; 2014) feature in this body of work. They argue that a combination of positivist and neoliberal languages in the global definition of water is removing water problems from their specific socio-political context, making political choices behind questions of distribution come to appear neutral or technical.

Boelens (2015; 2012; 2013a; 2013b) work on the 'formalization' of water user rights, a key line of inquiry in the thesis, draws out the assumptions and argues for context-specific approaches to studies that focus on socio-cultural diversity and the political interests behind dominant groups' employment of 'formalization' as a policy strategy. He argues that the concept of water security in national laws, development strategies or policy documents, as with other water policy discourses, deeply depoliticizes solutions to water distribution problems and naturalizes global solutions as being *the* best option, objectifying solutions. This often disregards that water and its management is a realm of human interests, choices and power plays (Boelens and Vos, 2012; Boelens and Seemann, 2014). Their construction and objectification in policies, accepted scientific disciplines and expert-based water development transforms water use and allocation 'efficiencies', for example, into neutral facts that have sufficient power in society to conceal the fact that they were socially created "convincing not only the actors who have to apply these concepts but also the creators themselves" (Boelens and Vos, 2012, p. 18). The process of naturalizing such 'facts' keeps the social and power relations invisible. Specifically, the preferred technical and managerial solutions imply that all users are benefitted equally, whereas in fact they obscure the controlling market-based interests of the state. The role of water experts, who link local/national and international communities, must be considered in the promotion of these interests: despite claims to promote pluralism and multiculturalism, Boelens and Vos (2012) argue, they are often led by questions originating in official governance frameworks and goals of development, rather than concerns or experiences of water user organizations.

The consequent framing of water security problems and solutions in policy circles is likely to be fundamentally at odds with the perspectives, understandings and value systems in local user communities (Orlove and Caton, 2010; Boelens and Vos, 2012). Hence the need for studies that are historically specific and recognize the embeddedness of existing water values, norms, meanings and practices in particular cultural-ecological contexts and in the power relations that mediate and influence them. These challenge mainstream ideas that view "clear, uniform, and enforceable water rights as tools and conditions for the rational exercise of state water control and/or exchange of water and services through market forces" (Boelens and Vos, 2012, p. 242).

Therefore, understanding the ways that global policy is framed is important because it shows where choices and priorities lie at this level and reveals the powers at play related to how knowledge is characterized, elucidating why other, less dominant voices come to be silenced or marginalized in the implementation of policy. Given the currency of water user rights 'formalization' at national and regional policy levels as a strategy to achieve a new (technocratic) water culture, and the homogenizing effects on pre-existing water management practices, I too challenge the naturalization of global, modernistic, technical-economic knowledge forms as preferable solutions to water distribution problems in water user rights 'formalization'. As demonstrated above, the gaps and tensions between definitions of water problems and solutions in national and regional policy and discourses show the lack of appreciation for other ways of valuing and managing water and a disconnect with the legal state recognition of 'customary' rights in the 2009 Water Resources Law.

2.3.2. IWRM as 'adaptation to climate change'

Water and how it is used and managed is high on the agenda of the global climate change community due to research findings related to the effects of glacier retreat. This has drawn global attention to glacier meltwater-dependent areas such as Peru's Cordillera Blanca. Climate policy and its institutional architecture lies with the MINAM, however it is closely connected with the water sector because changes in water institutions under IWRM are regarded as part of the country's efforts to 'adapt' to climate change (Ministerio de

Ambiente, 2016). How IWRM takes shape in Peru, then, is also influenced by climate change priorities.

Peru is a member country of the two key institutions that have been central to global climate change discussions, the United Nations Framework Convention Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC). As part of its obligations as a member country of the UNFCCC, the Peruvian Ministry of the Environment must submit a National Communication to the UNFCCC which sets out actions to address climate change and to adapt to its impacts. How people respond to climate change and its effects, such as variability in water supply, is understood using the term adaptation by the climate change community and the IPCC recognizes IWRM as an adaptation measure. Adaptation constitutes one of the main pillars of climate change action (Orlove, 2009) and is defined as "the process of adjustment to actual or expected climate change and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects" (IPCC, 2014, p. 5). The growing recognition of the inevitability of climate change impacts has meant that adaptation has become viewed as a central task in IPCC reports, resulting in the diffusion of the word to many institutions and contexts (facilitated by mechanisms such as the preparation of National Communications). Adaptation is therefore closely associated with the language of development and resource-management, as well as the need to recognize and incorporate so-called ´traditional´/´indigenous knowledge´. For example, the most recent IPCC Report (2014) cites adaptation measures as income and livelihood diversification and 'improved' infrastructure ("livelihood security" approach), water regulations and IWRM ("institutional" approach) and technological options, such as ´indigenous´, ´traditional´ and ´local´ knowledge, technologies and methods; efficient irrigation; water-saving technologies ("structural/physical" approaches) (IPCC, 2014, p. 27). The IPCC singles out the importance of decentralization and social participation in South America to ensure "efficient" and "effective" water resources management and the need for "improvements" in institutions and governance for effective implementation, as part of new constitutional and legal policy reforms understood as important adaptation measures (ibid.).

Over the past decade, there has been substantial critique of the ways that climate change narratives remain strongly tied to the natural sciences and institutional processes of the IPCC, often dominating climate change discourses. Hulme (2008) is critical of the narratives around global warming that tend to be framed as problem-solution policies, which, similar to critical work on the taken-for-granted nature of water policy concepts, claim universal authority. With specific regard to adaptation, Orlove (2009) is sceptical about the construction of adaptation in its most common usage as a harm that can be addressed and as defined by the IPCC. Notwithstanding the very positive contributions made by development organizations under study, he cautions against the use of what he called "meliorist language" (ibid., p. 161) of adaptation that offers the promise that problems could be addressed and that impacts were manageable, which implied that people could prepare for the worst consequences. This follows the precedent set in the IPCC definition that the harms associated with climate change can be modified and beneficial opportunities exploited. He also argues that the roots of adaptation in hazards literature, associated with quantifiable effects, described in economic terms as costs and benefits or as harms and opportunities, focus attention on short-term problems of lesser importance than longer term chronic ones.

Jennings (2011) looked at how knowledge and meaning about climate change travels across scales as it is re-interpreted to look at how it might be changing societies in its application. She argues that the use of the term in globalised policy discourse serve established power relations in a neoliberal state, furthering the interests of private property owners, business and multinational corporations, and leading to limited investment by socially and politically marginalized groups in maintaining socio-ecological systems. Critical of the political economic implications of taking the concept of adaptation for granted in community-based adaptation projects, Jennings (2011) also questions trends to incorporate so-called ´indigenous knowledge´ in attempts to include local people in projects aimed at climate change adaptation (for example, Berkes, 1994). She argues that the integration of so-called ´indigenous knowledge´ into existing institutional structures is likely to "unintentionally resurrect stereotypes about the ecological wisdom and knowledge of indigenous people" (Jennings, 2011, p. 241) and that it merely serves to reproduce the views of government officials and extend the power of the state, further increasing the marginalization of communities. She thus calls for social scientists to

acknowledge the integration of adaptation as a discourse in neoliberal policies to highlight potential opportunities to involve people in more self-determined and just ways.

Such work illustrates the need to look more closely at how the concept of adaptation is employed and assimilated across levels from global through national to local. As the authors cited above argue, its employment reveals the political interests at different levels in the implementation of the 2009 Water Resources Law, as well as the effects that its particular framing, and linkages with other dominant discourses, imply for how people view and use their water supply in the context of glacier retreat. This raises questions about the ways water authorities and other relevant agencies, such as NGOs, put to use externally defined ´local knowledge´ in the institutional changes introduced under the new IWRM approach in *comunidades campesinas* and the effects on understandings of pre-existing water use practices in new governance arrangements.

This section on global policy has outlined some of the global conceptual and governance influences that have shaped the Peruvian water policy agenda at national, regional and local levels. It has shown how multilateral financial institutions have been instrumental in the turn towards IWRM in Peru as part of a wider agenda to 'modernize' the water sector, characterized by international principles that promote the economic nature of water and the need to decentralize institutions. The Peruvian approach to water management contradicts claims to decentralize under IWRM due to the extent of normative power designated to ANA, which seems further compounded by recent findings about the limited/ambiguous devolution of responsibilities and decision-making power to regional authorities. The discursive and practical consequences of the current drive to 'formalize' 'customary' water user rights as a basis for enhancing water security raises questions about how communities and their water use practices are exposed to unfolding processes of IWRM, efforts to inculcate a 'new water culture' and pressures to 'adapt' to glacier retreat.

2.4. Local contexts – water management in the Andes

The previous section raises questions about the effects of the 2009 Water Resources Law on the spread of a state-defined techno-economic control over water user organizations in claims to decentralize. On the one hand, communities are expected to comply with the national legal framework, for instance by 'formalizing' unregistered water rights and incorporating village irrigation committees into water user associations. However, on the other hand, the 2009 Water Resources Law for the first time contains provisions that, in theory, guarantee the 'customary´ practices or *usos y costumbres* of ´indigenous´ and *comunidades campesinas* to manage water as a member of a wider water user organization. This would seem to be part of the national drive to 'formalize' unregistered water rights, meaning the institutionalization of so-called 'customary´ practices, as seen in the previous section. But, where exactly is the state coming from in its use of 'customary´ practices or *usos y costumbres* and what does the language of 'formalization' imply about the state's historical treatment of and regard for *comunidades campesinas* and ways of life? What exactly ´formalization´ of water user rights and adaptation means to the water authorities in specific contexts is important to expose the interests behind their use and their cross-linkages, as well as what their combined use means for the definition of existing ways of thinking and acting. These definitions may have implications for how people discuss and respond to water problems, as they see them.

These questions present renewed challenges for water management in the highlands because the institutions governing water use and management in *comunidades campesinas* can differ substantially from those defined by the 'formal' framework, often a local diverse adaptation of overlapping state-derived and locally-defined management practices. With an understanding of how the state's approach to water management has changed in recent years, this section moves on to elucidating some of this diversity in relation to highland communities, the discursive and practical implications of the new approach to water management for changing practices and the nature of these implications.

2.4.1. Understanding water management in the Andes

There is a growing body of literature in anthropology and environmental studies concerned with the everyday, routine interactions with water and the local politics emerging in interactions between people, place and politics. Rasmussen's 2016 monograph provides a sustained attention to water, building on earlier Andean works by Gelles (2000), Trawick (2003) and Oré (2005) that explored questions of power and the historical conditions that shape local-level water politics. This literature is helpful to understand the nature of transforming relations between the people, the state and the environment currently happening in the Andes.

Insightful work has also been carried out on the implications of changing water laws, water development projects and increased interaction with the state to transform community and water governance, for local irrigation management practices. The Colca Valley in Southern Peru has been an exemplary case for irrigation researchers studying its terraced slopes and unique allocation and distribution practices (Guillet et al., 1987; Mitchell and Guillet, 1994), producing many well-cited works on the transformation of irrigation management following increased interaction with the state to transform community and water governance (Guillet, 1981; Bolin, 1990; Pærregaard, 1994; Gelles, 2000). In the Central Andes, there seems to be much less work[4] that looks specifically at the social and political effects of increased interactions with the state on water management practices at community level (with the exception of Rasmussen's recent monograph).

Historical water management institutions in communities differ substantially from those defined by the state legal frameworks, primarily because of the importance of community in the Andes. While it is important not to generalize, it is also important to recognize an institutional factor that many have in common. Understanding irrigation in the Andes would not be possible without understanding community as an institution (Gelles and Boelens, 2003; Trawick, 2003). Communities are important sites of social and cultural production in the Andes and as such are an important institution in the management of

[4] This can perhaps be explained by the perception that communities in the north of Peru have not managed to retain their historical water management practices or technologies to the same extent as their southern counterparts or the existence of combined legal and technological water management frameworks. (In fact the Cordillera Blanca is seen as having important potential for the recovery of indigenous technologies see Herrera 2008, Lane 2014).

resources. Community structures create rules of land use that have historically transferred to the management of irrigation water. In-depth studies on water management practices (e.g. Trawick 2003) emphasize the importance of features of local water control, appropriated by Inka and Spanish regimes (e.g. Gelles & Boelens, 2003). A leading principle that continues to be in use in many communities is that water user rights are created or earned by the investment of families' and communities labour and resources in collective labour days known as *faena*, *mink'as*, or in *ayni*[5] exchanges to help construct, maintain and restore irrigation facilities (Mayer, 2002; Trawick, 2003). In addition, the *turno* is a sequencing rule that governs the distribution of water between community sectors, still in operation in many communities (Trawick, 2003). Commitment to these institutions, as well as mutual assistance arrangements through networks of reciprocity, are considered integral to Andean society (Mayer, 2002) and crucial for both the community and the individual household to ensure access to water rights, land or help with a harvest (Young and Lipton, 2006).

Not only do they differ significantly from state legal frameworks (what state authorities often refer to as 'formal'), but communal water governance rules vary hugely among themselves, diversely shaped by, for instance, the level of market integration, historical interactions and experiences with the state and the level of interaction with other sectors, such as with NGOs. Despite the institutions sometimes associated with Andean irrigation highlighted above, it is a mistake to assume their prevalence or acceptance in all communities. Early anthropological work of highland watering systems (Mitchell, 1973, 1976) around basic organisation, distribution and watering methods, cast doubt on the once widely-held notion that a distinctive technology, developed during Inca times, had spread and been maintained in many communities despite centuries of Spanish domination (Trawick, 2003). The basic organisation of irrigation in some communities was found to be highly centralised or unified, working in adherence to strict rules and procedures (Mayer and Fonseca Martel, 1979; Gelles, 1984; Blaser, 2009). Whereas others were found to be acephalous or operating without any effective central authority (Guillet et al., 1987), as would appear to have been the case in Huashao prior to 1999 (Chapter 5). Still others

[5] Trawick (2003) argued that these forms of group work were distorted by the *hacendados* during colonial times. He argued that when once they had been engaged in for mutual group benefit, they became forms of exploitation in their use by the *hacendados*.

seemed to alternate between these unified and acephalous approaches, depending on water supply (Mitchell, 1973, 1976). In terms of operation, the first type sometimes functioned relatively smoothly in line with rules and procedures, whereas the second tended to be characterised by competition and conflict over water rights (Pærregaard, 1994). The third type seemed to operate somewhere in between (Trawick, 2003). Distribution in some communities followed a fixed sequence, where sectors of land and individual fields were irrigated uniformly. In others irrigation happened in a less structured, more haphazard order, leading some people to get more than others. Based on these kinds of contrasting findings, it became clear for many anthropologists that a significant amount of regional and local variation in the way irrigation was organised and used must have existed in the distant past, just as in the present.

Water authorities often refer to water management practices historically associated with highland communities as *usos y costumbres.* This is used by water authorities to claim recognition, usually rhetorically, of historical practices and by water users to forward historical rights claims. It is a colonial term originating in Spanish colonial land and water law and continues to be used to refer to ´indigenous´ normative systems that are not normally recognized by law, giving them an inferior or secondary status (Fajardo, 2000; Seemann, 2016). The term emerged as a "discursive trope" (Perreault 2008, p. 839) in many Latin American countries in the early 2000s, connected to claims for rights associated with legal reforms to recognize ethnic and cultural plurality (hence the inclusion in the 2009 Water Resources Law of Convention 169 of the International Labour Organization).

As applied to irrigation, Perreault (2008) found *usos y costumbres* to be "the mutually agreed-on norms of water rights and management practices that govern communal irrigation systems" (p. 835). These hang together, he argues, by virtue of their habitual and repeated practice, comprehensive knowledge of the social and environmental context and mutual agreement in a social context, that cannot be imposed upon from outside. Given the diversity of changes that irrigation systems have sustained and recognizing their temporal and spatial variability, I stress instead that the importance of *usos y costumbres* is less to do with their authenticity in history, or a desire to define a specific set of practices, than with their symbolic role in discourse as "signifiers of indigenous or *campesino* cultural identity and political autonomy" (Perreault, 2008, p. 840). As such, its use in language

appeals to water rights claims and everyday livelihood practices employed by individuals, households and communities to secure the material basis of life. However, given its colonial roots, it is a problematic term and its political deployment should not be taken for granted; as Perreault notes, attention must be paid to how its use can be used to mask class differentiation or exclusionary practices.

This section shows the importance of considering context-specific practices and the historical relationships between communities and state authorities to understand the nature of state influence in context. Understanding *usos y costumbres* as both a problematic and powerful discourse, with its conflicted history but contemporary dynamism in cultural rights claims, is pertinent to reflect upon how regional authorities put this discourse to use in the implementation of the 2009 Water Resources Law and to explore the regard and interest shown by authorities to engage with local institutions.

2.4.2. *Comunidades campesinas* in the new governance arrangements - social construction, historical marginalization and experiences of engagement

As an identity category, I do not take the use of the term *comunidad campesina* for granted in the thesis; instead, I advocate for an appreciation of the historically constructed nature of the ´*comunidad campesina*´, associated ways of life and water use and management practices. The concept and category is deeply rooted in Peru´s colonial past and attempts by governments to deal with the socio-economic, cultural and political consequences of conquest and colonization in the highlands. Therefore, while it is important to recognize community as an institution that has influenced existing water management practices in the Andes, institutionalizing water use practices associated with community, such as *usos y costumbres*, in legal frameworks insulates them from wider societal change, as if they were fixed, unchanging objects (Seemann, 2016). In other words, it reifies ways of using and managing water without an appreciation for their historical construction or their dynamic nature.

As part of understanding the wider policy context and the reproduction of social inequalities, it is important to consider how the Peruvian state has historically constructed

comunidades campesinas and their practices because this raises questions about the embeddedness of social inequalities and power at local level, particularly those implied in 'formalization'. Such questions challenge the power contradictions that incorporate stereotyped 'customary' practices into positivist law.

Institutionalizing and codifying local rules and rights assumes that they can be conceived of as a separate collection of norms, when in most places they constitute local adaptations of official or colonial norms. Assuming their pre-existence to or autonomy from the state is denying that they are defined in contrast and in relation to it. Institutionalizing a collection of norms, by incorporating them into static legislative frameworks thus runs the risk of freezing local rules and practices and leaving them susceptible to expert-dominated redefinition and simplifying the array of institutional arrangements at work in communities. This could have the effect of "muzzling the complex variety of unruly rules" and further repressing "disobedient" rules (Boelens 2013b, p. 247).

The creation of the category of *campesino* or *comunidad campesina* reclassified people living in the highlands as ´peasants´ to apparently address class and ethnic inequality and promote economic integration in 1960s and 1970s Peru. However, the use of the terms can be ambiguous and problematic and is often used as an ethnic, racial, cultural, and linguistic label simultaneously (García, 2005). The historically-conflicted nature of the terms also depicts the diversity of common property regimes underpinning the contemporary control and management of irrigation water in the Andes. General Velasco's Revolutionary Government of the Armed Forces (1968-75) emerged in response to a rise in social unrest and guerrilla movements in the Peruvian highlands in the 1950s and 1960s (García, 2005). Class struggles were on the rise as ´peasants' sought land ownership and invaded *haciendas* (McClintock and Lowenthal, 1983). Velasco's government responded by launching a series of social and economic reforms - radical agrarian reform was introduced in 1969 initiating the massive and stringent handover of large estates by landowners to their former serfs and employees (ibid.). At the same time, Valesco prohibited the use of the term *indio*, replacing it with *campesino*. On 24 June 1969, the National Day of the Indian, he stated:

> The Agrarian Reform Law gives its support to the great multitude of peasants who today belong to indigenous communities and from this day forward – abandoning unacceptable racists habits and prejudices – will be called *comunidades campesinas*…To the men of the land, we can now say in the immortal and liberating voice of Tupac Amaru: Peasant: the Master will no longer feed off your poverty (Velasco Alvarado (1995, p. 265), in García, 2005, p. 74).

The language of *campesino* or *comunidad campesina* thus came to be used as part of a number of social and economic reforms introduced by the government aimed at tackling class and ethnic divisions and integrating highland populations into the Peruvian national economy (García, 2005). Prior to this (c. 1960), highland populations tended to be romanticized (albeit in a condescending and dismissive manner) as the persecuted descendants of the glorified Inca empire or disparaged as an irate population determined to obliterate the white imposter (ibid.). To this day, the distinctions created by Velasco´s military government persist - Peruvians refer to highland peoples mainly as *campesinos*, while the terms *indígenas* and *nativos* are often used to refer to lowland groups.

Given the highly racialized nature of the terms ´indigenous´ and ´peasant´ and in recognition of the historically political process involved in linking labels to specific groups of people, my use of these labels should not be considered static, but all at once open to change, situational and recognizant of diversity. Following Starn (1992, pp. 95–96) I see these labels as "partial markers" that are part of multiple layers of subjectivity. The idea behind "partial markers" is the recognition that people cannot be defined through a single set of essential attributes; that the application of an identity label as a *campesino*, for example, is only a partial reflection of identity, more or less prominent depending on the situation. Attention to this avoids an overeasy application of terms like *campesino* that can mask differing interests and values, along lines of gender, age, religions, income and ethnicity (ibid.).

The 1969 General Water Law enacted during the Agrarian Reform aimed to redistribute land and water, however it failed to change the conditions of water use on estate lands (Vera Delgado and Vincent, 2013). Practices carried out by *hacienda* owners such as converting land to cultivate alfalfa for animal fodder, often deprived communities of water and undermined 'customary' systems of distribution resulting in increased scarcity and

growing impoverishment and dependency (Trawick, 2003). Furthermore, the capacity of communities to manage their own affairs was weakened when the ATDR was established that concentrated on procedures for allocating rights (Lynch, 2012; Vera Delgado and Vincent, 2013). According to Delgado & Vincent (2013), the creation of this regulatory authority, together with the priority given to coastal irrigation, initiated ongoing struggles to maintain practices and entitlements in local Andean water management, and to maintain and increase access to irrigation in Andean communities where water was scarce.

The state's historical disregard of water management in *comunidades campesinas* in their dominant and exclusionary bureaucratic tradition (Lynch, 1988 cited in Trawick, 2003) is predicated on dominant ideas of what constitutes progress and development in national government. Indeed, *comunidades campesinas* are often considered a hindrance to Peru's economic progress, as depicted in Alan García´s (president of Peru 1985-1990; 2006-2011) derogatory message about smallholder agriculture:

> There are many unused resources that are not traded, that receive no investments and generate no employment. This is because of the taboo of long-obsolete ideologies, out of idleness, out of indolence and because of the syndrome of the dog in the manger saying: "If I cannot eat, nobody will." (. . .) we have fallen in the trap of giving small lots of land to poor families with no money to invest, thus they come to the State to ask for fertilizer, seed, irrigation and protected prices. This smallholder mode of production without technology is a vicious circle of miserable poverty. (Alan García, 2007, p. a4)[6].

This statement pushes forward neoliberal ideas that ´peasant´ and ´indigenous´ communities are inefficient and unproductive due to their lack of financial capital and technology to make their natural resources fully ´productive´, holding back Peru´s ´progress´ as a result (Boelens and Vos, 2012). Privatization policies of the natural resources in *comunidades campesinas* are promoted by the Peruvian government and many authors (see Lynch, 2012; Vera Delgado and Vincent, 2013) argue that the 2009 Water Resources Law is another example of this. The government attempts to foster efficiency and productivity in *comunidades campesinas*: the law, they argue, gives much importance to

[6] García published a number of statements with his views on natural resources in the national newspaper *El Comercio* in October and November 2007 and March 2008.

efficiency of large-scale agribusiness companies[7], commercial plantations and mining enterprises, while Andean communities and other economically less powerful groups have less access to 'modern' technology or work with their own irrigation systems. Poor farmers and *comunidades campesinas* are often deprived of their livelihoods as capital intensive projects are set up to make room for large-scale agribusiness. If, as Alan García sees it, communities would agree to sell their "idle" land and water, it could be sold to "modern" business and foreign investors whose knowledge and investment would make them more "productive". He argues the people of Peru must follow "the experience of successful peoples" which is "the only way we can progress" (García Pérez, 2007, p. a4).

Yet, despite being practically invisible to political elites (Urrutia, 2007), *comunidades campesinas* continue to be an important rural organization in Peru. Two out of every five hectares of land used for farming belongs to communities and two out of every five rural inhabitants are *campesinos*. Despite this, *comunidades campesinas* are rarely mentioned in pre-electoral campaigns as they are broadly seen as a hindrance to the development of the country. The priorities of the Special Programme for Allocating Land Titles (*Programa Especial de Titulación de Tierras*), the body responsible for formally recognizing the land held by communities, confirms this conviction as it seeks to institutionalize the individualization of communal property and further incorporate communities into the market (Urrutia, 2007; Osorio, 2009). A long history of abandonment in national policies, coupled with an ongoing romanticization of the ´community´ as an idyllic entity by some groups, impermeable to contextual and historical influences, contribute to their continued marginalization (Urrutia, 2007). Yet, more than 5,000 recognized *comunidades campesinas* exist mostly in the Andes (ibid.), currently recognized under the 1987 Law of Comunidades Campesinas and this number is on the increase[8].

[7] Government projects in Peru that have taken water from peasant communities for infrastructure projects that benefit large commercial farmers are Proyecto Especial Tambo – Ccaracocha PETACC (Ica-Huancavelica), and the Majes project (water from the Colca river). New irrigation infrastructure is under development (e.g. Chavimochic and Olmos projects) which will exclusively benefit large agribusiness companies (Boelens and Vos, 2012).

[8] The process of land titling that begun following the Agrarian Reform has continued though and in Ancash this was almost complete as of December 2006 - 299 out of a total of 349 *comunidades campesinas* had been formally recognized with a land title (Osorio, 2009). Being recognized as a comunidad campesina does not lead automatically to collective ownership of land, many community members have struggled for decades to secure what they perceive to be their land rights (Rasmussen, 2015).

This prolonged derogation and marginalization of *comunidades campesinas* in the country's wider development influences the views and rhetoric of civil servants charged with implementing new laws and regulations. Likewise, it affects the people who identify as *campesino*s, and the leaders who represent them, their everyday lives and how they see themselves. Categorizing socio-cultural practices into any kind of unified framework of water management or singling out practices as typically *campesino*, a pre-condition for the recognition of *usos y costumbres,* seems to underplay the diversity of practices at work and the social construction overly prescribes notions of what it means to live in a *comunidad campesina*. The excessive ascription/constructed distinctiveness implied could be burdening some people living in *comunidades campesinas* to conform. Conversely, under-ascribed distinctiveness in legislation aimed at 'formalizing' could be preventing them from using pre-existing ways of managing. It may also assume the pursuit of narrow productive interests (Cleaver, 2003), underestimating the agency of people to shape and broaden their livelihood path in new ways, drawing on and influencing diverse institutionalized norms.

While it is important to situate the effects of the new approach within the country's wider privatizing trends and the marginalizing effects, it is also vital to explore experiences of communities who have actively pursued and accepted legal recognition. Given the financial costs inherent in managing infrastructure, local water user groups often try to gain access to state resources and international funding and sometimes do so without relinquishing normative power (Boelens, 2013b; Boelens and Seemann, 2014). Local water users approach and adopt law as a powerful resource for claiming or defending interests or rights whereby local users recognize the power and legitimacy of the state, but do not necessarily accept the power structures that sustain it "harbouring a world of difference below the outer appearances of uniformity and formality" (Boelens 2013, p. 250). Subtly and intangibly, these strategies can counteract, or arguably transcend essentializing restrictions and universalizing claims (ibid.). In this regard, the questions of who controls the activities and resources for who and how is vital to draw out, in other words how they make use of state techniques, norms, rules and discourses to forge outward compliance while following their own interests and objectives.

This work suggests that people are not wholly dominated by new governance frameworks; that they assert their agency in strategic ways such as in their use of new techniques and

discourses that suit their interests and priorities. Others contend that there is a shift in perception because of new interactions. Rasmussen (2015), for example, argues that the challenge for *campesino*s lies in working out and through how the state materializes in everyday interactions in water scarce contexts. In other words, how people tactically engage and work with the "mechanisms at hand for dealing with the decrease in water, be it real or perceived" (ibid., p. 79), including new legal norms.

Focusing on communities that have accepted the state model of governance is useful to understand how and why relationships might be changing in situations of historical or ongoing conflict that communities find themselves in, as glaciers retreat and water grows scarcer, as well as the implications for how people view and relate to water. Approaching state/society relations from a standpoint of negotiation signifies that "things could be otherwise" (Rasmussen, 2015, p. 12). It opens up the possibility that rural populations are capable of benefiting from Peru's predicted economic progress, while also negotiating new encounters with the state. Communities cannot be viewed as subordinate bystanders in how they relate with the state, but rather it is important to take seriously that many communities actively seek state recognition to further their own interests. This does not necessarily translate to the concession of power or control. Instead, this means performing a kind of balancing act between complying with external norms to defend their interests, while continuing to structure their water management practices by other less tangible means. This does not, however, underplay the importance of questioning the repressing effects that so-called ´formalization´ of water user rights can exert on existing ways of using and managing water and the effects on existing irrigation practices.

2.5. Conclusion

This chapter situates the thesis in critical studies of Peruvian water governance, with a specific interest in the role of water user organizations as a non-state actor and the issues members of these organizations face in negotiating institutional change under the 2009 Water Resources Law. Water user organizations were created under the 1969 General Water Law in efforts to abolish private ownership, and a new regulatory authority, ATDR,

working from a US-imported, technocratic model of water management in the MINAGRI, promoted new distribution procedures based on rights allocation. Under new neoliberal reforms in the 90s, repeated attempts to privatize water were tried but failed and followed by less extreme, nonetheless insidious changes. These included efforts to transfer responsibilities to local water user organizations to enable self-administration. This had limited effect due to limited consultation and planning with regard to how this should happen. In addition, there was a lack of desire to transfer control by the state authority (ATDR). The chapter shows that there has been an historical tug-of-war of sorts going on over the control and maintenance of canal infrastructure between the ATDR, now the Local Water Administration (ALA), and local water user organizations, and begs the question of whether this situation has been improved under the new IWRM-style model. So far, under the 2009 Water Resources Law, the consolidation of decision-making power in ANA contradicts IWRM principles of decentralization and, therefore, does not bode well for the involvement of local water user organizations nor does it indicate state interest in working with existing water management institutions, despite the rhetoric of IWRM and decentralization. Furthermore, efforts to step up the World Bank's 'modernizing' plans for Peru's water sector, including advancing the ´formalization´ of water user rights, driven by the goal to inculcate a 'new water culture', mean that local water user organizations face renewed challenges when using pre-existing water management arrangements to manage their supply. However, it is also important to question why local communities might actively seek engagement with the state and place value on legal rights to show the new ways that they might be approaching and negotiating the state's presence in their communities and the different ways they might be thinking about water.

This chapter elucidated some of the conceptual origins of and critical debates about water security, climate change adaptation and 'formalization' of water user rights. It showed how there is often a severe disconnect between water security problems and solutions defined at policy level and the context-specific understandings at local level. Water security originated in global policy debates concerned with ensuring the fair distribution of water and water rights recognition has emerged as a core theme. The idea of 'formalization' of water rights has emerged in recent years, supported by international financing institutions, whereby 'customary´ rights are 'formally' recognized in legal frameworks. This recognition in policy has tended to favour a top-down approach that emphasizes modernistic and

techno-economic water laws, as opposed to empirical understandings of context-specific rights and practices. The chapter also showed how water security policy that fails to embrace complex water-society process, often favoured by financial institutions, underplays issues such as social diversity and power relations, with the effect that certain actions in response to water problems are given precedence over less well-known or understood conceptualizations of water. The taken-for-granted nature of water security and globalized solutions depoliticizes solutions to water distribution problems, playing down the human interests, choices and power relations at stake in water management. The chapter also made the connection between the global concept of climate change adaptation and Peru's attempts to deal with climate change impacts through IWRM. Adaptation is a term that has emerged among the global climate change community as an important approach to respond to climate change impacts. It showed how the language of adaptation has been criticized for downplaying the consequences of climate change, and overemphasizing short-term solutions, as well as reinforcing established power relations, through the resurrection of stereotypes of ´indigenous´ or ´local´ knowledge, for example, as the concept is employed and assimilated at different levels of governance.

Understanding how these concepts link to IWRM rhetoric suggests the need to examine more closely the assumptions of national and regional framings of these concepts and how they were used by local water authorities in interactions with water user organizations in the implementation of the 2009 Water Resources Law. To this end, the chapter also drew attention to the historically-marginalized position of *comunidades campesinas*, in both water access and Peru's general economic affairs to show how important this is to consider in claims to institutionalize practices deemed characteristic of *comunidades campesinas*, which could be subordinating rather than recognizing existing practices in any real sense. Notwithstanding the need to recognize the ongoing marginalization of *comunidades campesinas*, however, I will argue for the need for interpretative, context-specific approaches to the study of institutional change that considers everyday lives. This introduces the possibility that peoples' experiences are not necessarily defined by feelings of marginalization or vulnerability to climate change.

Chapter 3 : Conceptual framework

3.1. Introduction

In this chapter, I offer a framework for understanding peoples' decisions and actions in their everyday lives, including their responses and reactions to new state governance frameworks, and the nature and effects of dominant ideas, principles and concepts of water and its management. This chapter sets out the key concepts that I employ to understand these issues. It conceptualizes place as it relates to understanding livelihoods, discourse across scale in water governance, emerging from Chapter 2, agency as an entry point into understanding social change and bricolage as it relates to institutional change. The chapter illustrates a way of thinking about and examining these concepts and brings them together in a framework.

3.2. Place – foregrounding people and livelihoods

A shift from subsistence to commercial crop production in highland communities is leading to more intensive water use, while the 2009 Water Resources Law is increasing state control over water user organizations to change habits so that people use water in more 'efficient' ways. The thesis asks how different groups of people experience livelihood changes that could be seen as part of the wider shift from subsistence to commercial crop production, while dealing with the challenges and pressures that the 2009 Water Resources Law implied for their livelihood activities (research sub-question 2). Do they manage to maintain control over their livelihoods and associated water use practices, with these new pressures in their midst? If so, how do they engage and what kinds of institutions or environmental influences enable this engagement? If not, what aspects of the state-imposed institutional changes pose the greatest challenges and why?

These questions warrant a framework that appreciates the multiple dimensions of change in rural life in the Andes and how people act and interact, make decisions and take actions, within these conditions. This is necessary because the institutional changes introduced in the 2009 Water Resources Law do not operate in a vacuum but are introduced to places with situated livelihood practices that sometimes stem from long and complex histories of engagement with state and/or development interventions and linkages with the wider world. The latter all have implications for how new initiatives, such as the 2009 Water Resources Law, are received and responded to by the people of a place.

Focusing on place as a concept offers a lens through which the complexities of life in the Andes can be appreciated and explored. Following Bebbington (2000), the thesis conceptualizes place as a continuously-produced locality that represents the intersection between livelihood practices, local politics, institutional interventions and the wider political economy. This contrasts with post-structural approaches to understanding social change in *comunidades campesinas* that tend to emphasise the notion of resistance as a way of understanding *campesino* action and responses to new governance frameworks (Boelens and Vos, 2012). Instead, the intersection of practices with diverse influences shifts the focus of attention onto how people seek to control, as opposed to defend, the means of production of a place that underpin their livelihoods. It therefore centralizes the role of people, foregrounds issues of livelihood and production, as much as politics and power, emphasising negotiation and accommodation in the latter as much as resistance.

This conceptualization of place allows me to take a broad outlook when exploring how people maintain their livelihood practices, while dealing with the emerging 'formalization' of water user rights. I apply the focus on livelihoods and production to understand how peoples' decisions and actions shape their livelihoods and the negotiations involved, exemplifying the production and water use and management activities involved in new livelihood strategies in Huashao and their outcomes on social life. I focus on the intersection between production activities, how water is used and managed, the historical influence of a NGO, historical relationships with the wider market and the changes and challenges that the state's new legal framework brings to Huashao. Using the example of a new addition to an existing set of diversified livelihood strategies, I investigate empirically

the different ways people engage and interact with these processes to initiate production activities and to secure control over aspects of production. I look at how they incorporate ideas, practices and technologies, as needed, through interactions and negotiations with these initiatives and what was motivating this, as well as the obstacles they find to be impeding their involvement. Emphasising these aspects shows the subtle and often resourceful ways that people assert their power to achieve outcomes in their livelihoods, despite constraints such as state-held assumptions around irrigation practices in *comunidades campesinas*. It emphasises the kinds of logic that draw people into new livelihood activities and explores what this means for water use and management in the context of wider livelihood strategies. Applying the concept of place in this way therefore appreciates the complexity of life in specific contexts within which the water authorities are implementing the 2009 Water Resources Law.

This conceptualization of place suggests understanding livelihoods in a way that encompasses not just the material aspects of life, but also peoples' ideas about what makes life meaningful. Considering the dual nature of livelihoods – as both meaning and materiality – allows me to consider the ways people in Huashao build "something of their own" (Bebbington, 2000, p. 500) and how Huashao as a place is (re)produced and changed. Conceptually speaking, it means tracing the ways in which people create opportunities as a result of the engagement of their everyday practices with external interventions that generates income and occupation and fosters accumulation, infrastructural or otherwise. This also means exploring the aspects of these livelihoods that are linked to peoples' ideas and thoughts about what constituted a desirable way of life, or those processes invested with cultural and symbolic meaning (Bebbington, 2000; Cleaver, 2003; Perreault, 2008). For example, does the creation and sustenance of relationships created between people in Huashao and market activities in Lima help support the material production of livelihoods in Huashao? If so, what is meaningful about this?

The next section provides a framework for analysing and understanding how the new legal framework is materializing in the social practices of ANA (Chapter 2).

3.3. Discourses and scale in water governance

As demonstrated in Chapter 2, the state's approach to water management is going through a process of transformation, following the 2009 Water Resources Law. While recent analyses show that the approach continues to be a technocratic and bureaucratic model under the 2009 Water Resources Law, they also show the gradual assimilation of international principles of IWRM, which has had the effect of creating new devolved institutions and increasing interest in the participation of non-state actors in water governance. To explore the nature of institutional change driven by IWRM policies (research sub-question 1), I wish to critically examine the social practices of water authorities operating at national, regional and local levels, and the global influences, to identify the priorities that lie behind policy production at these levels. The aim of this is to understand the power that some social groups have to define expectations about water and its management and influence change from global to local environments. Here, I am driven by a concern for the social and cultural implications of dominant ways of being and knowing about water in rural populations, like Huashao (research sub-question 3).

In this case, social practices refer to the language and texts drawn on by water authorities to construct ideas, concepts and principles about water and its management. The concept of discourse (Phillips and Jørgensen, 2002) offers a framework for analysing the construction of norms and principles regarding water use and management (embedded in discourses of water security, water culture, 'formalization', and adaptation – see Chapter 2). The concept of scale (Gupta, 2008) draws attention to the different levels of governance systems at which discourses are constructed, as well as the ways that discourses travel from one level to another and why.

The thesis draws on a Foucauldian definition of discourse as multiple and competing sets of meanings that embrace both *text* and *practice*: "a specific ensemble of ideas, concepts, and categorizations that are produced, reproduced, and transformed in a particular set of practices through which meaning is given to physical and social realities" (Hajer, 1997, p. 44 in Sharp & Richardson, 2001). Foucault´s (1980) primary concern is the exposure of inequalities of power, specifically in relation to knowledge, as a means for achieving social change, arguing that power underlies forms of knowledge that appear intrinsically

objective (Szakolczai et al., 1993). He viewed power as a productive force that creates subjects and agents, rather than a characteristic possessed by individuals, which they could wield over others (ibid.). The continuous power struggles between competing discourses create the conditions that shape the social and physical world, and construct the individual.

Critical discourse analysts ascribe to this view, but also employ the concept of ideology to study the role that discursive practices play in the creation and perpetuation of unequal power relations between social groups, (or *ideological effects)* or the subjugation of one social group over other social groups (Phillips and Jørgensen, 2002). In critical discourse analysis, discursive practices i.e. how texts are *produced* (created) and *consumed* (received and interpreted) are an important form of social practice that contributes to the constitution of the social world. In addition to being *constitutive* of the social world, for critical discourse analysts, discourse is shaped or *constituted by* other social influences that are not solely discursive in character, namely the non-discursive aspects of the event being studied. Thus, language is both a form of action that enables people to change the world and a form of action which is socially and historically situated/constructed and in a dialectical relationship with other aspects of the social world. Therefore, the aim of critical discourse analytical research is to provide explanatory critique that draws attention to *both* the discursive practices used to construct particular ideas of the world, *and* the role that these play in furthering the interests of particular social groups in a political commitment to social change and improving the situation of socially oppressed people.

I adopt a critical discourse approach in the thesis to bring out the abstract sets of meanings[9] at work in the wide policy context as a way of understanding the wider ideas about water and their ideological effects in Huashao. This approach aims to transcend the division between work inspired by social theory that tends not to analyse texts (underestimating the social effects of spoken and written language), and work which focuses on the language of the text but tends not to engage with social theoretical issues (e.g. the socially constructed nature of discourse). Firstly, I explore the key ideas driving water policy and the social and political origins of these ideas in a key national policy document - whose interests they represent - to understand the nature of (prioritized concepts, principles etc.) ideas about water and its management and recommended

[9] The analytical tools I employ using this approach are set out in Section 4.7.

actions that have led to the increased currency of particular types of discourses in Huashao. Secondly, I explore the consumption of these policy ideas in Huashao to understand the role that these play in influencing existing ways of understanding water and its management in social life in Huashao (research sub-question 3). Observing and analysing the latter enables a discussion of power relations between groups, whose ideas dominate (how knowledge is characterized) and what the effects are on the less dominant groups (whose voices are silenced or marginalized).

Analysing the discourses in the policy documents reveals an understanding of the key ideas driving the 'formalizing' agenda of the National Water Authority. Setting this within and alongside the discursive practices of ALA officials charged with implementing institutional change to 'formalize' practices in the water user organization in Huashao, illustrates how knowledge brokers between regional and local levels consume 'formalization', influencing its materialization in this specific context and the prioritised aspects. Analysing the discursive construction of 'formalization' in policy documents and in meetings between ALA and the water user organization allows an understanding of the different discursive framings underlying the approach to water management and institutional change preferred by ANA to justify and give meaning to their actions.

Exploring how discourses can be used in unexpected ways i.e. that fall outside the sets of ideas or concepts of the water authorities, or how relevant discourses are deliberately not referred to by water users, can also be revealing. Contrasting the discourses of an ALA official in his interactions with water guards and members of the YUA Water User Committee with official discourses offers a way into what Fairclough (Fairclough, 2003) calls *creative* discursive practice, where discourses are combined in new and complex ways.

A concern for understanding the wider policy context relevant in Huashao means developing an understanding of the nature of global, national and regional discourses and how they interact across each other (research sub-question 1). This concern makes the concept of the administrative scale in environmental governance relevant in this study. Based on a treatment of scale as a "ruler along which relative magnitude can be measured" (Gupta, 2008, p. 225), the administrative scale refers to different levels of social organization: local, regional, national and global levels. These levels are points along the ruler which denote their relative magnitude along the scale, ranging from local to global.

Levels on the administrate scale considered appropriate for specific problems cannot be taken for granted because actors often apply strategies to define a problem or solution at a particular level to defend their own interests, sometimes at the expense of others (Gupta, 2008). Gupta's (2008) approach to scale argues for critical scrutiny of the motives driving "how norms, principles, concepts, instruments, and tasks become important factors"(p. 226) in the definition of problems and creation of institutional norms at different levels of the administrative scale to expose the political interests and social context in which choices are made. It therefore allows me to focus my critical discourse analysis on these implicit scale-related issues: I apply critical discourse analysis to explore the ways discourses become relevant and naturalized or domesticated at particular levels, how they travel and to what effect. Focusing on scale in this way is an attempt to respond to criticism of the increasing priority given to problems in water governance to higher levels on the administrative scale, separating them from their specific socio-political contexts (Joy et al., 2014) and sometimes resulting in a loss of power over resources at lower levels.

I apply this approach to scale in my analysis of the discourses of both national policy texts and the discursive practices of ALA in Huashao to draw out how the authors of a national policy document define certain water problems and solutions at particular levels. This enables a discussion of the political motives and allegiances of national policy-makers. In the analysis of the discursive practices of ALA, analysing the internalization and development of a policy objective by a civil servant charged with inculcating a 'new water culture' examines how and why a concept becomes important locally, for instance what socio-political interests does the use of a global term reveal? This speaks to the relationship between the state's commitment to recognize existing practices in *comunidades campesinas* and historically and socially-embedded relations of power (research sub-question 1).

In addition, the thesis explores the ways that a rhetoric of decentralization under IWRM and a centralization of power in ANA emerge in Huashao by examining ALA's level of interest in recognizing and working with existing community management practices. An examination of the nature of the interest, for example the types of practices understood to constitute 'efficient' practices in Huashao and therefore permitted for use, shows the kind of control transferred and under what conditions, revealing the types of practices preferred

by the state in how water is managed. The kinds of practices promoted and recognized by ANA authorities show empirical trends and preferences in the state's claims to decentralize.

Exploring the extent of 'scalar mobility' reveals the preferred courses of action identified at certain levels and an exploration of the possible motives and agendas underlying these preferences. This, for example, enables critical scrutiny of the motives of leaders of the YUA Water User Committee for choosing to frame a problem and/or solution at a particular level, and their agency or lack thereof to move between levels. Likewise, it enables examination of the motives of the ALA to downscale certain problems and solutions locally in processes of decentralization of water management.

To explore unequal power relations (research sub-question 1), I draw on an approach proposed by Rubenstein (2004) and Escobar (2010). Rubenstein (2004) and Escobar (2010) suggest exposing assumptions associated with problematic structural binaries that are characteristic of discourses associated with 'modernity'; they argue that these binary assumptions contribute to the subordination or marginalization of less dominant forms of knowledge. 'Modernity´, according to Escobar (2010), refers to the coherence and crystallization of forms (discourses, practices, structures and institutions) that have emerged over the last few hundred years out of certain cultural and ontological commitments of European societies, that have come to dominate ways of knowing and being in the world. As a result, some assumptions have become prominent in a 'modern' ontology, for example through certain constructs and practices, such as the primacy of humans over non-humans (separation of nature and culture) and of some humans over others (the colonial divide between us and them), and the belief in objective knowledge, reason and science as the only valid modes of knowing. The thesis refers to ´modern discourse´ to reflect a dominant form of thinking and knowing based on these divides. I use this way of thinking about binaries to unpack different discourses and how they are used and to what effect in Huashao. For example, assumptions associated with the use of binaries such as 'traditional' and 'modern' to refer to knowledge and technologies in *comunidades campesinas* reveal the power that their persistent use has in undermining less mainstream or dominant ways of seeing the world. Their use in discourses associated with the licensing of a canal has implications for the way water users come to view more

historical forms of water control and materially for how decisions are made to resolve conflict. Analysing their production and their political dynamics is useful and necessary to understand persistent power differentials between different social groups; how certain knowledges come to be prioritized over others, even by the historically subordinated groups themselves.

Laying bare the power behind such binaries to ´silence´ other voices, for instance through the subordination of 'other' knowledges in favour of 'formalized' water management, is useful to understand how certain approaches to water management, with their specific ontological and epistemological foundations, have the power to produce certain types of practices. In addition, understanding and recognizing that there are different discourses from different ontological and epistemological orientations can help to provide deeper explanations for apparent tensions between them, when it comes to implementation of a certain water management strategy.

As per Foucault (Szakolczai et al., 1993) understanding the way certain forms of knowledge are more dominant to others in the discourses of water guards acting at local level for instance, reveals the power of certain forms of knowledge and the levels of social power they have to act. In other words, the extent to which they have the power to use locally defined norms or the constraining influence of imposed norms.

This section set the scene for investigating the implications of the imperatives of policy and national and regional levels locally. Up until recently, the effects of these changes have concentrated in the state bureaucracy, however with the gradual implementation of the legislation, water users are increasingly encountering the transformation of the water sector (French, 2016). This materializes in the social practices associated with the allocation of water user licenses to water user organizations. Situating these wider discourses in Huashao, applying discourse analytical tools to trace the extent to which wider policy agendas reflect the discursive practices of authorities operating at regional and local level, gives an insight into the extent to which the kinds of institutional changes prioritized at national and global level are influencing local level priorities and action and why. To this end, the next section moves on to focus the conceptual lens on understanding how and why people engage with diverse initiatives and structure their livelihoods in different ways

and how they react and respond to the transformation of the water sector and all that that implies (research sub-question 2).

3.4. Agency

Carey (2010) raised a concern about increasing consumerism in glacier retreat-affected areas, under the prevailing capitalist development paradigm, that struck a chord with the puzzle of this thesis. He called for a deeper focus on people and their everyday practices in studies about glacier retreat because, as societies in the Andes move from subsistence to commercial crop production, they grow more tied to consumerism and, as such, the stakes of glacier retreat grow (Carey, 2010). The stakes here refer to the kinds of consumption that infrastructural and technological changes incite, drawing people into particular types of development paths and furthering their vulnerability to the impacts of glacier retreat. With Carey's (2000) assertion in mind, I wish to explore how and why people are becoming increasingly involved in commercial livelihood activities to investigate how they are consuming and what this suggests for social change and more specifically for water use and management in the context of the 'formalization' of water user rights. These questions focus attention on peoples' actions and their outcomes.

"The exercise of power is not a type of act; rather power is instantiated in action, as a regular and routine phenomenon" (Giddens 1979, p. 91).

Agency conceptualizes peoples' actions and their outcomes, central components of how people engage their livelihood practices with institutional interventions. Agency refers to the power that people exercise through their actions and how people, through these actions, can penetrate the conditions of their social lives through reproduction and change, despite social constraints (Giddens, 1979). For example, while *campesino*s might often be discursively categorized as marginalized or on the receiving end of development assistance, they also undertake individual and collective actions, within and outside of constraints that such categorisations might place upon them. Thus, while not downplaying structures of domination, the association of power with achieving outcomes in action helps to explore

the ways that different social groups, who might be discursively perceived as being in subordinate positions, could be penetrating the conditions of their social lives through reproduction and change.

Action is connected to power when actions, understood as involving an intervention of events in the world, produce definite outcomes. These outcomes might be engaging in a particular set of actions or abstaining from action and the capacity or likelihood of an individual to reach such an outcome is where the power in human agency lies. An important element of this is the argument that a person who exercises their power "could have acted otherwise" (Giddens, 1979, p. 91) meaning that there is no intrinsic relationship between agency and intention, will, motivation or wanting. Understood this way, power is implied in the very concept of action.

I conceptualize and apply agency as a central component of the place lens in two overlapping ways: to explore the ways that people engage with diverse institutions that inform and motivate their livelihoods, and what the outcomes of this are for water use and management practices; how people respond and react to the changes and challenges of institutional change. The former refers to how people engage their livelihoods with diverse initiatives that intersect a place speaking to wider questions of social change in the context of glacier retreat. The latter is a more specific analysis of how people interact with water use and management institutions that show the implications of the 2009 Water Resources Law. Taken together, this allows some modest interpretation of the types of social change happening in Huashao, as a place heavily influenced by the impacts of glacier retreat, as well as the tensions between different processes, including the changes and challenges that institutional change under the 2009 Water Resources Law present in the context of wider place and livelihood change.

3.4.1. Agency and social change

To understand peoples' agency in the context of new livelihoods and production activities in Huashao, I explore the reasons the different social groups cite for strategic actions in everyday productive and water use/management activities, following Giddens (1979). This helps to build an interpretation, albeit imperfect, of how they make meaning of their actions, as well as the embeddedness and dependence of action in and on societal structures. The incorporation of peoples' perspectives on the surroundings of their activities, offers a reflection on the kinds of environmental factors that are prioritized in their accounts (e.g. whether conservation of water is of concern) and the extent to which these might be informed by wider social forms (e.g. discourse about scarcity), or whether these reflect behaviour unguided by convention. Focusing on peoples' interpretations of actions, coupled with my observations of the nature of activities, is indicative of where priorities lie in peoples' lives and provides insights into the direction of social life in a place, and the power that they (perceive to) have to take a particular course of action.

I recognize that citing reasons for action is a limited way of building an understanding of peoples' actions; that meaning about behaviour/action can only be partially gauged from how people make meaning of and think about their actions and cannot be reduced to reasons alone. For example, tensions can emerge in accounts where the actor claims to have acted for reasons that he or she was not in fact guided by, or the reasons might be caught up in the demands and conflicting interests entailed in social interactions. According to Giddens (1979), how actors make meaning of their behaviour is the main basis upon which a judgement is made about a person's 'competence' by others and cannot be directly linked to internalized norms or conventions. In an effort to work around this, I combine my interpretation of individuals' accounts with observations of the taken-for-granted or implicit knowledge that is put to use in the enactment of actions, but which the actor has difficulty putting into words, or may not be aware of.

Spotlighting agency is also helpful to consider the ways that different people respond and react to the effects of the state's new legal framework on water use and management. Understanding the ways that different people respond, or not, to the new legal framework and how, can be gauged by focusing on the extent to which they adopt the discourses and practices preferred by the ALA, when, and the extent to which these are

used to affect outcomes. Exploring the extent of engagement with, or abstention from, state-imposed requirements under the new legal framework, can provide some insight into how those directly involved in water management are able to create their own room for movement by asserting their agency in different ways. A focus on agency, therefore, allows a consideration of the different ways that different social groups, such as members of water user organizations, act and react in the face of the changing discourses and practices associated with the new legal framework and what this means for social change.

Underpinning my understanding of agency to explore livelihoods and associated water use and management practices, is the 'duality of structure', as conceptualized by Giddens (1979). This concept allows a complex interpretation of the role of individuals, conceptualized as agents, in influencing social change through the institutions that shape this. The 'duality of structure' concerns the "fundamentally recursive character of social life" (ibid., p. 69) or the mutual dependence of social structures and agency. Agency refers to action, not in the sense of a series of distinct elements strung together, but rather to a "continuous flow of conduct" or a "stream of actual or contemplated causal interventions of corporeal beings in the ongoing process of events-in-the-world" (ibid., p. 55). Social structures are the rules and resources that signify relations between actors or groups that pattern interactions and continue in time to recursively reproduce social systems. 'Duality of structure' means that social structures provide guiding principles for peoples' actions but are also the outcome of the human actions that make up those structures. In this way, structure can have both an enabling and constraining influence on human action. The major connection between structure and action is in regularized acts, treated as "situated practices" (ibid., p. 56), which are brought into being in the context of overlapping and connected sets of rules, and given coherence by their involvement in the constitution of social systems in the movement of time. Importantly, from an interpretative standpoint, Giddens (1979) makes the point that rules can only be fathomed in the context of the historical development of social structures, as recursively involved in practices, meaning that 'an activity' cannot be singularly related to 'a rule' and vice versa; rules and practices only exist in combination with one another.

"Structure…is not to be conceptualized as a barrier to action, but as essentially involved in its production" (Giddens 1979, p. 70).

This idea of duality underpins how I understand the way institutions are continuously shaped by peoples' actions and their outcomes and vice versa. This is an important consideration in the thesis because it allows me to explore how people engage with the multiple dimensions of change in rural life to reproduce their livelihoods (Bebbington, 2000) and the ways that these kinds of engagements produce outcomes that can shape (constrain and/or enable) existing institutions governing livelihood and water use and management practices. Such engagements include historical and ongoing state and/or development interventions, as well as wider market influences.

An example is understanding the ways that *comunidades campesinas* develop. A *comunidad campesina* can be considered an institution in itself because many (re)produce the structures that guide the behaviour of its members, for example, their own internal statutes that define the expectations of community members' participation in communal activities, such as labour days known as *faenas*, and set out sanctions for failing to participate. A characteristic feature of institutions is their reproductive capacity. While nowadays the *faena* can be found written into community statutes, historically it was a less tangible social practice thought to have originated in Inca, and subsequently Spanish regimes (Trawick, 2003). Through ongoing use by people over centuries, the *faena* came to be accepted as a commonly used practice in highland communities. Compliance with the rules of the *faena*, together with its solidification as an accepted social structure, defining and constraining peoples' behaviour over time, show how practices become embedded as institutions.

It follows that institutional structures shape a person's character, and society simultaneously, but neither exhaustively due to the importance of unintended consequences of action (Giddens, 1979). In theory, then, while every action can be perceived as the production of something new, all action is a materialization of some past event. Therefore, conceptualizing structure as a barrier to action denies that structure is fundamentally involved in the production of action. Even the most extreme cases of social change entail structuration because they occur in time (ibid.).

This element of time in the action-structure dialectic is important in the thesis because it allows me to investigate whether people who self-identify as *campesinos* have historically produced and reproduced structural elements that continue to influence the development of their activities into the present. For example, *campesinos* may accept and reproduce historically defined arrangements that broadly characterize them as subsistence agriculturalists. However, at the same time, it is important to recognize that *campesinos* are increasingly involved in action that can no longer be associated with purely subsistence activity, which is generating increased cash-flow and consumer behaviour (see Chapter 2). This is why the construction of *campesino* cannot be considered a fixed structure but all the time open and amenable to change. A focus on outcomes then, intended or not, while keeping the duality of structure in mind, helps me to connect peoples' actions to the bigger picture of both structural reproduction and change over time.

What this section illustrates is how analysing the ways people make meaning of their actions and the effects of the unintended consequences of action on the reproduction of practices, can throw light on the relations between social reproduction, stability and change. How people make meaning of their actions helps to explain the continuity of institutional forms or how livelihood practices are reproduced; how reproduction of practices is made possible by actors' penetration of the institutions in and through their practices. This means applying an important assumption in structuration theory: that individuals are not unaware of the institutions that they contribute to producing and reproducing; in fact, Giddens (1979) argues, they "know a great deal about what they are doing in the processes of interaction" (ibid., p. 5), but also that there is a lot that they do not know when it comes to the conditions and consequences of their activities that nonetheless influence the course of action. Examining the effects of the activities that fall outside of the intentions of actors on the reproduction of practices is useful to shed light on the processes that connect the practices in question to other features of broader social systems of which they are a part.

Understanding that structures can function as enablers to action fits with Bebbington's (2000) call for a theory of agency in research in the Andes. This, he argues, shows how actors draw on structures to further their control over their livelihoods; accepting that behaviour is not just rule-bound and that structure is not always a constraint prises open

the possibilities of creative and strategic action. Conceptualized in this way, individual action and elements of the structure in question are given equal footing in the sense that it is not a foregone conclusion that structures impinge upon individuals from above; though produced through (never-free) social practices social practices are produced and reproduced at the level of practices itself (Ortner, 2006). It therefore recognizes and opens up the possibilities and power of human agency, that is, the ability that people have to act on their own behalf and to maintain some aspect of control over their lives.

To understand how different social groups within Huashao make decisions in Huashao when faced with a combination of historically-grounded and bureaucratic arrangements governing water use and management, my conceptual framework requires an understanding of agency specifically focused on how people relate to and interact with new bureaucratic water management institutions (research sub-question 2).

3.4.2. Agency and institutions – embracing complexity

It is important to emphasise the power of peoples' actions in diverse water management systems. As set out in the previous chapter, the 2009 legislation builds the expectation that *comunidades campesinas* must make their existing ways of using and managing water more 'efficient' and 'formal'. This is based on a state preference for volumetric water allocations and scientific distribution methods. On a practical level, this expectation depends on the availability of resources and infrastructure that allow for such methods to be employed, but, conceptually-speaking, it is built on an understanding that people make decisions about how to use and manage their resources in ways that optimize use. For example, if people know that water is scarce, they will automatically use a more 'efficient' method of distribution to use less water. However, people do not always draw upon social practices in such a purposive manner to make decisions; oftentimes, they act in unpredictable and contradictory ways, influenced by a range of institutional arrangements defined at different levels and by multiple motivations and diverse relationships influencing the direction of livelihoods that are not always accounted for in state-defined arrangements.

Furthermore, the introduction of the discourse of *usos y costumbres* into the language of the water authorities, following the 2009 Water Resources Law, sets the precedent that

communal ways of managing water historically associated with *campesino* cultural identity and political autonomy continue to be accepted by people in their everyday livelihood practices in communities. However, as livelihoods grow more and more tied to commercial production in the Andes (not usually associated with use of communal forms of management), the ongoing association of *campesino* culture with so-called ´traditional´ forms of communal management in the water authorities is questionable. The effects of inflexible interpretations of culture or tradition in bureaucratic institutions risks reinforcing or amplifying historical social divisions.

The goal of this section is to conceptualize institutions in a way that enables an investigation into how different social groups in Huashao make decisions about which institutional arrangements to use; what kinds of livelihood practices and logics underpin these decisions and actions. In other words, an understanding of institutions that centralizes the concept of agency to draw attention to some of the "muddy complexity" (Rasmussen, 2015, p. 7) of the seemingly-contradictory behaviour of individual water users in their livelihood practices, as well as the difficult position occupied by state officials and members of the central committee. Such a conceptualization facilitates a discussion of the effects of the institutional changes introduced in the 2009 Water Resources Law on existing ways of using and managing water from diverse perspectives, referred to in the paragraphs above, in the context of livelihood change from subsistence to commercial livelihoods taking place in the Andes.

When deep-seated cultural norms in some communities (not all), such as the *faena* (*phayna* in Quechua) or the *turno*, are still in use and being combined or replaced with newly-designed bureaucratic institutions such as contracts, legal rights and 'formal' sanctions, how are everyday decisions about livelihoods and resulting practices affected? To explore this question in a rural context with institutions of diverse origins (a combination of bureaucratic arrangements and pre-existing, contextualized social practices, as above), a dynamic understanding of institutions is required that encompasses the ways that social relations shape, reproduce and change institutions in complex ways.

The concept of institutional bricolage (Cleaver, 2003) provides an understanding of institutions that challenges views that individuals act rationally and economically in the use

and management of water. This is helpful where increasingly diverse livelihood choices encounter new institutional arrangements.

Institutional bricolage refers to the ways that individuals borrow or construct techniques for managing resources and act collectively from existing institutions, ways of thinking and sanctioned social relationships that have formed through processes of bricolage. These processes refer to the combination or replacement of established institutions with newly introduced bureaucratic institutions. The concept challenges the belief in the rational and economic behaviour of actors implied in new water governance arrangements as it is permeated by the understanding that people have the power to take strategic action, in other words, that people have agency. As mentioned in Section 3.4.1. above, having agency means that, while individuals are acknowledged as deeply entrenched in their cultural environment, they are nevertheless capable of analysing and acting upon the circumstances they face. Therefore, applying Giddens' (1979) conceptualization of agency to the concept of bricolage, I explore the ways that new institutional arrangements are negotiated and shaped in everyday interactions in ways that are often messier and more 'ad hoc' than ideas of rational and economic choices and actions would imply. Institutional bricolage thus becomes an appropriate lens for exploring complexity in human action in contexts where people are faced with complex and diverse decisions about the use of increasingly overlapping water management institutions.

Recognizing the complexity of local water management arrangements avoids unhelpful dichotomies often imposed by bureaucratic institutions in efforts to categorize institutions. Bureaucratic institutions often suggest that 'formal' structures, apparently rationally-designed, are less socially-embedded than less visible institutional forms, implying that 'formal' structures are likely to be 'better' at resolving conflicts or managing the use of resources as they objectify 'other' ways of managing based on deviation from their defined standard (Boelens and Vos, 2012). However, firstly, bureaucratic institutions are socially and culturally embedded: as demonstrated in Chapter 2, the current focus on 'formalizing' water rights in Peruvian water management is embedded in a persistent technocratic water management culture, influenced by the agendas of multilateral development banks. Secondly, the concept of bricolage is a way of investigating the processes by which collective institutions are formed and evolve, recognizing that these processes are messy

and piecemeal and shaped by individuals making decisions and acting within the constraints of their circumstances. Individuals are not always motivated primarily by optimizing resource use, such as by efficiency measures to 'improve' distribution, but perhaps by livelihood concerns to maintain social and economic relationships with networks of neighbours or trading relationships. In other words, how people choose to settle a conflict or manage their resources is often less straightforward than a simple 'better-worse' scenario as decisions are reliant upon diverse understandings of what constitutes a desirable way of life. Recognizing institutional complexity means recognizing the complex and diverse aspects of decision-making that influence peoples' actions and the institutions of which they are a part.

At local level, I see bricolage as a way of exploring preferred institutional arrangements at work in Huashao that could provide some insight into why commercial livelihoods constitute an attractive livelihood option, despite what this means for water use in the context of glacier retreat. The concept of institutional bricolage, with its built-in conceptualization of agency, is applied to understand the ways water is valued, used and managed by the different groups that emerge in Huashao (see Section 5.5.). This helps to show and understand the different types of agencies that exist at community level or the plurality of arrangements in place, operating alongside ANA's 'modernizing' agenda.

Recognizing plural institutional arrangements prises open space for different voices to be heard. By drawing attention to plurality, I investigate how, through strategic actions, people can work around what may otherwise be considered constraints to action and show what the consequences are for their lives and livelihoods. In other words, a plurality of arrangements may create opportunity for social groups to improvise by negotiating existing institutions and ways of thinking in new and unexpected ways. Rather than assuming that people are somehow transitioning to a more 'formal' and therefore 'better' water rights framework, looking at the ways in which people negotiate and contest these, is useful to illustrate some of the ways they engage with existing conditions to exploit opportunity and to sustain relationships that support livelihoods. Giving voice to those involved in these processes of bricolage helps to illustrate what may be missed out on by failing to consider plurality in water use and management.

Furthermore, examining plurality can show the diverse location of the generation of institutional arrangements and the importance of taking into consideration household decisions and practices that are commonly unaccounted for in more 'formal' arrangements, but which are nevertheless important in the formation of norms and practices of water use. This is especially relevant to investigate the responses and actions of leaders of water user organizations, often confronted with decisions about how to manage changing water use practices, while endeavouring to comply with water user rights 'formalization'. As Cleaver (2003) notes, it is important to see appointed leaders on committees as more than direct representatives of resource users, responsible for translating community norms into more 'formalized' arrangements. Institutional bricolage can facilitate an analysis of the less visible institutional structures, such as the norms and practices, underscored by relationships of trust and cooperation, formed and negotiated outside of 'formal' institutions.

What this section has provided is a way of embracing complexity in a study tasked with understanding how people were dealing with state-imposed institutional change under the 2009 Water Resources Law and its effects. Institutional bricolage centralizes the concept of agency to draw attention to peoples' strategic actions to elucidate the complex and contradictory ways that they often act, in situations where they are faced with diverse institutional arrangements. It highlights the plurality of arrangements that can be at work in any one place at any one time, creating opportunity for people to affect change in perhaps more direct ways and for different voices to be heard

3.5. Conceptual framework - brief illustration and narrative

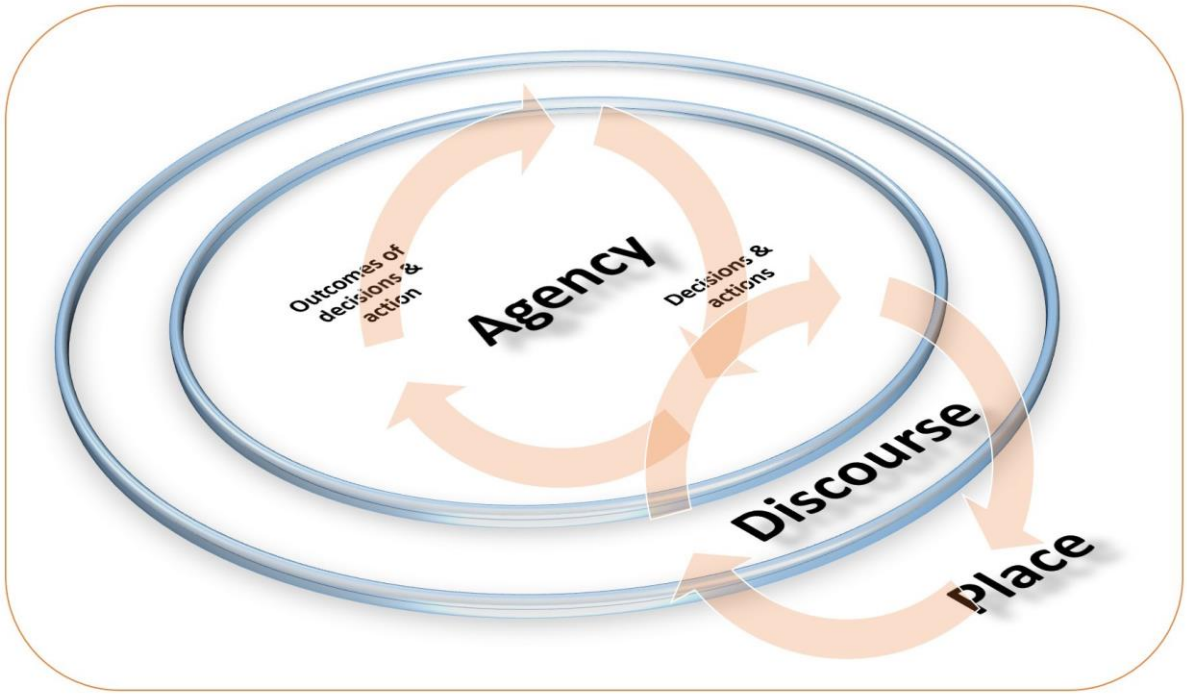


Figure 3.1 Conceptual Framework. Source: own (based on Giddens, 1979; Bebbington, 2000; Cleaver, 2003).

Looking through the lens of place (illustrated above as if looking down and through a magnifying glass), I consider and interpret the ways that people interact with the broad set of conditions, represented above by the outer lens, that influence their everyday decisions (historical interactions with development organizations, market connections, state authorities) in efforts to gain control over their livelihoods, based on Gidden's (1979) duality of structure. I use the concepts of place as it relates to livelihoods (Bebbington, 2000) and discourses (Foucault, 1980; Szakolczai et al., 1993) at and across scale (Gupta, 2008), and their ideological effects (Phillips and Jørgensen, 2002), to develop an understanding of interactions at local level in a broad way. Exploring these interactions and their outcomes in Huashao develops some insight into the ways that society is changing in this mountain village and how people view their role in this change, for example, the extent to which they are willing to interact with local markets and use new ideas from these interactions that affect their everyday lives. What aspects of social change are valued by the people there and why? It also exposes some of the abstract discourses at work that are

shaping the social world of Huashao. This gives some indication of the direction in which livelihoods are moving in Huashao and, therefore, contextualizes the more specific analysis that follows of how people are dealing with institutional changes introduced by the state. This contextualization helps to build a deeper understanding of the ways that wider social changes have an influence on how people make decisions and react to new institutions of water use and management.

Adjusting the focus to the inner lens, the focus becomes one of trying to understand how groups of people within Huashao interact with new bureaucratic arrangements in the context of pre-existing practices, drawing on the concept of bricolage, which encompasses concepts of institutions and agency. The concept of bricolage allows for a more specific investigation of the complex interactions between people, their livelihoods and water management institutions within a place.

Chapter 4 : Methodology

4.1. Introduction

In this chapter, I outline the methodological approach and methods used in this study. Firstly, I reflect on my personal research motivations that help to explain my epistemological position in this research. I set out the case study rationale for taking an exploratory approach with reference to my conceptual approach and provide some contextual background to the case study site and the case itself. I then describe the sources of data and methods used to collect data and my analytical approach. Finally, I discuss some reflections on the research process itself, including ethical considerations and issues with regard to language.

4.2. Reflection on motivations

> "Adaptation from the inside-out is not about forcing change on others, but about reflecting on the perspectives that we bring to adaptation research and practice, including our own blind spots" (O'Brien, 2013, p. 308)

Like all would-be researchers, I came to this topic from a certain place. In the years prior to the PhD, I grappled with the degree of personal and wider societal change I had experienced in my mid-20s in Ireland. I had grown up in what some might now consider a rural place in Ireland, still influenced by rural ways of living. Summers spent in the peatbog helping my family and neighbours to foot and collect turf[10] to provide fuel to heat our home, stood in sharp contrast to my later life in Dublin, where I worked for a professional services firm during the economic boom. On reflection I was (or perhaps I like to think I was) partially co-opted by an apparent Generation Y ideal to pursue a career the sole purpose of which was

[10] For many this is an important part of Ireland's traditional heritage in rural Ireland. The government is gradually phasing out turf cutting under Ireland's commitments to European environmental policy to cut carbon dioxide emissions.

to maximise my income. I was part of a generation of degree-educated youngsters with parents who worked hard to provide their children with a lifestyle they could not have imagined for themselves but I was increasingly disillusioned by it.

I struggled to reconcile my participation in the burning of a fossil fuel that I took for granted in my previous home life, with what I had learnt from climate change scientists. It was part of my family and community heritage and tradition to collect, store and burn turf in this way. Why should people have to give up something they had always done; something that they associated with happiness and being outdoors and, to the surprise of some the sustainable management and conservation of the peatlands and its wildlife? To me, banning small-scale turf cutting in Ireland in the name of sustainable development and tackling climate change seemed nonsensical when compared with the blatant disregard of large-scale cutting or unbridled construction and its effect in the rest of the country.

I carried a personal (and what I now know to be a naïve) disillusionment with the merits of capitalist development, together with a particularly ingrained, partially inherited, cynicism of the encroachment of powerful actors, on the activities of seemingly less powerful others in everyday life. I was eager to situate these concerns in a developing country context, where marginalised communities would be hardest hit by the effects of climate change. If I could situate these concerns in a more socially and culturally diverse landscape in a place experiencing rapid environmental change, perhaps I could understand what it was that made people desire different types of change, give up and leave behind old habits and traditions in the context of wider societal influences and environmental pressures. Conversely, maybe it would allow me to form an impression of what they refused to let go of and why and what this meant for the direction of their lives and their wider social world. In other words, I was driven by a passion to understand how lesser understood ways of thinking and acting are undermined and/or survive in the context of climate change, and constraints imposed by more powerful actors' ways of thinking and acting. I was motivated first and foremost by personal curiosity, followed closely by a desire to contribute some critical research to the human dimensions of climate change.

Meeting people like Professor Mark Carey during the first year of my PhD and reading the work of Practical Action drew my attention to the Callejón de Huaylas in Peru and the relevance of the region to my concerns. Coupled with previous work with ´indigenous´

groups in Guatemala, I decided to situate my research concerns around human experiences of glacier retreat and changing water availability in the Callejón De Huaylas region of Peru.

My home life in Ireland clearly influenced my choices to pursue studies in international development. I consider my personal motivations because they offer an insight into the critical lens that has influenced how I see the world and they indicate my interest in understanding how we change given complex forces and in the fairness of these kinds of changes for how we live our lives and interact with others. Further, the emotive tone of my account above reflects an earlier way of thinking about certain problems that I was forced to rethink throughout the PhD process, which was further brought home upon reading Karen O'Brien's 2013 essay, "The courage to change: adaptation from the inside-out". When faced with climate change, O'Brien (2013) pondered, and increasing calls for paradigm shifts in response to global problems: whose paradigm needs to shift? Whose worldview needs to change? This cannot be about imposing direct change on others, she insisted, nor about converging in one common shared worldview, "instead, adaptation from the inside-out is about transforming our own attitudes, assumptions and beliefs, both individually and collectively" (O'Brien, 2013, p. 312). As O´Brien notes, her own personal reflections on her research forced her to contemplate how she herself found it difficult to embrace change.

Accounts such as these (see also: Agrawal et al., 2012; Bolin, 2009; Crate & Nuttall, 2009; Hulme & Mahony, 2010) have served as constant reminders of the need for reflexivity about my own assumptions, emotions, attitudes, interests and beliefs when trying to build a picture of other ways of thinking and acting. As Meadows (1999 cited in O'Brien, 2013) put it, a researcher must strive "to keep oneself unattached in the arena of paradigms, to stay flexible, to realize that no paradigm is "true", that everyone, including the one that sweetly shapes your own worldview, is a tremendously limited understanding of an immense and amazing universe that is far beyond human comprehension. It is to "get" at the gut level the paradigm that there are paradigms, and to see that that itself is a paradigm, and to regard that whole realization as devastatingly funny" (p.309-310). As I see it, this is at the core of learning 'how to think' within the interpretivist philosophical tradition.

4.3. Epistemological grounding

The way I view the world and associated epistemology is closely aligned with interpretivist approaches (Layton, 1997; Mason, 2002). Interpretivism rests on a view of the world or reality as a mentally shared construct that can only be understood within social confines/context of a group. Multiple realities can co-exist beside each other, are shaped through negotiation and social interaction and, as such, are constantly changing and evolving as changes happen within groups. The aim of interpretivist social inquiry is to make sense of the actions, beliefs, social practices, value systems, institutions and other elements that comprise the social world. Knowledge is then revealed by uncovering the intentions and motivations that inform human action and by making sense of the broader social context in its holistic entirety, in which those beliefs, intentions, and actions take shape. Hence, it involves the prolonged observation and 'being-there' on the part of a researcher to interpret and read the significance of moments in human relationships or the meaning that is produced through the negotiations and social interactions of individuals specific to a context.

My analytical focus on discourse, explored further below, aligns with elements of social constructivism in its application as a framework for analysis in this study. Constructivists contend that reality is socially constructed through language and texts, independent of human thought, which provides hierarchical structure and order to society. Knowledge about hidden social and cultural values is therefore revealed in the deconstruction of language in cultural texts and artefacts, which in turn exposes social power relations (Phillips and Jørgensen, 2002). This study is influenced by constructivism insofar as thinking this way is useful to uncover hidden power relations in the scrutiny of texts and language. However, unlike hard-line constructivists, I disagree that reality has no meaning outside of its description and expression in language. Such a view assumes that people are unaware of the manipulative social forces at work; that they are somehow oblivious to social institutions and ideologies. For this reason, this study adopts a critical approach to discourse analysis that appreciates both the role of discourse in the constitution of the social world, as well as how discourses are constituted by other societal influences, or the non-discursive aspects of the phenomenon being studied, such as individual action and social interactions (Hajer, 1997). This coheres with interpretivist approaches that rest on the idea that humans are producers

and negotiators of meaning, adapt to their environments and the voluntary nature with which they comply with socially-shared rituals and values.

4.4. Ethnographic case study methodology

The study employs ethnographic case study methodology to explore how the people living in Huashao value and use their water and how this is affected by new interactions with state water authorities in the implementation of 'formalization' policies. An ethnographic approach to research constitutes an in-depth description of relationships, habits, meanings and understandings (tacit and implicit) and tries to make sense of a place and a case in relation to the entire social setting and social relationships (Layton, 1997; Mason, 2002). Informed by both post-structural concerns related to the power of discourse in perpetuating social inequalities, as well as by a commitment to showing the agency individuals have to influence change through their actions (Rubenstein, 2004), I employ this methodology to the case study of changing water use and management in the village of Huashao. Using an ethnographic approach to case study methodology allows me to situate problems in their wider context, observing the phenomenon in question as it unfolds and the important contextual conditions pertinent to each case, as well as interview people involved in each activity in situ (Yin, 2009).

The case study of Huashao is ethnographic in the sense that I sought to discover what was of value to the people in Huashao and how they defined and explained their world. As mentioned previously, I was cautious of the assumptions underlying the language of adaptation dominant in climate change literature but I also deliberately avoided using the term 'climate change' for as long as I could to see how and when the use of the term emerged. This was an attempt to develop "an insider's view" (Blaikie, 2000, p. 115).

A case study is an empirical enquiry that is the preferred approach when a 'how' or 'why' question frames research into a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly apparent (Yin, 2009). Such questions allow the establishment of links across an array of exploratory information over time. With this research, I set out with an overarching

research question that asked firstly, if people perceived change in their environment, and, secondly, if they had perceived change, how was this being defined, what type of change was prioritised and why. As explained above, my first priority was to find out the aspects of change of greatest concern and priority to the people living there that would later inform my understanding of their interactions with state policies of 'formalization'. Such an understanding would be incomplete without the full description of contextual conditions while "being there" that were pertinent to the exploration of changing water use and management. Employing case study methodology taking an ethnographic approach meant that I could develop empirical depth in understanding meanings and motivations behind prioritized aspects of change. I built depth into the study not only by analysing what people told me in our interactions, but also by prolonged observations of what they did and how they did it, which allow me to understand the everyday tensions and contradictions of peoples' lives between what they say and do and situating these in a broad context.

4.4.1. Selecting a case study site

My fieldwork in Huashao lasted approximately nine months (November 2013 to July 2014). During my first month of scoping, I stayed in Lima for a few days before moving on to Huaraz. While in Lima, I met with members of Practical Action to learn more about their work and visited the *Instituto de Estudios Peruanos* (Peruvian Studies Institute) to access more context-specific literature. The discussion with Practical Action centred on organizations and networks of people with whom they had worked in the Callejón de Huaylas.

I spent one month in Huaraz, where I carried out formal interviews and informal discussions and conversations with representatives from institutions with connections and/or interests in the research topic. With assistance from the owner of the hostel where I stayed, I interviewed and developed relationships with people from key institutions who helped me to identify informants in the style of snowball sampling (Bryman, 2012). These included the Universidad de Santiago Antunez de Mayolo (UNASAM), The Mountain Institute, the Glaciology Office, the Cultural Centre and Care International. I met with various representatives from these institutions for discussions about the topics of water availability, glacier retreat and experiences of *comunidades campesinas* in order to compile

information about a possible case study. In the end, specialists from the Huascarán National Park and an environmental lawyer from the Department of Social Development in the regional government of Ancash became key informants in the identification of, as well as access to the case study site in the village of Huashao.

In Huaraz, I either formally arranged meetings or dropped by offices, for example, in the case of the Mountain Institute, I pre-arranged a meeting by email, whereas in the case of the University and Huascarán National Park, I made contacts and arranged meetings by visiting and making inquiries at their offices in Huaraz over several days. While I had a daily plan in my research diary, I also had to remain flexible and open to chance meetings. I kept a record of the outcomes of meetings in an institutional map and a field diary for important contacts.

Using the institutional map and the information that arose in my scoping interviews, I found links to Huashao and the *comunidad campesina Unidos Venceremos* across the institutions and their work that roughly satisfied my criteria for a suitable case study site (see Table 4.1).

- **Rural area in highly glacierized region** – subsistence farming community who rely on glacier melt-water as one source for irrigation.
- **Type of watershed** – where water shortages have been noted or noticed reduction of glacial area.
- **Pre-existing forms of irrigation practices** still used, dependent on glacier run-off for water supply.
- **Presence of NGO and/or government agents -** A watershed with climate change adaptation-related project activity.
- **Access –** how harsh are conditions and what is the likelihood of me gaining access?

Table 4.1 Case study criteria. Source: own.

Practical Action is an NGO that contributed findings to Peru´s Second National Communication to the United Nations Framework Convention on Climate Change (2010). This contribution drew on findings produced by their work on the ´experiences of technological adaptation´ in seven rural regions of Peru, one of which included the

experiences of people living in the village of Huashao. The lawyer from the Department of Social Development provided a full list of legally-recognised *comunidades campesinas* in Ancash (2013). He drew my attention to the community of *Unidos Venceremos* because they had previously hosted volunteers and were open to interactions with foreign workers. My initial meeting with the mayor of Huashao, enabled by the lawyer, flagged that water scarcity may be a concern in Huashao, that diverse irrigation methods were still in use and that the main sources of livelihoods were agriculture, livestock rearing and tourism. Furthermore, this village was located in the Llanganuco watershed which had exhibited the fastest glacial area reduction over the previous two decades, according to Baraer et al. (2012). The blend of activities at work in Huashao, including the interactions between *Unidos Venceremos* and local water authorities that I would later find out about, made it a suitable case study site to explore how the people were living with pressures to adapt to new governance frameworks in the context of wider socio-economic change.

4.5. Being in Huashao & living with a family

4.5.1. Accessing people and place

Following an introduction by the environmental lawyer, I met a community leader in Huashao on my first trip there in mid-December 2013. He introduced me to a fellow *comunero* Don Heracio, to see if he would be willing to let me stay with him and his family for the duration of my time there. I moved to Huashao in early January 2014 and stayed with Don Heracio and his family until July of the same year. In the beginning, I continued to rent a room in Huaraz as I took a class in Quechua at the weekends and attended events at the Cultural Centre and Care International. As the weeks passed, however, my host family were increasingly concerned about my whereabouts and I decided to move to Huashao full-time.

A family in Huashao had previously hosted a volunteer from an international NGO. I was repeatedly mistaken for the volunteer throughout my time in Huashao – walking through the village or shopping at the market in Yungay. The familiarity with which community members addressed me often helped to strike up conversations. While being

overshadowed by a volunteer facilitated an entry point to the village and access to meetings, it also made it quite difficult to establish my own identity in Huashao. Without an affiliation, I mostly described myself as a student from Ireland, there to learn from them and about their way of life.

Don Heracio´s family live in a large adobe house as part of a homestead shared with his extended family. From their porch, one looks down over the village, with its school and medical post, and open pastures, through which the deluge of the 1970 avalanche had once passed on its destructive journey from Mt Huascarán to Yungay. To the front and rear of their house, Don Heracio and his family maintain their *chacras*, where they harvested flowers for commercial production. They share land with their extended family to grow maize in other parts of Huashao and, they also share-cropped land in the high-altitude sector of Huarca, where, during my fieldwork, they harvested large quantities of *olluco* (Andean tuber). They keep a pig that Sofia releases to fodder each morning and guinea pigs, killed for food on special family and community celebrations. Their daughter was also working under the tourist contract at the national park and son and granddaughter attended the local school. A small stream flows downstream at the front of the house, that they access to irrigate their plot at the front, one of the many tributaries of *Yurac Uran Atma*.

Don Heracio and his wife had lived and worked in Lima for many years before returning to Huashao. When we had visits from local politicians, Don Heracio often described their way of life as “humilde” or modest, not in a derogatory sense, but in what seemed like a self-assured or knowing way based on their experience of living in the city. A sinewy figure with jet black hair and never unkempt, Don Heracio was a devoted *comunero*, often reading the internal statute following meetings to check the rules and legislation governing decisions about the accepted behaviour of *comuneros*. He was man of the law, untaken by religion, he told me one evening, as he listened with amusement to Sofia as she scolded me for walking into an “ancestors’ graveyard” during my walkabout that day that had caused a severe migraine I had developed, in her view.

It was primarily through Don Heracio that I accessed community gatherings and official events, for example, with the ALA. He invited me to meetings and we usually walked together, discussing topics ranging from the changing landscape to hearing about what life

was like in Ireland. I had less verbal interaction with Sofia, mainly because of the language barrier, but it became a routine for us to attend local food, clothes and flower markets together. Always dressed in ornate *llikllas* (traditional shawl) and *polleras* (traditional skirt), she adorned her coveted bowler hat, set at a jaunty angle as she worked in the fields. Trips together to the market and various bouts of illness when she cared for me, meant that by the end of fieldwork we had developed quite a close bond.

4.5.2. Activities and emerging relationships

Living with a family in Huashao, I could immerse myself in their daily lives, however, this did not happen immediately. Only after spending several months in Huashao was I allowed to help with the daily tasks, which to a large extent centred around flower production and to a lesser extent, harvesting *olluco*. Before then I was told that the work was too dirty for me; to my host family's amusement, I tried to convince them that I was well capable of working in the *chacra*. After some coaxing and light-hearted deal-making, I started to help with pruning and sorting the harvest with my host family in the prepared area of their porch. During the harvest, I helped them to pick *olluco* wearing the traditional *pollera* that Sofia had bought me to help gather the crop.

After the daily chores had been completed, I joined the women as they sat and chatted with the other women of the household with their children, relatives and elders (*mamachi* and coca-chewing *papachi*). After everyone had bathed and weather-permitting, we would sit either on the grass by the road at the front of their house, or some other preferred spot in their neighbour's yard or by the *chacra*. Due to the language barrier (see Section 5.8 below), I soon realised that just taking the time to be there was valued and oftentimes they were happy to entertain my interjections in Castellano. What were awkward and stilted conversations in the beginning thus became more relaxed and free-flowing bi-lingual exchanges as I grew in confidence and we got to know each other. Sharing these moments, often in silence, built trust and friendship. With Don Heracio and his family, I could spend time talking about where I was from, especially after dinner in the evenings, after the children had finished their homework. They were fascinated by the prospect of living on an island: we drew maps, compared weather patterns, pondered the lack of wet and dry

seasons and the largely flat terrain compared with Peru´s colossal peaks. Over time, I accompanied the family to larger extended family and community gatherings, such as their granddaughter's communion, local festivals and dances held at the school or other sectors, and day trips to the buried cemetery in Yungay and the national park.

My decision to focus on the role of people in changing water use emerged from my living with and observing the family and its extended members, and their diverse understandings of change in their surroundings contributed to my interest in diverse explanations of change. The time and effort that Don Heracio, Sofia and their daughter dedicated to flower production, the value they attributed to it and my impression of the implications for other crops and how they were using and managing their water led me to explore this case in the wider community (this is the subject of Chapter 7). Furthermore, the connections that Don Heracio had to *Unidos Venceremos*, its leaders and important groups, including the water user organization, meant that I could explore changing water use within the context of community water management structures. My insights from living with the family, as well as the access to other groups of people it enabled, were thus fundamental to defining my case study and research questions. They helped to tap into an aspect of change and experience that connected with wider issues of water use and management in the context of glacier retreat and access the key groups associated with the latter.

Before becoming more involved in the family's daily activities, I volunteered at a school in Huashao for the duration of my time there, teaching basic English, participating in sport events and acting as *madrina* (sponsor) for the children in their transition ceremony to high school. In the earlier months, I spent days walking through the village and wider community, getting to know the different sectors of the community and introducing myself to people. Houses in *Unidos Venceremos* were dispersed across rough terrain and at steep intervals; all of the other sectors were scattered at higher altitudes to Huashao. Without more detailed knowledge of the terrain and given this was my first time to do research of this nature, I never strayed too far from the main road or I would wait until I was in the company of others, following a community meeting, for example to help point the way to a particular sector I had arranged to visit.

The president of *Unidos Venceremos* also lived in Huashao. I met with him in early January and he suggested that I present myself to the community at the water license awarding ceremony. I accepted enthusiastically, seeing it as a way-in to the community, ill-informed that I would be uttering my first words in Quechua to an audience of over 900 attendees, all members of *Yurac Uran Atma* Water User Committee. That day I met Don Elmar, based in Huaraz, who was the main intermediary from ALA Huaraz working with YUA Water User Committee (Chapter 5). During that time, I also met with the president of the Water Committee who lived in the sector of Churu Huarca (I explore the geographical layout of Huashao in Chapter 5). I accompanied him on his inspection of the irrigation canal in January 2014 and that was the first of a number of interactions with him. He became my main access point to the meetings of the *Yurac Uran Atma* Water User Committee.

Living in Huashao meant that I could collect observations from my attendance at formal activities, as well as more casual social interactions with my host family and wider community members. I recorded my observations daily in a fieldwork journal. At meetings of the *comunidad campesina*, I made notes about the members of the community who were most opinionated to trace dominant voices and my hunches about potential agendas and interests. I traced and linked groups within the community in this way. Attending these events gave invaluable insights into life as a member of *Unidos Venceremos*, the heavily bureaucratized management of its leaders and ritualized behaviours and routines of its members. Living with a family whose head was a respected member of the community also provided key insights into the place of community in, as well as its influence on the social and economic life of a family.

Other types of observations were more casual or exploratory in nature, such as those collected at the bustling flower market in Acho or in *colectivos* to and from Huashao. On long walks through rough terrain I became familiar with the area in a tactile way. I noted changes to the physical and built environment that linked to the case and to the context, such as the visible retreat of glacial tongues on Mt Huascarán and the use of different types of irrigation. Seeing the technology at work allowed me to link this behaviour to flower production, for example. Noting its prevalent use in the lands surrounding the flower factory added a new dimension to previously understood motivations for use. My monitoring of the use of water during and outside of the *turno* system of rotation allowed

claims in interviews of non-compliance to be corroborated. In general, the ability to uncover tensions between discourse and practice through direct and participant observation added depth and complexity to the case study questions.

4.6. Other sources of data & data collection methods

Case study methodology has the advantage of relying on multiple sources of evidence, the triangulation of which across the diversity of social groups helped to build a fuller picture of the topic in question. Sources of data in Huashao came from my field notebook where I recorded my daily interactions, interview transcripts, a resource map activity, participation and direct observation and many informal conversations and walks with members of the groups identified, as detailed below. I carried out almost forty semi-structured interviews, with individual members of the different social groups that emerged as relevant to the research, as well as leaders of the community, over the course of my time in Huashao. Data collection took shape across two parallel sets of activities: those that happened organically and in an ad-hoc way as I learnt to live as another member of a family in Huashao, as described above, and more formal interviews and discussions. The former often took the form of walks or extended chats, as I adopted an informal interview style with the *comuneros* and *comuneras* in Huashao, however the latter often followed a more structured interview schedule, usually those with community leaders in Huashao and/or institutional representatives in Huaraz.

4.6.1. Social groups & semi-structured interviews

While my observations about changing water use in Huashao were rooted in life with Don Heracio's family, as described above, I also carried out semi-structured interviews with the members of the different groups that emerged as significant to explore my research questions. These included the flower producing *comuneros* and *comuneras* from Huashao and other sectors of *Unidos Venceremos*, the factory owner, the central committee of the *Yurac Uran Atma* Water User Committee (Chapter 5) and the Head of Knowledge and

Interinstitutional Coordination, based in ALA Huaraz (Chapter 5). In the groups of *comuneros* and *comuneras* I spoke to, I distinguish between small-scale flower producers (those involving family members only) and large-scale flower growing (those who had accumulated enough wealth to be able to employ *peones,* as well as family members and acquired infrastructure e.g. a truck, storage building). As *comuneros* and *comuneras* of *Unidos Venceremos*, they were also water users[11] of the YUA Water User Committee, the local level of state-water management institutions in place since 2009 (Chapter 5). Focusing on this group meant that I could explore any tensions and contradictions between their discourses and actions related to water use and practice and wider institutional change in water management.

Semi-structured interviews have the advantage of providing insights into how interviewees view the world; how they frame and understand issues and events (Bryman, 2012). In the first few weeks, I used a general interview guide with a comprehensive list of questions covering broad topics related to demographics, occupation, perceptions and experiences of environmental change, changes in water availability and general experience of life in Huashao. Semi-structured interviews were appropriate because I wanted to ascertain what was important to the interviewee in explaining and understanding events that illustrated changing circumstances and their behaviour/responses.

While I had the structure of a semi-structured interview in mind, how these happened were less structured than the interviews I had arranged with institutions in Huaraz. Oftentimes I had to take advantage of opportunities in the spur of the moment.

- ***Comuneros* and *comuneras* involved in flower production**

I carried out face-to-face semi-structured interviews with *comuneros* and *comuneras* involved in flower production in Huashao with the aim of understanding how and why they had become involved in growing and the outcomes. These belonged to what I define as small and large-scale production in Huashao. The men ranged in age from early-twenties to mid-fifties and occupied different leadership or volunteer roles in the community. They juggled diverse livelihood activities with their flower production; the large-scale producers

[11] Under Law No 30157, *Ley de las Organizaciones de Usuarios de Agua* (Law of Water User Organizations) (Peru, 2014), a water user is a person who possesses a right to use water allocated by ANA.

to a lesser extent, however, as they had to coordinate collections and manage larger volumes of produce.

The opportunities to conduct face-to-face interviews with the women presented themselves less frequently and more randomly than was the case with the men: in the *colectivo* on the way to Huashao from the flower market, for instance after I had spoken to one woman's father who was a large-scale producer or on a walk through the village as one woman sat outside her house bunching flowers. I usually waited to be approached or spoken to by the women because they tended to be preoccupied with child-minding and/or working in the *chacra* or the home and were generally shier in demeanour. They were also less present at formal events that I usually attended with Don Heracio, which was where it seemed easier to set up meetings with the male participants.

As well as categorising flower producers into small and large-scale production and by gender, it was helpful to further define them according to how long they had been involved in the activity to get a sense for their motivations. As such, interviews were framed around questions about a) how the producer had started and why and b) why people were continuing to get involved in recent years or what appeared to be sustaining the activity. Claims that flower production was water-intensive led me to ask producers about how often they irrigated and what types of irrigation methods were used, the effect on other activities and if they believed community life had changed in some way because of production.

My interview with the factory owner in Huashao, served as somewhat of a turning point in the research as it enabled me to situate the research in a broader historical political economy and take forward lines of inquiry that could only be considered hunches before then. Themes emerged that added new dimensions to reflect upon in the case of flower growing, for example: the effects of perceived changes in temperature for continued commercial production in this place and questions of persistent power differentials between private landowners and the *comunidad campesina.* The factory owner also shed new light on the introduction of sprinkler irrigation in Huashao. He was a private landowner and only non-*comunero* interviewed out of the group. A previous employee of the Dutch company, the man was living in Lima and travelled to Huashao monthly to monitor the management of his business.

- **Local Water Administration (ALA), Huaraz**

Intrigued by the way ALA Huaraz's main representative working with YUA Water User Committee, Don Elmar, had spoken to the water users during a training event, his emphasis on the need to change so-called rustic methods and unique articulation of ´el cambio climático´ (Chapter 6), I carried out two semi-structured interviews with him at his office in Huaraz in January and July 2014. In our first interview, I wanted to get a better sense of his role with the *Yurac Uran Atma* Water User Committee, how he had interacted with them and why, clarification of where he stood on *campesino* infrastructure and water availability. I was interested in how he viewed the role of *campesinos* and their practices in the context of new state water management rules and legal requirements and his understandings of climate change. My interview questions stemmed from the way he had spoken at the training event, his use of metaphors, for example, to explain changes in the legislation. In the second, the interview was more specifically focused on the institutional changes that I was now more aware of. Having lived in Huashao for over 6 months at that point, I was better able to conduct such an interview. The goal was to get to the bottom of how he viewed what the collective license and water user rights in general meant for the way the water user committee should conduct themselves and manage their water according to ALA Huaraz.

- ***Yurac Uran Atma* central committee**

I carried out repeat interviews with the president of the central committee, Don Hugo. We walked as far as the *bocatoma* (water outlet for irrigation), and he spoke about the main issues he was dealing with relating to the use and extraction of ice and water (Figure 4.1). As he signalled the exact position of the "dead" or "fallen" ice on Mt Huandoy up ahead, that "belonged to *Yurac Uran Atma*", he showed the significance attached to the ice and water and why he displayed such a strong sense of ownership over, and care for, the canal. Given the early phase of fieldwork, my more specific questions were aimed at developing a better understanding of the need for a lined canal and its history paying attention to the discourses used by Don Hugo. A repeat interview was held with him in June to ascertain his understandings of the water user license and how new legislation, norms and tariffs had

changed the way he managed the committee and user organization, and the extent to which he had adopted the language of 'formalization'.

The remaining interviews with the secretary, treasurer and guards focused on building an understanding of the workings and meaningfulness of the '*turno*' rotation system, observations of changes in water availability and irrigation methods specific to the sector they represented, as well as the kinds of conflictual issues they were dealing with between water users (Chapter 8).

Figure 4.1 Photographs from walking interview to the outlet of *Yurac Uran Atma* irrigation canal. Source: own.

I also undertook semi-structured interviews with the president of *Unidos Venceremos*; NGO World Vision and an English ex-pat who had opened a lodge closed to Lake Queishu and was a registered member of *Unidos Venceremos*. These interviews helped me to fill in knowledge gaps and connect the specific case to the bigger picture of what changes in water use and management meant for the community and their interactions with organizations operating in Huashao. With these, I tried to avoid what Yin (2009) considers a

major pitfall in case studies, that is one that focuses only on the subunit level and fails to return to the larger unit of analysis or phenomenon of interest.

4.6.2. Resource map activity

To gauge more female perspectives about flower production and wider community change, I experimented with a Participatory Rural Appraisal method (Sontheimer et al., 1999). I carried out the activity with a group of women in July of fieldwork (see Plan for Resource Map Activity, Appendix 12.1). Four of the ten I had invited attended. The aim was to learn about their perceptions of what resources could be found in the community, how they were used and how they had changed in the previous 10-20 years. The idea behind this was to see how this group of women saw the development of flower production in Huashao, compared with other crops and the future of production. We sat in the shaded porch of the village chapel, I brought some *refrigerio* (refreshments) to thank them for coming and some of the local children helped me to gather some sticks, pebbles, petals etc. to simulate the different crops in Huashao for the map.

The participants belonged to the small-scale production group, ranged in age from mid-twenties to late-fifties and combined flower growing with other livelihood activities (e.g. a shopkeeper in the village but also maintaining a flower plot by to supplement income) (Appendix 12.1). I marked the location of the school and North, South, East and West. They started off by drawing landmarks, like signpost for Huashao, school, restaurant, the different roads and the chapel. It was slow to take off but the younger participants took an immediate interest in the map, while the older members observed while knitting, commenting on what belonged where, as the drawing took shape. When I reiterated the objective, I was asked “but do you want us to draw Huascaran?” I said that was up to them, if it would help to describe the crops that are currently grown here and they said, “but the main thing grown here is flowers”.

Figure 4.2 Photograph of resource map, outcome of resource map activity with the *comuneras*. Source: own.

Figure 4.2 shows the resource map illustrated by *comuneras* who were asked to depict the most important crops in the area, to facilitate a discussion on how the landscape had changed in the last 10-20 years (twigs in bottom of the picture denote maize, twigs in the centre quinoa, stones potatoes, and grass represents oca). The map served as a useful prop to discuss livelihood production and water and the following themes emerged during the two-hour long activity:

- The change in crops historically;
- The problems with flower production, including effects on food consumption and labour intensiveness;
- Irrigation needs;
- Relationships that led them to produce;
- Meaningfulness of having work from flower production ("before just one person gave work now everyone gives work");
- Links between canal infrastructure and disappearing springs.

4.6.3. Secondary data

Throughout fieldwork I collected pieces of information that provided context through which to interpret my data. The policy instruments and legislation both referred to by Don Elmar from the Local Water Administration and used in his training events in Huashao were important texts to understand circulating discourses. These included:

- *Política y Estrategia Nacional de Recursos Hídricos del Perú* (2009) (National Water Resources Policy and Strategy of Peru), supported by a reading of the 2015 version. This was the "guiding instrument" (Comisión Técnica Multisectorial, 2009, p. 42) for the implementation of the 2009 Water Resources Law;
- *Ley de Recursos Hídricos 29388* (2009) (Hydrologic Resources Law 29388).
- *Ley de las Organizaciones de Usuarios de Agua 30157* (2014) (Law of Water User Organizations 30157).
- Copy of *Yurac Uran Atma* irrigation map.

The 2009 National Water Resources Policy and Strategy (Comisión Técnica Multisectorial, 2009) was repeatedly referenced by Don Elmar as he urged the water user organisation to comply. Water guards and user members of the Water User Committee were already taking on board some of these ideas during my time in Huashao (see Chapter 6).

I retrieved a copy of the map covering the area under irrigation in the *Yurac Uran Atma* watershed block, used in the 'formalization' of water use rights in the high Santa valley (Ministerio de Agricultura, 2013). This provided a deeper insight into the types of rationale driving 'formalization' discourses, for instance, the quantification of water. ANA's website, which reported on the water user license ceremony, was useful to further grasp the framing of their work with communities.

I was able to build an institutional understanding of *Unidos Venceremos* from the following documents:

- *Estatuto Interno de la Comunidad Campesina Unidos Venceremos 2010* (Internal Statute of the *Comunidad campesina* "*Unidos Venceremos*" Huashao-Yungay (2010)
- *Censos Nacionales 2007: XI de Población y VI de Vivienda* (2008) (National Census 2007: XI Population and VI Housing).

The aspects of history I was most interested in understanding in Huashao were the extent of change experienced in livelihood strategies, as well as the legacy of the division of *hacienda* lands during the agrarian reform. Understanding these aspects of history would help to interpret some of the ongoing social divisions implied in interviews and interactions with the different social groups and the claims to how much livelihoods based on food production had changed. To try to piece together a sense of Huashao historically and culturally, the only secondary source of information I could find was the *Libro de Oro de Yungay*, written by Alberto Carrión Vergara in 1962, although the latter was mostly a geographical and demographical account of what the village looked like back then. As such, the description of the history of the place is quite limited, however I collected some snippets of information from the older generation about how agrarian reform took place, making connections with the information in the book where possible.

4.7. Analysis

The study adopts a two-prong approach to analysis: critical discourse analysis, combined with an interpretative analysis of decisions, actions and behaviours (Giddens, 1979). Critical discourse analysis is used to scrutinize the construction of meaning in the discursive practices of the groups of people to visualize the patterns of discourses circulating in Huashao with regard to water use and management. Fairclough (2003) offers methodological tools for the empirical study of discourse in everyday social interaction and emphasizes the importance of doing systematic analyses of spoken and written language in a text-oriented form of discourse analysis. This involved questioning the priorities, constructed rationale and the subsequent expectations of the different actors evident in text and practice. In the analysis of the text documents, for example, I asked questions like how they were written, who wrote them, what type of language was used, assumptions made, prioritized knowledges etc. The objective was to visualize the more abstract discourses as a way of understanding how discourses more generally might be limiting possibilities for action. This helps to reveal how and why certain water use and management and institutional actions are framed in different ways in Huashao, and to facilitate a discussion about how struggles at the level of discourses contribute to changing,

as well as reproducing, the social realities in Huashao (Phillips and Jørgensen, 2002) i.e. the discursive practices and their ideological effects.

The construction of meaning pertaining to peoples' actions and behaviours was achieved throughout the research process by adopting an iterative, analytic technique that resulted in a series of iterations, repeated as many times as needed, similar to those suggested by Yin (2013, p. 149):

- Making an initial theoretical statement or an initial explanatory proposition
- Comparing the findings from an initial case against such a statement or proposition
- Revising the statement of proposition
- Comparing other details of the case against the revision
- Comparing the revision to the findings from *a second, third, or more cases.*

Using this approach, I reflected and analysed my data as I collected it, stepping back from my interviews at regular intervals during fieldwork. Certain themes had already emerged during fieldwork, which I chose to focus on in the final phase of fieldwork. When I returned, I set about transcribing recorded interviews and meetings. I used NVivo software to do this, which doubled as a password-secure database for my research. As I transcribed, I made notes of the key characteristics of the type of data, the main topics covered and what each interview or meeting could be a good illustration of (for instance an account from large-scale flower producer about how they had expanded their business). I then coded the interviews using thematic categories as they arose. I used a combination of NVivo and manual mind maps for the group of themes and preliminary analysis of links across broad themes.

For my detailed analysis, I stepped away from software and followed an inductive analytic strategy (Gee and Handford, 2013) to manually code for patterns and concepts in my interview and meeting transcripts and to connect first order data to disciplinary concepts as follows:

- Step 1: Identify the "experience-near" concepts or first order constructs of reality – those concepts used by participants to naturally and effortlessly define what he or she sees, feels, thinks, imagines about a broadly unstructured question.

- Step 2: Based on the “experience-near” concepts, group the concepts by actors to arrive at a proposition about a shared understanding of the group under a broad focus area, largely continuing to use the terms of participants.
- Step 3: Identify "experience-distant" or disciplinary concepts that I will employ to forward a scientific, philosophical or practical aim.

I created tables defined by the social groups and using the steps above as headings. Deciding on the discourses with most influence and concepts that had emerged from the inductive analysis of themes, I revisited my research questions on numerous occasions to adapt them to more adequately reflect the data.

4.8. Reflections on research process

4.8.1. Language

My language barrier in Huashao was significant. People spoke Quechua in their everyday lives and it became apparent that some women only spoke Quechua, while men tended to be bilingual or perhaps more open to speaking to me in Castellano. I took Quechua classes in the Cultural Centre in Huaraz for almost three months, but it soon became apparent that I would not be able to learn more than the very basics, unless I prolonged my fieldwork. Trying to learn even the basics was an unrealistic goal within the time I had allocated for fieldwork and I decided that my time would be better spent incorporating the language-learning into efforts to build trust with people. In saying that, doing my homework for Quechua class with my host family was a way of connecting with them. It was Don Heracio´s first time to see Quechua in writing and they thoroughly enjoyed my efforts at pronunciation. I also learnt that people tended to speak a mix of Quechua and Castellano in public meetings, so I was oftentimes able to grasp meanings[12].

[12] All quotes and quotations in English throughout the thesis are my personal translations of the original quotes and quotations in Spanish.

4.8.2. Research ethics

I received ethical clearance from the Research Ethics Committee in the School of International Development at UEA on 26th October 2013.

- **Introducing the research and obtaining consent**

At the beginning of each interview or informal chat, I explained where I was from and the general aims of my research. In the more formal interviews in Huaraz and other interviews with community leaders from Huashao that took place outside of the village for logistical reasons, I provided a consent form with my contact details and the contact details of the environmental lawyer, who had agreed to act as my point of contact. I explained that I would keep their responses anonymous and confidential. In Huashao, given the impromptu nature of many of the interviews it was not always possible or appropriate to provide a consent form (I noticed early on that some women had difficulty reading). Many recognized me from previous meetings in passing or my presentation at the Water User Committee meeting in January 2014 and presenting a consent form was not necessarily conducive to the flow of a conversation that may already have started on foot or while in the *chacra*. In cases where written consent was not possible, I always obtained verbal consent.

While it was my intention to record the interviews on my dictaphone, when on the first few occasions in Huashao I asked for the person's permission to be recorded, it was greeted with suspicion. From then on, I exercised caution and judgement when deciding whether to suggest recording in the first place. For those more structured interviews with institutions or with community leaders, I asked if they were comfortable with being recorded, explained that they were under no obligation. In cases where the person agreed, I explained that this would later be written up, anonymized and remain confidential.

- **Exercising discretion and asserting neutrality**

Staying with one family for the duration of my fieldwork meant giving up a certain amount of my independence and freedom as a researcher – I was not just renting a room in their house but, essentially, I was another member of their family. Sofia sometimes referred to me as "*mi gringa"* (my foreigner) in conversations with women at the market who were curious about me, which suggested some power or prestige attached to hosting a foreigner. As family feuds and rival groups began to manifest themselves in Huashao, these

kinds of political dynamics were important to bear in mind as I interviewed and conversed with other members of the community whose responses could be influenced by their knowledge and perception of my host family. I had to be mindful of the potential bias that this singular affiliation probably produced in my data collection efforts with others. I exercised discretion and asserted my position as a neutral observer for the duration of fieldwork as much as possible by remaining open to all perspectives and points of views with research participants. However, a leadership conflict broke out between members of my host family and another family of *Unidos Venceremos* towards the end of my fieldwork that made it increasingly difficult to maintain an unbiased position.

- **Managing expectations**

Due to the difficulty of navigating the terrain, as mentioned above, it proved particularly challenging to access the water guards who lived in the more remote sectors located at higher ground. To try to work around this and also because of time constraints, I took the opportunity at a meeting of the central committee to gauge the perspectives of the guards about changing water availability and new interactions with state authorities using a questionnaire. While I was aware that this method did not fit with my overall methodology, I thought that it might give some indication that would help me to narrow down which of the guards I could speak to. Instead, observing how the guards huddled together with the president of the Committee to write their responses and later reading their reflections, revealed their expectations and hopes related to my research outcomes. Their responses revealed a need to source funding to build a reservoir and a hope that my research might help to identify such funding, as one guard intonated to me on returning the questionnaires. I tried to avoid the creation of these kinds of expectations by asserting my positionality as a student there to learn about their way of life. However, the asymmetry of this was omnipresent, so I tried to give back while I was there by volunteering at the school, helping out at the recreation zone of the national park, or promoting rural tourism initiatives in Huashao on my visits to Huaraz and other parts. I also plan to return to feedback the outcomes of my research.

The thesis continues with an exploration of the historical and social landscape of Huashao and its people to contextualise emerging interactions with water authorities.

Chapter 5 : The village of Huashao - people and place

5.1. Introduction

In this chapter, I delve into the physical and social landscape of the village of Huashao and the wider region. The aim is to uncover and examine the multiple dimensions of physical and social change in Huashao that relate to livelihoods change, how water is valued, used and managed, and the nature of these changes (research sub-question 2). It is important to examine the context-specific nature of livelihood practices and multiple influences on water use and management practices because this shows the contextual complexities of changing social life in Huashao into which further institutional changes are folded under the 2009 Water Resources Law.

The chapter starts with a brief examination of the history and physical geography of Huashao within the wider Cordillera Blanca and following Peru's Agrarian Reform. I subsequently explore the changing and diverse nature of livelihood activities in the Andes and then in Huashao specifically, discussing recent commercial developments, as well as central features of decision-making of production in the Andes. I then focus on examining the landscape of local and regional water agencies operating in Huashao (composition and background), their interactions and how and why the local Water User Organization, *Yurac Uran Atma*, had been granted a water user license. In the final section, I highlight the changing nature of water distribution that relies on communal rules and individualized technologies (explored further in Chapter 8), the effects of the introduction of state tariffs and the role of Practical Action in the adoption of new irrigation technologies.

5.2. Huashao village and the Cordillera Blanca mountains

On my first visit to Huashao in December 2013, I was greeted by eager taxi men in Yungay, howling “Laguna de Llanganuco” (*Lake Llanganuco*) and ushering me into their respective cabs. It was natural for them to assume I was yet another backpacker on her way to take in the breath-taking scenery and turquoise-coloured glacial lakes of the Cordillera Blanca mountains towering over the valley - Yungay is the most direct entry point to the Llanganuco sector of Huascarán National Park. In the taxi ride uphill, I was struck by the vast cemetery that came into view in the valley below. It was the buried town of Yungay the taxi man told me forlornly. In 1970 a deadly earthquake caused a glacier avalanche from Mt Huascarán, burying the town of Yungay, killing 15,000 people (Bode, 1990). Later I would learn how surviving residents of Huashao looked on helplessly from higher ground as the avalanche passed through the heart of the village before it levelled the town of Yungay. The buried town is now a national cemetery. Though the deadliest of disasters had taken place in 1970, residents of the Callejón de Huaylas had suffered the consequences of a barrage of outburst floods and glacier avalanches since the 1940s (Carey, 2010).

Since the 1940s the Cordillera Blanca has been gradually exposed to more and more newcomers. According to Carey (2010), glacier experts and water developers (hydroelectricity generators and large-scale coastal irrigators) moved into the Cordillera Blanca, firstly facilitated by disaster prevention programs and since the 1980s, by international concerns about global warming. Rural residents enabled communication networks in the previously remote Cordillera Blanca by helping scientists and working on engineering projects. New roads and trails constructed to drain glacial lakes were used to get into town, and they increasingly encountered tourists, water developers, national park workers and government officials on the same routes passing through their communities. Interactions with these groups meant that rural residents increasingly shared control over the previously remote Cordillera Blanca.

Early one morning in Huashao Don Heracio kept me company as I waited for a *colectivo* to travel to Yungay, while we took in the sunrise over Mt Huascarán from the porch. Don Heracio was just six years old when the earthquake hit; his grandparents, uncles and aunts had all perished. As he contemplated the peaks that morning, Don Heracio told me that

they used to call Mt Huascarán “asesino” (murderer); it had taken his parents almost two years to start cultivating again because, he said, they had been too scared to leave higher ground. However, now, as he reflected with a lighter air, he told me they give thanks to the mountains for the tourism the mountains creates. Without it and the work opportunities they offer, they would not be able to survive in the area, he noted. Contrasting with the accounts of loss in water scarcity narratives dominant in scientific discourses, Don Heracio’s relationship with Mt Huascarán as an actor with agency had enabled them to continue living in Huashao, offering opportunity and hope[13] (De la Cadena, 2008, 2010).

Indeed, the influx of newcomers to the Cordillera Blanca had also opened the area to tourists. Researchers told stories of the stunning beauty of the Cordillera Blanca and disseminated information promoting mountain tourism in the region. Global popularity in mountaineering, skiing, adventure travel and ecotourism increased as hazard prevention infrastructure, such as roads, trails and labour camps, paved the way to rugged canyons and majestic mountains. Huascarán National Park was created in 1975 to officially place the Cordillera Blanca glaciers under government jurisdiction and promotes conservation as well as mountaineering and tourism. Nowadays tourist traffic to the Cordillera Blanca remains unmatched by the other 19 glaciated mountain ranges in Peru.

Originating in the Quechua word meaning "far", Huashao is a village comprising of members and non-members of a *comunidad campesina* called *Unidos Venceremos* or “Together We Will Conquer”. It is located at 3,100 metres above sea level, nestled between Mounts Huascarán and Huandoy, the highest peaks of the Cordillera Blanca, and located approximately 10km from Yungay town on the main road to Llanganuco Lake (see Figure 5.1). Huashao constitutes the main village of Coptac, one of seven sectors belonging to *Unidos Venceremos:* Coptac, Incapacolcan, Humacchuco, Jara Allpa, Churu Huarca, Huepish, and Huarca (see Figure 5.2).

[13] An exploration of the conceptualization of Mt Huascarán as a non-human actor with agency was outside the scope of the thesis.

Figure 5.1 Map of Huashao with respect to Yungay, Huascarán National Park and Mounts Huandoy and Huascarán. Source: Map data ©2018 Google

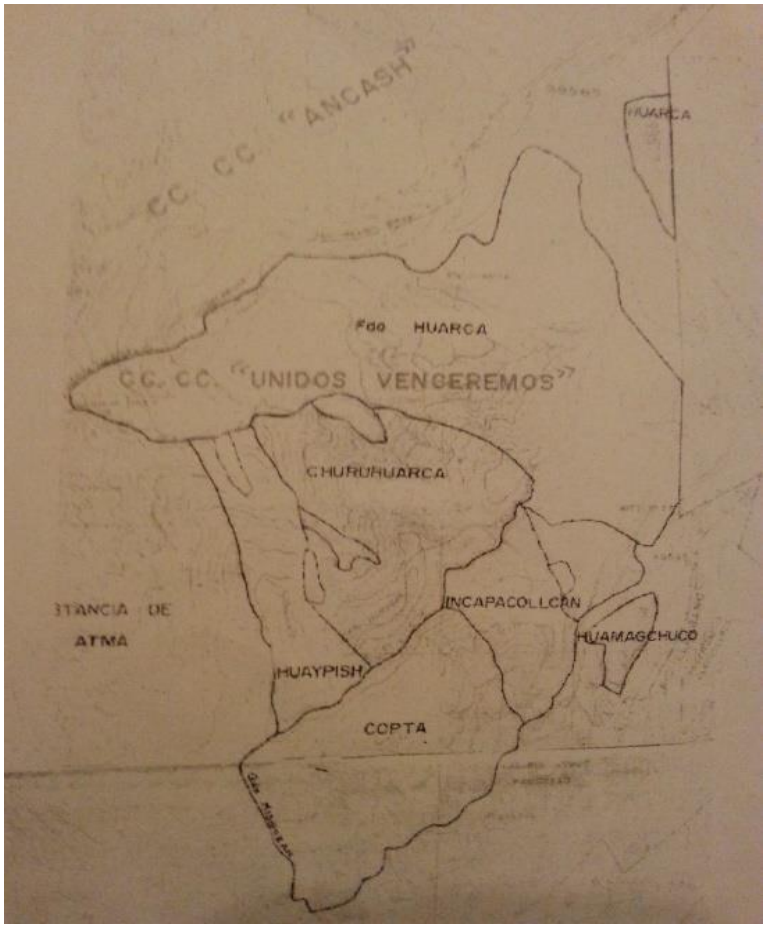


Figure 5.2 Map of territories covered by the member sectores of comunidad campesina Unidos Venceremos. Source: Unidos Venceremos.

Huashao is primarily a Quechua-speaking village. A proportion of the population also speak Spanish (Castellano), mainly children and educated middle-aged men who occupy or have occupied a leadership role. The women in the village converse primarily in Quechua but can hold basic conversations in Castellano. Most non-Quechua speakers reside in the privately-owned land around the borders of the *comunidad campesina* and are usually *peones* who commute from Yungay to Huashao to work in the small family-run flower cultivation plants or teachers commuting to work at the local school.

With approximately 400 heads of family and land extending over 931 hectares, the *comunidad campesina* was formally recognized by the state in 1977 (R. N˚ 061-OAE/JAF-ORAMS-III-77). In the early 1960s, the sectors of Coptac and Incapacollcan were property of the state (*Beneficiencia de Yungay*, "welfare of Yungay") and Huashao belonged to the

heirs of don Leonor Angeles (Carrión Vergara, 1962). While most of Huashao to the west, was divided up into sectors now belonging to the *comunidad campesina* during Peru´s Agrarian Reform, Shilta to the east (southeast of Coptac in Figure 5.2 above), remains privately owned. A flower factory is now located in this sector and belongs to private landowners. Huascarán National Park lies to the east of Huashao, small landholders to the west (Atma) and south and shares its border to the north with adjacent *comunidad campesina*, *Ancash.* Impossible to gauge from the sketched map, the seven sectors that make up the *comunidad campesina* lie at diverse altitudes to the north-west of Huashao, ranging from approx. 2,200masl in Coptac to over 3,500masl in Churuhuarca.

Despite its meaning in Quechua, the village of Huashao is a short drive from Yungay market - residents can travel relatively easily to the local urban centre or nearby valley towns, though they are prone to road-closing landslides. In recent years, this accessibility has meant that it has received significant attention from development and government organizations with research and political agendas in how water is used and managed in the areas surrounding Huashao. Its location in the buffer zone of Huascarán National Park and on the main road to Llanganuco Lake has also made it a target for state-led conservation initiatives in efforts to strengthen the relationship between the *comunidad campesina* and the park authority.

Turning the corner before entering Huashao from Yungay offers a dramatic view of the adjacent peaks of Mt. Huandoy (6,360masl) and Mt. Huascarán (6,768masl). A large tourist restaurant lies here, one of several in the village. This point is a glimpse into village life. Pigs and donkeys graze in a pasture at the heart of the village bordered by small plots of arable land. A minor road leads to tiny chapel, medical post and the village´s primary and secondary school and gives way to a cement-covered square, with fountain and seating area, before continuing onwards to the Llanganuco entrance of Huascarán National Park. The village is dotted by one and two-story adobe houses with some serving as convenience stores or family restaurants. Eucalyptus and native *quenual* border the *chacras* and man-made canals meander throughout, carrying water from rivers Pay Karma (Mt Huascarán) and *Yurac Uran Atma* (Mt Huandoy) to irrigate the *chacras*.

5.3. Livelihood activities – diversity and change

In the highlands of the Callejón de Huaylas people are engaged in livelihood strategies of cash and subsistence crop production and market-based agro-pastoralism, mining and tourism, according to Young & Lipton (2006). The choice of crops grown varies along elevational gradients related to altitude that generate the environmental conditions that favour, limit or impede production (Mayer, 2002). The features of the landscape - its 'verticality' - enable distinct sets of livelihood portfolios (Mayer, 2002). Agricultural production of alfalfa, corn, wheat, barley, and beans are grown at elevations between 2,000-3,000m; potatoes, *olluco*, oca, broad beans and quinoa are frequently cultivated from 2,500 to 4,000m (ibid.). Upper elevations (3,900 to 5,000m) are also used for rotational grazing of mostly cattle, horses and sheep and, less frequently, alpacas and llamas (ibid.). In addition, the tourism sector provides opportunities to subsidize incomes and through its conservation agenda, the Huascarán National Park has ensured mining activities have not gained a foothold while tourism in its various guises has emerged as the option most compatible with conservation (Rasmussen et al., *forthcoming*). Families in this region thus utilize multiple fields from various elevations and select numerous crop types, livestock raising or wage labour, sometimes all at the same time.

Many Andean agro-pastoral activities and decisions about the use of resources – land, water, animals, crops – are made and implemented on a household, extended family and community level, mediated by a combination of institutions, as evidenced throughout the tropical Andes (Brush and Guillet, 1985; Mayer and de la Cadena, 1989; Mayer, 2002; Young and Lipton, 2006). As illustrated above, the diversification of activities has long been found to be a central feature of the way that the decision making of production is structured in the Andes and the way that livelihoods are sustained by creating additional income-generating activities. Extending beyond agricultural production, strategies might simultaneously include field agriculture, livestock rearing or wage labour, in construction for example. Decisions about whether to undertake distinct activities and livelihoods depend upon factors such as the priorities of the household and the availability of labour, which will be evaluated by the season, access to different ecological zones and the ease and cost of access to urban areas (Young and Lipton, 2006). The gendered division of labour

also allows households to engage in a wider array of income-generating activities (Deere, 1990).

Mayer (2002) argues that the household economy, as the basic institution in Andean economies, can be understood by the relationships between households and those that bind them to the community, as well as the links established to commodity markets (see also Bebbington 1997, 2001). To understand shifts in crop choices and preferences and connections created to the market therefore is to understand the fundamentally social nature of agricultural production affecting decisions within and between households (Mayer, 2002; Rasmussen, 2015).

According to the Libro de Oro de Yungay (Carrión Vergara, 1962), the 1960s in Huashao were characterized by predominantly agricultural activities (subsistence food production), with some pastoralism and tailoring of materials, like handwoven wool *bayeta* cloth, used for ponchos, blankets and the traditional wide skirt still worn by women, the *pollera*. The women of Huashao were dedicated to hand spinning wool and cheesemaking (ibid.). During my fieldwork, the activities were mixed: small scale, subsistence agriculture and livestock rearing was often combined with other commercial activities such as flower cultivation, if land was available, wood selling and tourism services. Crops such as potato, maize, *olluco*, quinoa and oca were grown and livestock such as pigs and cattle reared for domestic consumption. Other less common activities included wood cutting and/or construction work, which could bring the men away from the village for weeks at a time. Two small grocery shops run in the village and a number of tourist restaurants run by *comuneros* offering traditional Peruvian dishes and catering for the passing tourist trade on day-trips or extended hikes to Huascarán National Park. As mentioned above, there was also what appeared to be a new livelihood activity taking root in Huashao, commercial flower growing. In recent years, following the arrival of a Dutch flower producer to the region, diverse varieties of flowers could be seen growing at elevations above 2,800m approximately.

The creation of Huascarán National Park in 1975 and subsequent improvement of the Yungay-Llanganuco road have had major consequences in this area, including a rise in the passing tourist trade as well as alternative employment opportunities in the park itself. The Llanganuco gorge contains the park's most important tourism attractions: two turquoise-

coloured lakes called Chinancocha and Orconcocha and the checkpoint to Llanganuco is a twenty-minute drive from Huashao. It constitutes the most popular adventure tourism route in the Cordillera Blanca and was the most visited area in Huascarán National Park in 2016, with over 90,000 visitors.

During my time on fieldwork, the leaders of *Unidos Venceremos* were in the process of administering a 5-year tourism contract with Huascarán National Park, the first of its kind agreed between a *comunidad campesina* and the Peruvian state (Rasmussen et al., *forthcoming*). In 2013, the leaders of the *comunidad campesina* signed a Rural Community Tourism contract with Peru's National Protected Areas Service (SERNANP) in the Ministry for the Environment to provide minor tourist services in the Llanganuco recreation zone of the park, including the sale of food stuffs, artisanal goods, boat trips on Chinancocha Lake and walks with llamas. In exchange for the socio-economic benefits associated with the control of these services, the community pays 30 Peruvian centavos to SERNANP for every tourist who enters the park, and commits to supporting conservation efforts, including promising to remove 250 heads of cattle, collect solid waste, assist with reforestation, maintain tourism infrastructure, and provide communal park rangers.

Workers earn an hourly wage and their shifts rotated by sectors, following community structures for work organization. The money from the sale of products and services contributed to the community fund, which was growing significantly and being distributed to community members in different ways. For example, while I was on fieldwork, food and drink was provided at community meetings and paid for using the newly-generated money from contract activities in the park, whereas before the signing of the contract, members had to bring their own refreshments. This was significant for community members' attendance and morale at these events; meetings often went on for the best part of the day at high altitudes and were taxing even for those accustomed to the temperature extremes. Therefore, not having to worry about food was a significant benefit. The leadership at the time also sought to invest this money in community development infrastructure, such as the purchase of school computers and the construction of a community-run store, however this had not yet transpired during my time in Huashao.

The contract was a source of pride for leaders because they viewed the terms of the contract as an achievement of the community's development goal, outlined in their 2010

internal statute, to create business opportunities and promote tourist activity. It strongly coincided with the communal leadership's vision for economic development in the community. Reflecting on the increasing activity in *Unidos Venceremos*, the president told me that:

> we are looking for its development, no? Its own development that it's going to carry out in its own territory, that tomorrow, later, when it is no longer with SERNAMP, that the community has its own income revenue…the community has a plan: we're not going to donate to anyone, but rather we will have our own management to be able to help the community.

Conveying a strong belief in *comunidades campesinas* as entrepreneurial entities with power to bring about change, he was especially proud of the competition for work and labourers that they were experiencing in Huashao. "Why?" he asked me, "because there are many people here that sow flowers, the community has its own work in Llanganuco, so it's already generating its own work. So, where does this come from? When everyone contributes their willpower, when there is a good leader, all of this goes hand in hand. And this for me is development". The leadership in place at the time of fieldwork was prioritizing the generation of funds from their control of production services in Llanganuco, as part of a wider desire to expand the set of livelihood opportunities on offer to community members and to promote self-management.

The dominant activities in Huashao show a diverse range of livelihood activities, with a strong emphasis on tourism in recent years and increased interaction with commercially-driven activities, compared with predominantly agricultural livelihoods in the 1960s. The signing of the tourism contract gives a sense that there is an openness to interaction and cooperation with authorities in this place, on the part of the leadership, with a view to creating mutually beneficial opportunities for community members. It also signals a preference for economic development among community leadership, based on the outward-facing identification of opportunity. The livelihood activities in Huashao are therefore interesting to explore in light of wider trends in livelihood strategies in the highlands of the Callejón de Huaylas and the gradual opening up to commercial trade. A move away from subsistence agriculture in the context of glacier retreat raises questions about what the implications might be for water use of increasingly commercial livelihood

practices and the state's ongoing association of subsistence agriculture with *comunidades campesinas* vis-à-vis understandings of so-called ´customary´ uses (research sub-question 2).

5.4. Landscape of water agencies in Huashao

Members of *Unidos Venceremos* relied on the waters of an irrigation canal called the *Yurac Uran Atma* (YUA) irrigation canal, fed by the glacier meltwater of Mt Huandoy. This was the site of several infrastructural and normative changes in irrigation water management brought about by new national water management arrangements instituted in the 2009 Water Resources Law. These included the transformation of a natural irrigation ditch to a piped canal, allocation of user rights, the introduction of a tariff system, and the creation of hierarchical water management agencies with specialized functions, targeting perceived water scarcity and the achievement of water use 'efficiencies'.

The landscape of water agencies operating and interacting in Huashao consists of a Water User Organization, called YUA Water User Committee, recognised in the state system of irrigation under the National Irrigation User Board of Peru (JNURDP). In addition, devolved authorities of ANA operating at local and regional levels in the Callejón de Huaylas, ALA Huaraz and the Knowledge Management and Interinstitutional Coordination team, are also working in Huashao. The Knowledge Management and Interinstitutional Coordination team appears to be an unplanned authority within the 2009 Water Resources Law, seemingly set up to deal with the current conjuncture of water institutions.

In this section, I lay out the composition and background to the latter water management authorities operating in Huashao with responsibility for influencing the implementation of the former changes. These exemplify some of the "new forms of water institutionalization that have emerged under the 2009 Water Resources Law, which organizes water in a nested hierarchy of agencies with specialized functions" (Rasmussen, 2015, p. 74). Studying their interactions is an attempt to understand how the different components of the water

bureaucracy, that continue to be developed in Peru, are working and interacting at local and regional levels (Ortiz, 2008).

5.4.1. The *Yurac Uran Atma* (YUA) Water User Committee

The users of *Yurac Uran Atma* canal were organized following the state's system of social organization (Rasmussen, 2015): each user of the canal is assigned to the *Yurac Uran Atma* Water User Committee which is part of the pyramid structure through which irrigation in Peru is organized (ibid.). It is the lowest level of social organization in the state´s system, encompassing all the registered users of the *Yurac Uran Atma* canal, approximately 1,200 users.

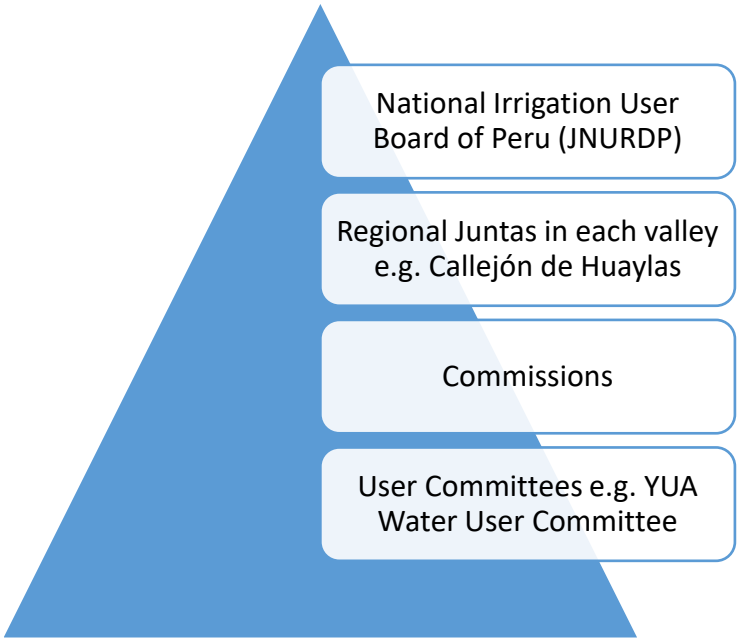


Figure 5.3 The social organization of irrigation in Peru. Source: own (based on Rasmussen, 2015).

Lying at the base of the pyramid, the committee is the fundamental unit of organization at the local level. Committees are then grouped into a commission that covers a larger zone. The commissions are then organized into a regional junta, which in this case covers the entire Callejón de Huaylas. Under legislation, the regional junta of users is responsible for the operation and maintenance of minor irrigation infrastructure. The regional user boards are then brought together in a national organization, JNUDRP. Under the 2009 Water

Resources Law, only recognized canals can be considered part of the nested hierarchy of water organisations.

Confusingly for users, the office of the president of the Junta de Usuarios de Callejón de Huaylas (Regional Junta of Irrigators of Callejón de Huaylas) is located in a government building, even though the organization is formally separate from the state and originally a union for the country´s irrigators. According to Rasmussen (2015), the latter is symbolic of the state´s increasing interest in controlling the flow of water and "embodies the institutional lack of clarity concerning water governance" (p. 77). This also means that users are taking on responsibilities that would appear to belong to the state structure (ibid.).

The Committee is governed by a central committee comprising a president, general secretary, a treasurer and 11 *vigilantes de agua* (water guard), which are assigned to each of its constituent sectors. These eleven sectors are the seven sectors that make up *Unidos Venceremos* plus four others outside of the community (either private property or belonging to another *comunidad campesina*). The function of the water guard is to allocate water to the family plots in his assigned sector, to ensure that each family is registered on his list, to monitor water use and to deal with any conflict situations or those taking water out of turn. When a problem arises, theoretically it is the job of the central committee to intervene and decide on a course of action based on their internal statute and the water resources laws, however in practice this is not always the case (Chapter 8).

5.4.2. 'Formalization' of the YUA Water User Committee: organization in the face of conflict and a license to defend

The YUA Water User Committee was awarded a state license in 2013, following historical conflicts with a neighbouring water committee over the share of water, multiple blockades to prevent the removal of snowfields, as well as problems with distribution of water within their own territory. Being a recognized canal means holding a license issued by the Program for the Formalization of Water User Rights (PROFODUA), an office within ALA Huaraz. The committee itself was formed in 1999 and, before that, water distribution was "totally disorganized", according to the president of the Water User Committee, with people taking water from the canal on a needs basis.

In the years leading up to the awarding of the license, the president of the *YUA Water User Committee* had opposed the removal of snowfields from Mt Huandoy and a longstanding water conflict with a neighbouring water committee. In the first instance, ice was being taken from Mt Huandoy to be used for the commercial production of *raspadilla*[14] in Chimbote and Trujillo but the removal of "fallen/dead" ice was harming their supply, according to Don Hugo. Since taking over his post in 2009, the president and his committee had arranged blockades to stop the extraction (with the consultation of SERNAMP) and had led 12 trials that resulted in the implementation of precautionary measures to prevent the extraction. In the second instance, the Water User Committee was in litigation with a neighbouring water committee, Pata Pata, that had begun as far back as 1968.

The two committees have historically disagreed over the amounts of water reaching their land. The North and South peaks of Mt Huandoy form streams (*riachuelos*) or small gorges (*quebrada*) that supply Pata Pata and *Yurac Uran Atma* with their water respectively. Pata Pata claimed that they were not receiving enough water and demanded that the water be divided equally between committees. However, according to the president and the Committee treasurer, their Committee (*Yurac Uran Atma*) in fact needed more because of their greater numbers of users and hectares under irrigation. Allegedly, Pata Pata also had access to more natural springs (*puquios*) on their land. The conflict intensified between 2009 and 2011 and a judicial process began with the involvement of ANA.

According to the treasurer, the authorities had difficulties understanding the situation initially based on Pata Pata´s claim:

> Legally they were telling us that we should control the water because *water is life* but the legal authorities did not understand… did not see geographically… thought that there was just one source of water and that we were covering it for Atma only. So, thinking this, the legal authorities said, "give them water; 50% give them" [emphasis added].

It seemed the authorities believed that there was just one water source and accused *Yurac Uran Atma* of keeping (*que habíamos tapado*) the water for themselves, leaving none for Pata Pata, on the grounds that they should have been able to share the supply following

[14] A local sweet treat, historically made with glacier ice (Dunbar and Damacia Medina Marcos, 2012).

principles of solidarity underlying 'water is life' thinking. *El agua es vida* or 'water is life' is a commonly held belief among communities in the Andes that invokes "the morality of life on the puna and the solidarity of peers – a specific domain" (Rasmussen 2015, p. 71) that contrasts with a different domain, that of national legislation.

The judiciary subsequently issued an order to divide up the water equally, however ANA ordered a valuation of the water which overturned the decision of the judiciary. "They sent hydrologists, agricultural engineers, what was needed and they did a study to measure the water, what type of land we have, what type of land they have, everything", the treasurer told me. The results of the valuation showed that the water supplying *Yurac Uran Atma* satisfied just 40% of their crop needs over 1,500 hectares, whereas with just 511 hectares, Pata Pata were able to satisfy the needs of their land by 75%. (The valuation had measured how many litres per second were flowing in the canal's waters, how many tonnes of potatoes and *olluco* this could produce, how much this would be worth at market etc.) An act of reconciliation was subsequently reached, signaling the supposed end of a 40-year feud because "each one of us was left with our own [water] source" (president of YUA Water User Committee).

The conflict experienced by *Yurac Uran Atma* culminated in a judicial process and a valuation of the water supply which, together with the ultimate granting of the license in 2013, are all considered part of the legalization and 'formalization' of norms and procedures or specialized functions deemed necessary by the state to 'modernize' Peru´s water management. While this meant that the intake of *Yurac Uran Atma* irrigation canal was now on paper and included numerical measurements of the canal's capacity, the conflict with Yurac Uran Pata Pata water committee was far from resolved by the time I left Huashao. According to the treasurer, the president of Pata Pata water committee was unsatisfied with the details of the license issued to Atma and had submitted an appeal to ANA in Lima. Committee members questioned the possible motives behind this appeal while they awaited the results: how could they (Pata Pata) appeal a document that "they themselves had requested from engineers, they themselves had made the engineers walk their land, analyze the land, measure the water"? A conflict that had originated in a concern for the physical distribution of the water flow between neighbouring villages was

becoming a process of negotiation over the details of the license with the national water authority.

5.4.3. The Local Water Administration (ALA), Huaraz

Under the devolution of water management in Peru, each region has its own Administrative Water Authority (*Autoridad Administrativa de Agua* or AAA). In Ancash, this authority is AAA Huarmey-Chicama. This authority is further devolved into six Local Water Administrations (*Autoridades Locales Administrativas* or ALA, circled in yellow in Figure 5.4 below), one of which is ALA Huaraz. Responsible for managing the upper and middle basins of the Santa River watershed, they were required to implement, supervise and evaluate compliance with the National Water Resources Policy and Strategy (NWRPS) and the National Water Resources Plan at all levels of government with the participation of the users and operators of hydraulic infrastructure.

While they are identified as separate entities in the organigram, representatives from the Knowledge Management and Interinstitutional Coordination team (circled in red in Figure 5.4) identified themselves in Huashao as ALA Huaraz. As the organigram suggests, this team acts as an intermediary between the highest management and lowest administrative levels. Their primary activities are aimed at knowledge management, implementing a 'new water culture' and general management of communications related to IWRM. First and foremost, this team was responsible for "proposing and supervising the implementation of norms for the development and strengthening of capacities" and suggest "strategies for the prevention and management of social conflicts related to water resources" (ANA website).

While the name given to this authority is local, for the purposes of the research, I consider it a regional authority (Huaraz is the provincial capital of Ancash region) to differentiate it with the YUA Water User Committee, the decision-making authority at the lowest level in the state's national irrigation system.

During my time in Huashao, ALA's activities were focused on training events with YUA Water User Committee aimed at raising awareness about the new rules they were legally compelled to comply with under the 2009 Water Resources Law and the legal access that their newly issued water user license facilitated. These included changes to participation

and decision-making arrangements under the proposed new Water User Organizations regulation (Proyecto de Ley No 3031/2013-CR), subsequently passed into law and now known as *Ley de Organizaciones de Usuarios de Agua 30157*, (Water User Resources Law 30157). Activities such as these encompass the first phase of implementation, so-called in the 2009 NWRPS, which described this phase of implementation as a "sensitization process of the public and private sector in support of the legal and institutional framework" (Comisión Técnica Multisectorial, 2009, p. 72).

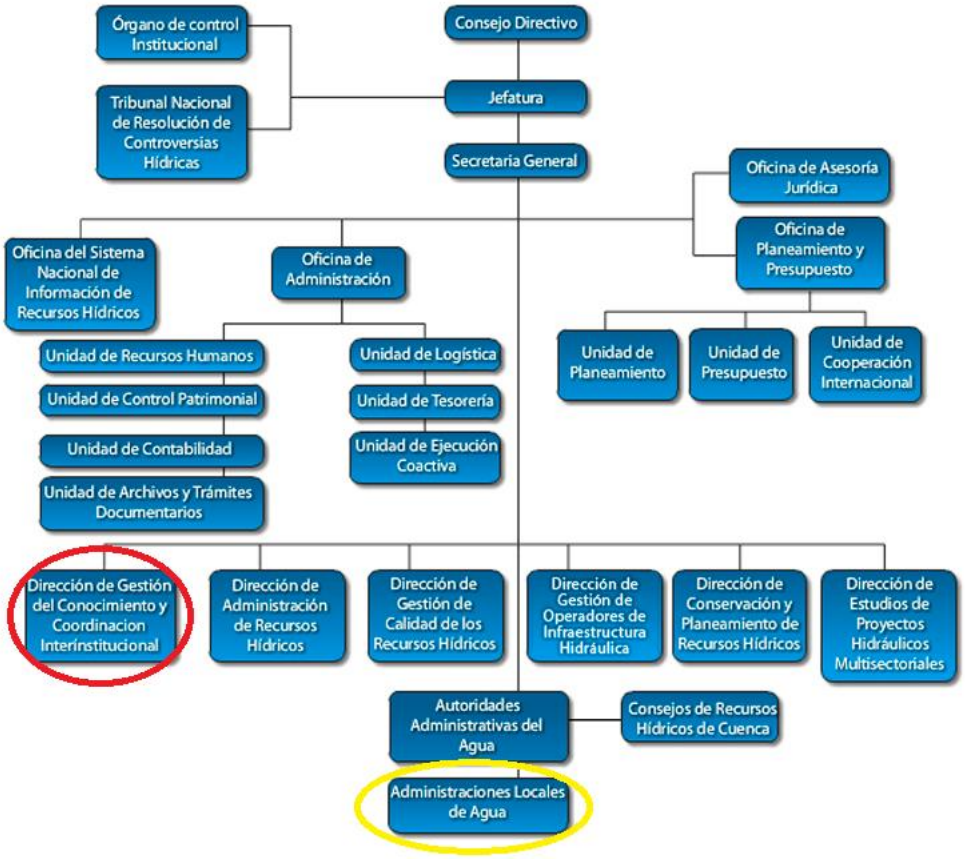


Figure 5.4 Organizational structure of Peru´s National Water Authority (ANA). Source: http://www.ana.gob.pe/organizacion-funciones/organigrama/organigrama.

Civil servants at ALA Huaraz were therefore responsible for interpreting the 2009 Water Resources Law and transferring information about the legal changes, such as those above, to the YUA Water User Committee. ALA Huaraz was interacting with the YUA Water User

Committee through the Head of Knowledge Management and Interinstitutional Coordination. The resulting interactions meant that rights and governance frameworks defined at global and national level were being combined with existing local institutions through the circulation of discourses of officials from ALA Huaraz working in Huashao. Now a state recognised committee, expectations were high for users of the YUA Water User Committee to adapt to state and global efforts to conserve water through new water governance arrangements, affecting access and distribution, while they were increasingly involved in water-intensive economic development processes.

5.5. Water use and management practices in Huashao

In Huashao, the YUA central committee made efforts to manage water using communal structures for organizing irrigation. However, it was not a straightforward task because the system was historically disorganized. In addition, families appeared to be using and managing their irrigation water for an increasingly diverse range of subsistence and commercial crops and the irrigation of commercial crops did not always fit with community forms of organizing irrigation.

5.5.1. Community (dis)organization, irrigation practices and commercial growing

The central committee encouraged irrigators to use a communal scheduling system called the *turno.* The *turno* is a sequencing rule that governs the way water distribution is managed between sectors. It is the order in which sectors are irrigated, determining which *yarqha*, or secondary canal, must be opened so that water can be diverted into it from the main canal. According to many users, water distribution in Huashao was largely disorganized before the establishment of the *turno* system in 2011, the same year the canal was lined with concrete. Before that, people took water from the canal whenever they so wished. According to Trawick (2003), the *turno* is often understood as 'traditional' or 'customary' in the Andes. Indeed, when the term was used in Huashao, it was used to refer

to their *usos y costumbres* (´customary´ practices) (see Chapter 2) when operating the lock-gates of the canal. Since 2011, each sector had a fixed number of days in the week, depending on the size of the sector, to irrigate their plots with the water that had been released from the main canal. Water guards had to meet at 5am in the morning to distribute the water to their respective sectors (by opening and closing the lock-gates with padded locks) and if the water guard did not show up, he was not entitled to water (then only those who were listed on their sector's register of water users had the right to use the water released). The *turno* was associated primarily with distributing water between sectors as a rule that governed which sector got water and when, but was far from being an established norm or ´traditional´ or ´customary´ in the sense implied by Trawick (2003), as leaders of the committee struggled to achieve the acceptance of some sectors' water guards.

The sectors of *Unidos Venceremos* did not appear to be irrigated in the order in which they were planted or, for that matter, based on the crop growing cycle, as in other cases (see Trawick, 2003). Once water reached the sectors, it was unclear whether water guards applied rules to organise distribution to family plots within the sectors (once the water arrived from the primary canal, the water guards were responsible for coordinating with their respective sector). Non-compliance with the *turno* was widespread and fluctuated by sector, with two sectors refusing to adopt a *turno*. Only one sector, one of the community's biggest, was abiding by *turnos* within their sector. Furthermore, claims were made that commercial producers were not abiding by the *turno* system because their need for water was constant, whereas subsistence crops had more extended growing cycles and their need was more intermittent. How, then, were peoples´ decisions to produce a new commercial crop, changing irrigation habits and what did this imply for the use of the *turno* as a communal structure for organizing irrigation across the community?

5.5.2. Water-using technologies

Often, when it came to distribution *within* the sectors, discussions turned to the use and application of water-using technologies. These water-using technologies (Lane, 2014) included irrigation canals, reservoirs, terraces, *puquios* and technical irrigation methods (drip and aspersion). Irrigation canals, terraces and *puquios* are understood to be pre-

Hispanic by archaeologists studying water technologies in the highlands (see Lane 2014), who have focused on farming and herding in the Andes as they pertained to economic activity. These authors contend that, as part of a longstanding agropastoralist tradition, water technology in the Andes has served the interests of both farmers and herders by helping to store water, its primary function, according to Lane (2014).

The most basic water feature is the irrigation canal; its function in the highlands is to move water from where it is abundant to where it is needed, from aquifers to fields and terraces, in the most efficient way possible (Lane, 2014). Two main types of canals have been identified in the study of ancient water technology: stone lined and unlined. Stone-lined canals are usually the *acequias madres* or main feeder canals, the core of the irrigation system. These were lined with cobble or slabs and more static and permanent in nature (hence were more visible). Localised outtakes, or *acequias secundarias*, disperse the water to individual plots and terraces and usually take the shape of earthen or sod-banked canals as this make-up allows their course to be easily changed with relative frequency depending on fallow seasons and shifting cultivation patterns (ibid.). Water is controlled and then distributed by means of sluice gates (*bocatomas*) sometimes cut into the *acequias madres*, so as to allow the subsequent distribution of water throughout the network.

Another water technology was important for domestic use in the area covered by *Yurac Uran Atma*, called *puquios*. Found in the Nazca region of the South Central Andes (100BC – AD650, with possible expansion under Spanish colonial rule), Chile, and in the Santa Valley as well as the highlands, this technology comprises a series of vertical and horizontal trenches (aqueducts) and tunnels (*puquios*) that tap into phreatic aquifers, where surface river water periodically disappears underground. Water availability in these features fluctuates according to the annual discharge in the rivers. According to Lane (2014), this water is then brought to the surface to irrigate agricultural land, however in Huashao it was mostly associated with domestic use. I examine the accounts of water users to understand changes detected in water available in the *puquios* and the value attributed to this source of water.

Yurac Uran Atma, the main feeder canal, was lined with concrete in 2011, funded by the provincial municipal government in Yungay. The release of water from *Yurac Uran Atma* canal was controlled by lock-gates (*compuertas*). Unlined canals were still visible and being

used by water users to divert water from the main, concrete-lined canal, officially by way of the lock-gates, and unofficially by applying old techniques for diverting water (sometimes to the detriment of the concrete structure) (Chapter 8). Claims were also made that the lining of the canal was preventing filtration to the *puquios* (Chapter 8).

The quantity of water released into the secondary canals was not physically measured but dispensed by manually adjusting the lock-gates used to regulate the water flow, an action that had to be approved by the water committee. Water guards judged the amount that should be released in a sector´s *turno* by watching and monitoring the flow in each sector (the amount available would vary by the velocity of the water) and requesting approval from the water committee to increase or decrease the level of the gate. This would be monitored by counting the number of rings on display on the sluice-gate. In one instance at a committee meeting, one water guard observed that the smallest sector of the community, with just 19 residents, was getting too much water, and they subsequently adjusted the sluice-gate so that it showed 9 rings (previously 15), thus reducing the amount of water being released. The decision-making process that governed how much water would be released was an ongoing socio-political process, combining proactive and reactive decisions that required constant communication and negotiation among the guards. I explore the problems facing water guards and the central committee, when it came to users' combined use of official and unofficial methods (Chapter 8), illustrating their difficult task of maintaining order and 'formality' and preventing water loss in water use and management.

5.5.3. Water tariffs – canal maintenance, security and ownership

Water pricing[15] was set out in the 2009 Water Resources Law. The registered water users of *Yurac Uran Atma* water user committee now had to pay 3.50 Peruvian soles per annum per hectare of land used for irrigation. This fee is given to the irrigation commission, the user assembly, and regional/national user assembly to be used for the maintenance of the canal

[15] Water pricing was introduced in the 2009 Water Resources Law and defines three types of fees and two types of tariffs: (i) fees paid for water abstraction from the environment (*Retribuciones economicas por el uso del agua*) (ii) fees paid for wastewater discharge to the environment (iii) tariffs for the use of water infrastructure (iv) tariffs for water monitoring and (v) tariffs for sectoral water distribution - see Lynch (2012) and Boelens (2012).

and fifty percent of the money is returned to the users, not in money but in materials, when needed. The tariff served both the users of the canal in terms of maintenance and gave 'formal' recognition to the Committee that it was paying the state, according to the leaders of the Water User Committee (Chapter 5).

The payment of a tariff has been a major change for some people. Some called it privatization as the water would "now be bought" (treasurer of Water Committee). People living in higher zones who were members of a less organized committee (water was understood to be in abundant supply in these areas), resented having to attend meetings and training workshops on how to look after their supply, seeing it a waste of their time. This was particularly the case on Mt Huascarán, where water was thought to be in much greater supply than on Mt Huandoy. Others asked fundamental questions about the rationale behind the fees - according to the treasurer people asked: 'if nobody is in charge of the water, nobody makes it, then why pay?', 'the water, who makes it? The state? If I'm going to pay, that´s fine but they can increase the amount of water in my spring then…who am I paying when it is Huascarán who gives water to me?". A *comunera*, echoed this discomfort:

> I don't assimilate very well. Has the state, by chance, made this irrigation canal? This comes from a long time ago. This belongs to the grandparents. My grandfather has now died but he also used to say this canal was already there, nobody earns (from it). By chance did the state make this canal? It has no right. But sometimes we also make laws against or for (us) too.

Now, however, the treasurer of the Committee said "it is working well because now people are understanding…little by little they are getting used to it":

> Previously, when the new rules were just released, they said they didn't want to pay them. But little by little, talks, training workshops came, they have to be *made* to understand [emphasis added].

People's reactions following the introduction of the water tariff recalled by the treasurer point to a difficulty assimilating the rationale for the change on the basis of concerns about privatization, a disconnect between the new rules and people's experiences of abundant supply and questions related to whether the state could be considered to have 'created' or

‘produced’ the water and canal to be able to earn from it. But despite an apparent initial reluctance, people had slowly begun to accept the tariff, following training activities imparted by authorities.

5.5.4. The role of Practical Action

Although it is no longer present in Huashao, NGO Practical Action has a legacy in the village for its work in the fields of risk management, disaster prevention and, of most relevance to the thesis, climate change adaptation through their 2008 macro-project on the ´experiences of technological adaptation´ that included the village of Huashao (Orlove, 2009b; International Institute for Sustainable Development, 2011). I look more closely at the goals of the organization and their role in Huashao in this section in order to understand their role in influencing the direction of water use and management in Huashao, based on their understandings of and responses to climate change (adaptation).

Practical Action is an international NGO with a focus on development and appropriate technology (Orlove, 2009b). Founded in 1966 by the economist E.F. Schumacher, it developed on the basis of Schumacher's rejection of the belief that economic development could be promoted by transferring large-scale technologies. On the grounds that these technologies undermined regional and national self-sufficiency and displaced cultural values for materialist ones, he promoted smaller scale, locally-based technologies with the rural poor.

Orlove (2009b) depicts Practical Action as an intermediary organization that has promoted links between the global and local in the ways that they have become involved with the question of adaptation to climate change in the case of Cusco. Their role in Huashao is a similar one. The organization contributed to Peru´s Second National Communication to the United Nations Framework Convention on Climate Change (2010), based on findings produced by their 2008 macro-project on the ´experiences of technological adaptation´ in seven rural regions of Peru, one of which included the experiences of people living in the village of Huashao. A central proposal of the project was the development of adaptation technologies based on ´local knowledge´ that could become a reference for other organizations to consider for interventions in similar mountain ecosystems. In Ancash, the

goal was to reduce vulnerability of ´peasant´ families in situations of poverty when confronted with the threat of disasters and climate change.

In Huashao, Practical Action gathered what the organization coined *saberes locales* or ´local knowledges´ from residents of Huashao about how they were adapting to variability in water supply, an impact of climate change understood to be of most concern to residents. With regard to water management, the project found that people in Huashao had established irrigation by turns as one way of dealing with variability. The project categorized the *turno* as a *saber local/tradicional* or a ´local´/´traditional knowledge´, in other words it constituted one way that people in this place were adapting to climate change. The project also recommended that one way of adapting to predicted water scarcity or excess, was to adopt technologies that optimized water use, such as aspersion irrigation. Indeed, during my fieldwork, some of the members of *Unidos Venceremos* who had participated in the research with Practical Action, claimed that Practical Action was responsible for introducing the sprinkler method in Huashao. Whether or not this was the case, the organization classified the use of both the *turno* as a ´local´ or ´traditional´ knowledge, and the sprinkler as a non-´traditional´ method, legitimising their use as adaptations to predicted impacts of climate change on water availability.

Given the extent of work carried out by Practical Action in two separate projects in Huashao (2005 and 2008) and the participation of key leaders of *Unidos Venceremos*, including one who would later become the community president, the organization left an indelible impression on the direction of water use and management in Huashao. I look more closely at how the *turno* has come to be used in the discourses of the Local Water Administration in Chapter 6 and the extent to which this corresponds or otherwise with the discourses of the people of Huashao. Understanding why they may or may not correspond reveals peoples' understandings of their own practices and their rationale for using an irrigation method.

5.6. Conclusion

This chapter has shown the increasing importance of commercial livelihood opportunities in tourism in Huashao over time, due to the gradual opening of the Cordillera Blanca, its proximity to Huascarán National Park and Yungay and an enthusiasm to attract economic development opportunities on the part of community leaders. It therefore found an increasingly mixed set of livelihood activities in Huashao, which appeared to exemplify wider trends in commercial livelihood activities in the rural areas of the Callejón de Huaylas, raising questions about the implications for water use (Bury et al., 2013) and the recognition of *usos y costumbres* (Chapter 2).

The chapter has also shown the activities of the water agencies operating and interacting with each other in Huashao, including the local Water User Organization, *Yurac Uran Atma* Water User Committee and newly devolved authorities of ANA: the Local Water Administration (ALA) Huaraz and, within the latter, the Knowledge Management and Interinstitutional Coordination team. It found that ANA awarded *Yurac Uran Atma* Water User Committee with a water user license in 2013 as part of the state´s ´formalization´ of norms and procedures to 'modernize' Peru´s water management (Chapter 2). The Committee president had actively sought this legal recognition following a 40-year conflict over distribution with a neighbouring committee and repeated ice extractions. Despite the pride with which the president referred to the awarding of a license, the neighbouring committee continued to contest the numerical water allocations assigned in the license, raising the question about whether water user licenses were serving to address or compound social conflict.

The final section of the chapter demonstrated the complex mix of communal and individualized water use and management arrangements in operation in Huashao, the changing nature of water-using technologies, the influence of Practical Action on understandings of community-based water management structures and water pricing. It showed that the *turno,* a community- scheduling system historically understood as ´traditional´ or ´customary´ practice (Trawick 2003) and classified as a ´local´/'traditional' knowledge by Practical Action, was not an established norm in Huashao and was, according

to some, further threatened by increased commercial livelihood activity. It also found a reliance on a combination of water-using technologies (lined/unlined canals, *puquios* and technical irrigation methods, the latter also promoted by Practical Action as an adaptation to the predicted impacts of climate change on water supply). The chapter found that water tariffs for the use of water infrastructure were in operation in Huashao, despite some people having shown resistance based on different understandings of the ownership of water and the right to allocate it.

Thus, by situating people and their livelihoods at the centre of an understanding of place, this chapter has demonstrated the multiple dimensions of social change that intersect in Huashao, and their context-specific nature. The people of Huashao interact with these changes in their everyday lives: growing commercial livelihood opportunities connected to tourism, the political agenda of community leaders with regard to the negotiation of local economic development, new market activities such as flower production and historical interactions with a development intervention. In addition, historical interactions with state authorities, both water and tourism, show an openness and willingness to negotiate opportunity with the state, despite a history of domination. The engagement of people with some of these wider social changes in Huashao suggest that the latter are decreasing the reliance on institutions and practices of water management historically associated with *comunidades campesinas*. All of this reflects the importance of considering the broad circumstances and continuous production of places that shape peoples' livelihood practices in order to contextualize the institutional changes under the 2009 Water Resources Law, as the latter constitute just one of multiple changes affecting life and livelihoods in rural places.

Events in Huashao such as the partial resolution of a water conflict and the granting of a water user license have increased interactions with officials from water agencies who hold and disseminate certain ideas and expectations about how water should be used and managed by members of a *comunidad campesina*. The next chapter examines the discourses employed by ALA Huaraz used to justify the institutional changes required under the 2009 Water Resources Law.

Chapter 6 : Multi-level discourses behind water rights 'formalization'

6.1. Introduction

> (…[we] want to generate a new culture of water. A new culture of water, but within the framework of peace. Water, as the leftover blue on the planet, cannot lead us to quarrel with brothers. We have to learn to be hydro-caring, if we have too much water, to give it to someone who needs it…logically within the topology of our lands. Water has to unite us, it has to encourage us, this is our reality (Don Elmer, sector Puka Kaka 2014, personal translation from original).

At the YUA Water User Assembly in January 2014, the main representative from ALA Huaraz, Don Elmer, was consulting with water users about the changes that they would need to make to their water use and management practices under the 2009 Water Resources Law when he made the above statement. Using the awe-inspiring backdrop of Puka Kaka to drive home his message, Don Elmer looked to the mountains to illustrate how the water from Mt Huandoy was running out and how it needed to be preserved and conserved. Don Elmer analogized the 200 lakes of the Cordillera Blanca mountain range with a "drinking glass". He used this repeatedly to illustrate how each "drop" should be distributed, referring to the water user committee as the "mother" and "father" to whom he had given the glass and who were now responsible for distributing the water among their "children". In other words, the state had given the committee a glass of water and the committee were now responsible for distributing the corresponding drops to its users.

I was struck by Don Elmer's discursive creativity: his analogies and metaphors reminded me of Carey's (2010) critique of Peruvian engineers' role in transforming the glaciers of the Cordillera Blanca from hazards to "vanishing water towers", imbuing them with economic value. His allusions also vividly illustrated how institutionalized the state's role as "owner", to quote Don Elmer, of the nation´s water had become, as well as the role of the water user organizations to administer the supply, once granted the right to do so. He appealed to the

comuneros' strong sense of attachment to the mountains and desire to protect the water. Yet, he was clearly trying to inculcate the new technical culture of water with water users.

This chapter examines the discourses of national and regional water authorities to draw out further the nature of the institutional changes recommended in rural places following the 2009 Water Resources Law (in conjunction with Chapter 2). In doing so, it offers an insight into the social and political construction of IWRM and the challenges that this brings with the expansion of the 'formalization' of water user rights locally. In other words, it brings out the wider conditions that have made diverse discourses about water and climate change possible in Huashao.

Firstly, this chapter analyses the construction of meaning around IWRM in the 2009 National Water Resources Policy and Strategy (NWRPS) (Comisión Técnica Multisectorial, 2009) to understand the agenda driving institutional change at national level in Peru at the time of fieldwork. It was the "guiding instrument" (Comisión Técnica Multisectorial, 2009, p. 42) for the implementation of the 2009 Water Resources Law. Don Elmer drew my attention to it as he referred to it in his speeches at the Water User Assembly in January 2014 and it appeared to be guiding his interpretation of how the new water law should be implemented. Secondly, the chapter examines the language used by Don Elmer at the training event, as well as in my two interviews with him, to investigate the types of discourses at regional level that were justifying the changes ALA Huaraz were instigating in Huashao, in his capacity as a member of ANA's Knowledge and Interinstitutional Coordination Management team. The aim is to explore the role that the discourses of ALA Huaraz play in creating and perpetuating unequal power relations through particular knowledge forms (research sub-question 1).

6.2. National water policy – what is behind Integrated Water Resources Management (IWRM)?

This section examines the priorities behind the current focus on IWRM at national level and on the need for institutional change in how water is managed in the Andes specifically, including the reasons justifying these imperatives. The aim is to learn about the conceptual underpinnings of IWRM nationally with international principles in mind and to elucidate whose interests count in the policy.

As time passed during fieldwork, it became clear that concepts of water security, efficiency and *usos y costumbres* were underpinning the discourses of Don Elmer, hence my decision to explore them further in a text to which he had explicitly referred. Edited by ANA and written by a Technical Committee made up of multiple sectors (Agriculture, Environment, Economy and Finances, Energy and Mines, Production, Health, Housing, Construction and Sanitation), the 2009 NWRPS was one of the five planning instruments constituting Peru's National System of Water Resources Management which included the National Environmental Policy, the National Water Resources Policy and Strategy, the National Water Resources Plan and specific Watershed Water Resources Management Plans.

6.2.1. A new legal framework for water security and 'water for everyone'

The direction of water management outlined in the National Water Resources Policy and Strategy 2009 is based on the sustainable development commitments made at the World Summit on Sustainable Development in Johannesburg in 2002 towards the goal of implementing IWRM in Peru. The Technical Committee define the most desirable scenario as "*Agua para todos"* or "Water for everyone" (Comisión Técnica Multisectorial 2009, p. 39) and the goal was to implement, by 2025, both a new legal framework and actions that would achieve "an integrated, multi-sectoral, equitable and efficient management, affording water security to all sector users" (ibid.).

The recommended action measures to achieve water security, according to the Committee, included creating a 'new water culture'. This referred to the improvement of the effectiveness of charging for water storage, with interventions that facilitated the application of economic instruments, the valuation of environmental services that a basin offers, as well as promoting the participation of the private sector in the development and management of water resources (Comisión Técnica Multisectorial, 2009, p. 49). According to the Committee, such an approach would promote and result in water security for everyone.

While there is no definition of water security in the document, the measures identified as necessary for the promotion and achievement of water security are clearly associated with a desire to achieve what is called sustainable economic growth. Firstly, economic growth will be sustainable, and in turn the MDGs will be achieved, if "order and formality prevail in the country's productive activities" (Comisión Técnica Multisectorial, 2009, p. 43) using measures to "ensure water security" (ibid.). Towards order and 'formality', they propose a new legal framework constituted by norms that clearly define the roles, capacities and scope of user organizations and state organisms in the management of water resources and generally contribute to the "better utilization of water resources" (ibid.). Secondly, the Technical Committee proposes that the institutional environment should be based on the creation of a unique authority that "devises policies and normalises aspects related to the quality, quantity and opportunity associated with water resources…at national and watershed level" (ibid.). All of this to be implemented alongside activities that raise user consciousness of the economic, social and environmental value of water through the introduction of a new tariff structure[16]. Thus, the dissemination of new management norms under a new legal framework and the gradual introduction of tariffs underscore the path to water security in Peru's national policy, all of which were necessary policy measures to achieve the order and 'formality' needed for sustainable economic growth, according to the Technical Committee.

The 2009 document stresses the limited availability of water on Peru's Pacific slopes as a cause for an increasing number of conflicts between users over access to water. The

[16] The aim of this proposal is to improve the recovery of the costs associated with the administration, operation and maintenance of hydraulic infrastructure, as well as the repayment of long term investments.

authors cite an imbalance in the volume of water calculated to be concentrated in the main watersheds in Peru, taking into consideration the percentage population and contribution to GDP. They find significant differences in the availability of the resource across the regions, for example, 1.8% of the volume is concentrated in the Pacific slope, where 65% of the population lives and 80.4% of the GDP is produced (Comisión Técnica Multisectorial, 2009, p. 1). In this way, conflict over access to water resources is depicted as justifying Peruvian policy, namely the perceived need for change in how people manage their water in the Pacific slopes of the Andes.

6.2.2. Efficiency v recognition of water use in *comunidades campesinas*

Among the policy challenges identified by the Technical Committee for the Peruvian government is guaranteeing access to sufficient amounts of water to satisfy basic needs for all of the population, while ensuring that people are using water 'efficiently' in their productive activities. Increasing water use efficiency is seen as paramount in the agricultural sector, which represents 80% of all users. But what does efficiency actually mean in Peru's 2009 policy? Efficiency is considered a key principle of IWRM in the policy: "the integrated management of water resources is sustained by its efficient use and its conservation, incentivizing the development of a culture of saving among all users and operators of hydraulic infrastructure" (Comisión Técnica Multisectorial, 2009, p. 47). The policy measures the achievement of efficiency by counting the numbers of users granted water use licenses for irrigation purposes and by discussing the extent to which water distribution responsibilities had been transferred to user boards, which included approving, raising and administering funds aimed at financing the operation and maintenance of hydraulic infrastructure that they operate. On the one hand, those without licenses are described in the document as causing "informality and disorder in the distribution of water for users" (ibid., p. 34). On the other, the transfer of water management to the user boards is described as unsuccessful because it is purported to have led to the setting of low tariffs, which were impeding the adequate maintenance of the measuring infrastructure. Therefore, efficiency is assessed by the numbers of licenses issued to users to ensure access and address ´informality´, and also by the extent to which the user boards are

financially solvent. In other words, the challenge of increasing efficiency appears to present largely legal, administrative and institutional burdens/responsibilities to the Peruvian government, underpinned by concerns related to (rationed) access, 'informality' and the finances required to manage infrastructure.

Another of the basic principles of IWRM in the 2009 policy is the state's commitment to "respect the *usos y costumbres* of *campesino* and native communities, as well as the (their) right to use the water that passes through their territories, provided this is not in opposition to the law" (Comisión Técnica Multisectorial 2009, p.47). The policy further states that, where rights systems are already in place, the allocation of water use rights must "respect" and "tailor/adapt" the rights of these communities and should promote "ancestral knowledge and technology in water management" (ibid.). The order and 'formality' driving the efficiency principle seems at odds with the principle of respect for water use practices in *comunidades campesinas*, given the level of diversity and complexity of water institutions.

This text-based analysis of a national policy instrument shows that IWRM is built upon a policy goal of 'water (security)-for-everyone' that sees intervening in water management using economic instruments as the way to achieve this, the crux of the 'new water culture'. The achievement of Peru's sustainable development goals, which includes the achievement of water security, depends on the enforcement of ´order´ and ´formality´ in a new legal framework that will clarify the capacities of user organizations and state agencies and centralise the policy formation in one unique authority, i.e. the National Water Authority. An imbalance in the spatial distribution of water and subsequent conflict over access justifies the framing. Efficiency is related to the granting of administrative licenses for irrigation and the extent of the transfer of distribution responsibilities to the local and regional user boards, and anyone without a license is considered to be acting 'informally'.

The fourth Dublin Principle that defines water as an economic good is therefore heavily prioritized at national level in this planning instrument, with a gesture to the Second Principle that calls for participation in creating institutions at sub-national level. However, the extent of authority assigned to the new central authority in overseeing compliance and instilling a 'new water culture' would seem to contradict efforts to decentralize to the lowest appropriate level of authority under IWRM. Less attention is paid to the role played

by women in management (the document recognises the importance of guaranteeing equality of opportunity on page 46 but there is no connection made between women and water[17]).

This section has shown that water concepts that predominate at national level policy (water security, water culture, efficiency) are underpinned by the state's emphasis on securing economic growth, which values efficiency, order, and 'formality' over socio-cultural institutions and practices of water management. This appears to rule out other ways of knowing about and managing water, despite the principle of recognition of *usos y costumbres* in IWRM.

6.3. Insights from the 'formalization' of water user rights at regional/local level

The objective of the 2009 NWRPS was to establish norms that regulated the use of water as a resource (in an efficient and sustainable way) and grant legal security in the context of an increasing number of users (Comisión Técnica Multisectorial, 2009, p. 52). One of the strategic actions to mobilize the ongoing administration of water use rights in the 2009 policy was to promote and consolidate the progressive 'formalization' of water use rights nationwide through the allocation of water licenses by blocks (Comisión Técnica Multisectorial, 2009, p. 52). As ALA Huaraz was charged with disseminating legal norms and instigating action through the allocation of administrative water user rights in the Callejón de Huaylas, my question is: how did it promote this agenda locally?

This section analyses ALA's construction of understanding around the water user license, drawing on my discussions with Don Elmer and an analysis of the irrigation block map governing YUA Water User Committee. Analysing the map deepened understanding of the ideas, principles and concepts underlying the 'formalization' of water user rights as the process got underway in Huashao as well as of the actions that followed the principles, or did not follow, as the case may be. (As previously described, the 'formalization' of water

[17] Furthermore, in Peru's 2015 National Water Resources Strategy and Plan, the words 'woman/women' or 'gender' do not appear.

user rights constitutes an essential component of national policy to 'modernize' the water sector in Peru). I also chose to focus on it because it seemed to represent part of the Water Committee president's armour to defend the canal against encroachment, along with the license itself, which I discuss in more depth in Chapter 8 (he was very protective of it and evaded my requests to see it. In the end, Don Elmer allowed me to make a copy at his office in Huaraz).

6.3.1. Water user license: legalizing and quantifying use

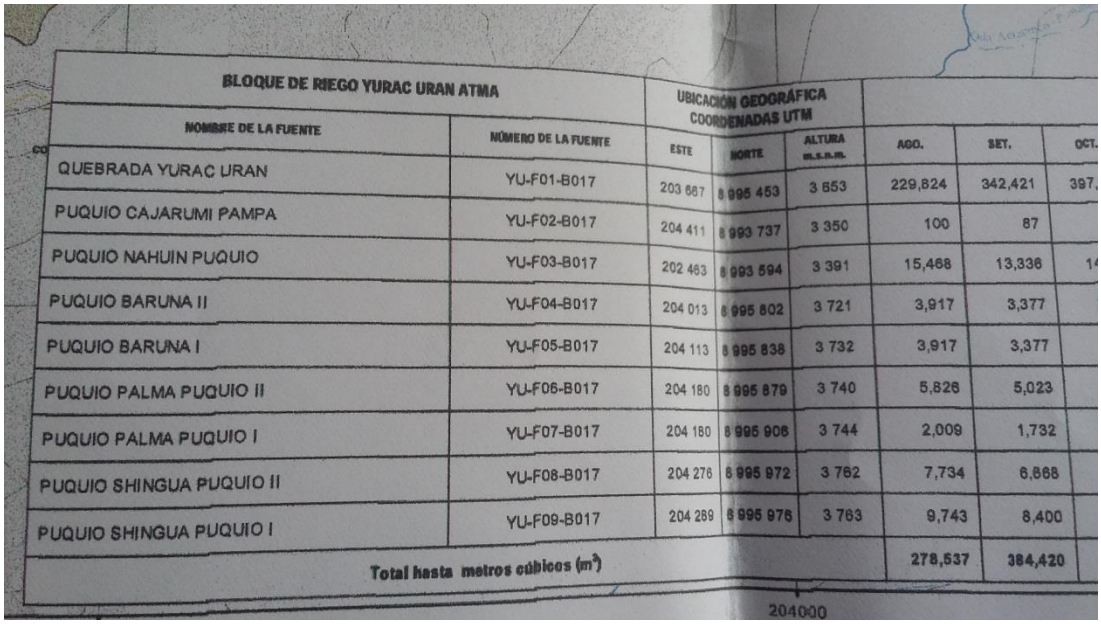
> This is an historic day for the water user organization of *Yurac Uran Atma*, since they now rely on a legal document that guarantees them access to a maximum annual volume of 6,249,478 m³ of water (Autoridad Nacional de Agua, 2013).

In 2013, ALA Huaraz awarded a water user license or literally a 'water use license by block with agrarian aims' to the *Yurac Uran Atma* water user committee in a ceremony held in the community in 2013, attended by over 800 local residents. It certainly seemed to be a significant occasion for the water guards and the central committee, who had spent years feuding with their neighbouring community over the fair distribution of YUA canal's waters. According to some water guards, acquiring the license, as well as the registration of the water user committee in the public register[18], were significant advances for the committee towards fulfilling their obligations under the new water legislation. The idea is that the canal-wide license provides for a further administrative water use right called a '*certificado nominativo*' which, under legislation, should contain a measurable allocation of water depending on the needs of the farmer or household.

Under the 2009 law, PROFODUA, an office in ALA Huaraz, issued a block water user license to *Yurac Uran Atma* in 2013 as part of the wider 'formalization' of water user rights in the Callejón de Huaylas. ANA produced the license, based on a mapping of the villages relying

[18] Under Article 18 of the Ley No 30157, water user organizations can acquire legal status by registering in the public register. Water user boards are legally obliged to register, however it is optional for water user committees and commissions.

on the canal's waters for irrigation, which quantified the volumes of water flowing within the block banks (see Figure 6.1). The *Yurac Uran Atma* canal carries water from Yurac Uran gorge and a number of smaller springs rising at approximately 3,600 masl on Mt Huandoy to the areas of Atma under irrigation, termed the *Yurac Uran Atma* 'irrigation block' by water authorities. The 'irrigation block' is the total surface area estimated by the MINAM, ANA, the Water Resources Administration Authority and ALA Huaraz to be using water from this canal and covers over 1,219 hectares of land. The map, dated 2013, delineates the surface area and specific villages under irrigation and shows the allocation of surface water in cubic metres understood to be flowing (monthly and annually) in each water source, for example, according to the map, the Yurac Uran gorge, the main tributary of canal *Yurac Uran Atma*, contains a total annual surface water volume of 5,539,694m³. The metrics and territory mapping that went into calculating the irrigation block and producing the license further show the quantitative understanding of water and its management adopted by ANA and related institutions.



BLOQUE DE RIEGO YURAC URAN ATMA		UBICACIÓN GEOGRÁFICA COORDENADAS UTM					
NOMBRE DE LA FUENTE	NÚMERO DE LA FUENTE	ESTE	NORTE	ALTURA m.s.n.m.	AGO.	SET.	OCT.
QUEBRADA YURAC URAN	YU-F01-B017	203 667	8 995 453	3 653	229,824	342,421	397.
PUQUIO CAJARUMI PAMPA	YU-F02-B017	204 411	8 993 737	3 350	100	87	
PUQUIO NAHUIN PUQUIO	YU-F03-B017	202 463	8 993 594	3 391	15,468	13,336	1
PUQUIO BARUNA II	YU-F04-B017	204 013	8 995 802	3 721	3,917	3,377	
PUQUIO BARUNA I	YU-F05-B017	204 113	8 995 838	3 732	3,917	3,377	
PUQUIO PALMA PUQUIO II	YU-F06-B017	204 180	8 995 879	3 740	5,826	5,023	
PUQUIO PALMA PUQUIO I	YU-F07-B017	204 180	8 995 906	3 744	2,009	1,732	
PUQUIO SHINGUA PUQUIO II	YU-F08-B017	204 276	8 995 972	3 762	7,734	6,668	
PUQUIO SHINGUA PUQUIO I	YU-F09-B017	204 289	8 995 976	3 763	9,743	8,400	
Total hasta metros cúbicos (m^3)					278,537	384,420	

204000

Figure 6.1 Surface water allocations by source in map of *Yurac Uran Atma* irrigation block. Source: Local Water Authority (ALA Huaraz).

The license issued to the *Yurac Uran Atma* user organization gives its users the right to use the quantity of water flowing in the canal, as calculated above. Don Elmer considered *comunidades campesinas*, in this case *Unidos Venceremos*, to be just one of these users, along with private landowners, and other *comunidades campesinas* covered by the map. The right that the water license constituted did not denote property, he warned, rather the right to a fair share so that "nobody falls short". Further, he stressed that the key difference with previous arrangements was that the legal resolutions that the organization now had recourse to as a license-holder, would allow the community to defend itself in new ways, not like before when "the *campesino* used to defend himself with picks and clubs". This suggests that the intention behind the awarding of licenses by PROFODUA to *comunidades campesinas* was to facilitate less confrontational ways of defending water supplies, based on Don Elmer's regard for previous behaviour in this community. Don Elmer was referring to the longstanding feud between YUA and their neighbouring committee (see Section 3.4.1.) and maintained that they now had recourse to legal certificates and government agencies under new arrangements that they could use to defend themselves in conflicts over distribution.

This sub-section shows the ideas behind the license adopted by Don Elmer. He understood that the license would ensure water for everyone by quantifying it, and solutions to conflict were seen in legal resolutions, that again relied on quantified allocations to back a claimant's case. In other words, the potential for conflict could be reduced by recourse to legal rights that quantified a user's entitlements. From the perspective of leaders of the user committees, this meant that, in the case of an unresolved conflict among users at the level of the canal, the committee must contact the president of the regional commission, located in Yungay, to step in and help find a solution. For example, in the case of conflict with an adjacent canal, the president of *Yurac Uran Atma* would be charged with finding a solution as to the amount of water that each canal is entitled to, now calculated in litres per second.

Don Elmer was reproducing the national discourse of 'water for all', applying it to the quantification of water as a resource. This quantification, together with the legalization of surface water depicted in the irrigation block map, vividly illustrates the ALA Huaraz' expectations of water users. The benefits to *comunidades campesinas* of holding a license

to address conflict more effectively, cited by Don Elmer, corresponded with the justification for institutional change in the Andes given at national level that highlighted increased conflicts over access. Unsurprisingly, Don Elmer had largely adopted the dominant technocratic tone of the national water management approach regarding canal licensing. However, the next sub-section shows more variation as Don Elmer set out to explain the practical changes to water users, and to me, in more detail in Huashao.

6.3.2. 'Formalizing' "bad" irrigation habits and adapting to climate change

This sub-section draws on my observation of the Water User Assembly led by Don Elmer, held in the sector of Puka Kaka in January 2014, just after I had moved to Huashao. At the assembly, Don Elmer gave instructions to attendees about the new rules that they were required to comply with under the 2009 National Water Resources Policy and Strategy. I focused on the ways Don Elmer communicated his interpretation of changes under IWRM with water users of YUA canal because it allowed an exploration of discursive creativity in policy communication at local level, showing what norms and principles from the national and international water management principles became important or not and why and why not.

As Don Heracio and I hitched lifts on the back of pick-ups and tackled some arduous inclines on the way to the high-altitude sector of Puka Kaka (4,000 masl), I tried to find out more about the event held by ALA. I was nervous as I had only recently moved to Huashao and it would be my first time to introduce myself to the community. We passed many others making their way, as we packed ourselves into *colectivos*. Don Heracio mentioned that ALA had come to inform them about some legal changes to water use; he did not seem to know very much either. He smirked though when he mentioned that a Don Elmer would be there, saying that he was a "character".

Don Elmer was quite the character. He greeted me warmly and threw out questions while I sat in the 900-strong crowd throughout the consultation, asking what the situation was like "in my country". He addressed people with a sense of humour and openness, dressed informally and his tone was loud and authoritative, but persuasive. He seemed to make a

deliberate effort to use non-jargon, frequently drawing on metaphors and stories to get his point across which often tacitly revealed where he viewed the position of *campesinos* in the Peruvian social hierarchy.

Throughout the day, Don Elmer encouraged users of *Yurac Uran Atma* water user organisation to change their habits. He insisted that twenty years previously, the problem of water storage did not exist in the Cordillera Blanca and *comunidades campesinas* did not have to organize themselves as "the *campesino* knew" when the rains would come. In a separate interview with him following the Assembly, he told me that climate change had made the rains more irregular, according to the official, dumbfounding *campesino*s and forcing them to "adapt". I probed Don Elmar a little further about what he meant by the loaded term adaptation. It is about "sowing" or "storing" water in the six million cubic metres of water contained in the 200 lakes, or the "natural drinking glasses" as he called them, in the Cordillera Blanca mountain range. He urged me "to remember that the infrastructure here is rustic" – *canales de tierra* (soil-made canals), *bocatomas de piedra* (stone water outlets for irrigation), the use of which resulted in "great loss". "If they put down pipes, almost nothing would be lost", he commented, and "bad irrigation habits", such as flooding, had to be changed. In his view, YUA water users must change their habits because of the need to adapt to climate change and the loss of water being caused by inefficient irrigation technology/infrastructure, coupled with the authority's perception of a lack of desire by the organisation's users to manage water with more efficiency.

Don Elmer employed the language of climate change adaptation, probably facilitated by our proximity to Mt Huandoy, to communicate the need for people to change their habits and to adopt a more technocratic approach to water management. This framing of adaptation reiterated a belief in the commodification of the glaciers as ´water towers´ to store water, symbolic of the goals of the 'new water culture'. The way he incorporated his depiction of their loss of knowledge about climate change into discourses of modernization and development belittled their capacities and any infrastructure that had not been piped/lined with concrete, calling them rustic. Clearly promoting the wider agenda of ANA, Don Elmer's language therefore depicted a 'modern' worldview that saw the knowledge and infrastructure of *comuneros* as no longer 'useful' and inferior and firmly placed the responsibility on them to change existing habits and infrastructure.

Not only would it be advantageous for people to change their irrigation habits, but their crops too in order to improve their economic situation in the context of climate change, according to Don Elmer:

> So we always talk about this with our agriculturalists, no? While it's sure that climate change can be seen in a negative way, we also have to capitalize on (*sacarlo provecho*) some of the advantages that it brings us...if before they sowed potatoes, now they have to sow more profitable products (*productos mas rentables*).

Don Elmer talked about the kinds of actions that could be taken to adapt to climate change in a positive light, claiming that it could bring more profitable possibilities in crop alteration. On the one hand, there is an essentialized treatment of '*campesinos*', including an assumption that the only way they could adapt is by altering crops. On the other, he was trying to help them improve their economic livelihoods, framed as a short-term, opportunistic solution. In doing so, Don Elmer shined a positive light on the possible opportunities that climate change and temporary increases in runoff could bring, echoing the IPCC's definition of adaptation that highlights the exploitation of opportunity as a way of responding to climate change and its effects. While this showed a possible concern for the livelihood issues facing *campesinos*, suggesting that they could change their crops to "take advantage" of warmer temperatures, Don Elmer was also, probably unwittingly, condoning a switch to potentially more water-intensive crop production as a form of adaptation to climate change, which ran contrary to any discursive aim to conserve water.

6.3.3. How to change "bad" irrigation habits

Don Elmer told the attendees that they would have to transform the way they distributed water. Under new arrangements, they must calculate how much water each user is entitled to, in cubic metres per second, depending on the size of their plots. This right to a quantity is recorded on another certificate held by each user, constituting that person's or family's water use right. According to the ANA official, the process would be a difficult one, but not so difficult for *comuneros* because "they know". They may not distribute according to the water flow, but they have been distributing by hours for a long time, commented the official, a practice whereby water is released in turns for a number of hours to each sector

of the community. “Now, these hours must be transformed into litres per second - how many litres pass in these hours and this is what corresponds to them,” he said. In order for the organization and users to comply with the new rules and to exercise its right to access water according to the amount allocated under the license, the water user committee had to transform this method of distributing water according to ALA.

At the same time as claiming that people must “transform” turns, the official stated that the water authority was not disturbing the *usos y costumbres*: “the only thing that it has done is ‘formalize’ what they are doing, respecting their *usos y costumbres*. We, the water authority, have not imposed anything on them. We have said to them *use it like this – keep using it in line with your usos y costumbres*”. In other words, in practice, the water authority was allowing people to continue to use turns, yet, for compliance purposes, people must express the equivalent amount, allocated in the turn, in the *certificado nominativo*.

But of course, Don Elmer was entirely contradicting himself - how could people continue to use existing practices if they had to “transform” their distribution methods to align with efficiency measures in national policy? It was clear that this was merely lip service and seen as being on a continuum from ´bad´ to ´good´ practices as he told me later that this transformation had to be introduced “little by little” because people “still” follow their customs and “they do not want to have this discussion”. The knowledge the people possessed of the *turno* system, however, was acknowledged and legitimate in Don Elmer´s eyes, but only for the (unspecified) role it could play in helping to measure amounts of water.

This section illustrates the ways a key knowledge broker between the national and local levels of water governance in Peru was communicating his interpretation of the ‘formalizing’ changes that needed to be made to distribution methods at local level in Huashao, following the granting of a water license. Albeit that his was just one voice representing ANA’s vision locally, it suggests that ALA Huaraz were not very interested in working with existing institutions, despite ANA’s policy commitment to do so. Don Elmer feigned recognition of the *turno* under the discourse of *usos y costumbres* and at the same time homogenized all distribution methods used by YUA water users as ‘informal’ and rustic. He made the assumption that all comuneros were following the turn system of

collective water management in the YUA Water User Committee, essentializing community identity and practices and reinforcing social divisions between *campesino*s and the rest of the population.

As illustrated above, the YUA water users were being told to change their methods, but it seemed that this was the long-term goal; methods would not be "disturbed" immediately. Such an approach seemed to give flexibility to the YUA Water User Committee with regard to interpreting the policy goal locally and taking appropriate action. But, how much flexibility could they truly be perceived to have, given the primary canal was now lined with concrete and that any allowance of the use of existing methods was temporary? The latter heavily constrained the types of methods that users could apply to access their water, at least from the primary canal. What's more, the concrete lining of the canal seemed to be preventing filtration from the primary canal to the *puquios*, as some of my discussions with the women indicate in Chapter 7.

This section explores the extent to which Don Elmar adopted and adapted the ideas and concepts prioritised at global and national policy level for a local audience, to understand how and why his interpretation corresponded or deviated from global and national norms. In other words, it provides an example of the interaction of discourses of diverse origins at local level. Don Elmer's discourses show a strong technocratic bias in his orders to users to transform their ad hoc forms of distributing water in line with national policy and harking back to the economic definition of water in the Fourth Dublin Principle. This implied that decision-making locally was heavily constrained by the expert-vision of state authority (Lynch, 2012) as they seemed to seek to extend their control and ownership over water, not just as a resource, but also over how people viewed water.

6.4. Conclusion

This chapter shows, firstly, the nature of national discourses that were behind IWRM and driving the ´formalization´ of water user rights. National discourses were characterised by a legal and managerial water security discourse. This was aimed at achieving economic growth in production and 'water for all'; an understanding that the prevalence of conflict over water access in the Pacific slopes of the Andes justified the need for institutional change; and a conceptualization of efficiency focused on rationing water use and addressing 'informality' through licensing. Therefore, norms of efficiency, order and 'formality' towards economic growth characterised the preferred approach to water management nationally. National policy contrasts with global principles in the recognition of water uses in *comunidades campesinas* through a cursory engagement with the discourse of *usos y costumbres*, however the technocratic principles of efficiency, 'formality' and order overshadow the recognition commitment. The only instructions as to how this recognition might occur suggest that current practices should be ´aligned´ with legislation rather than permitted for use and reveals a cultural homogenization of water management that values the results of efficiency and productivity over and above social and cultural aspects. The responsibilities of the proposed new central authority reflect policies and norms that universalize how, and how much, water can be used and to educate people about the economic, social and environmental value of water, leaving little room, if any, for possible use of, and learning from, pre-existing water management knowledge and practices.

Secondly, the chapter has examined the discourses of ALA Huaraz's Head of Knowledge Management and Interinstitutional Coordination. This showed the sets of ALA Huaraz discourses drawn upon that justified the dissemination of new norms and principles in efforts to change institutions in local Water User Organizations in the region. The prioritized institutional changes included the conversion of historical distribution methods into quantifiable measurements, the allocation of water user rights that legalized the use of water and the dissemination of new norms and measures to deal with conflict. Don Elmar reproduced national discourses of 'water for all' and *usos y costumbres*, while introducing new dimensions in his use of a climate change adaptation discourse. His justification for the

need to convert historical distribution methods drew on his understanding of the role of *comunidades campesinas* in climate change adaptation, ascribing value to the *turno* method of allocation supposedly used by *campesinos*. However, at the same time, he undervalued historical predictive knowledge about rainfall variability in a judgement about the usefulness, or otherwise, of these knowledges as ways of adapting to climate change. Lip service to the *turno* while belittling historical knowledge sent confusing messages to water users in Huashao about how they needed to change existing practices and suggested a disinterest on the part of ANA to work with existing institutions, despite the push to decentralize.

The legal and economic thrust of IWRM nationally and the approach to implementation adopted by regional authorities posed challenges for decision-making for the users and managers of *Yurac Uran Atma*. As shown in Chapter 5, the system of distribution based on the *turno* was not widely accepted by water users. If fact, it was unclear whether the *turno* method was historically used to distribute water in this area at all; based on my discussions with the central committee, the system of distribution in Huashao was largely 'disorganized' prior to 2011. My impression was that efforts were being made to reinstall this practice as a so-called *uso y costumbre* based on its significance as a ´local knowledge´, in light of the climate change adaptation project undertaken by Practical Action in 2011, which appeared to have influenced how water was being distributed from the newly-lined canal. This meant that the users of *Yurac Uran Atma* canal were required to fit their understanding of how they used to manage their previously unlined canal, for example, cutting sluice gates into the main earthen canals to divert the flow, with the current requirement to distribute water from a concrete-lined structure, as well as to adhere to the rules of the *turno*. In other words, not only were they faced with having to manage their water using a combination of bureaucratic and socially-embedded institutions, but also with adopting a *turno* system with which they did not necessarily identify, but with which, as a community, ALA Huaraz generally associated them.

By prioritizing legal and economic forms of knowledge, the water authorities insinuated that there was just one 'right way' of addressing water scarcity, objectifying and naturalizing the use of particular types of technologies, for instance lined canals. This suggests that state water authorities were endeavouring to assert control over how people

were using and managing their water, curtailing the power of people locally to follow other courses of action that fell outside of legal-economic views of water, such as relying on their own set of malleable and diversely conceived bricolage of institutional arrangements (Chapter 3). As shown in the discourses of ALA Huaraz, rather than understanding empirically the diverse nature of existing water management practices in some form of recognition, the interest in the dissemination of global norms, such as efficiency, and the use of stereotyped understandings of practices in *comunidades campesinas*, failed to consider local experience, for example the changes to the *turno* system. The consumption of global policy ideas by state authorities thus helped to reinforce institutionalized views of knowledge forms in *comunidades campesinas* as inferior and stereotyped understandings of ways of life, perpetuating historically unequal power relations.

How, then, were people in Huashao thinking about and discussing water; what were their concerns or problem areas with water - how did they define them and how did their views connect and link problems and solutions? As Boelens (2013a) implies, this is likely to reveal the complexity of existing practices and related meanings, their historical contingence and embeddedness in power relations. This may also show the ways that people view the state and make use of state legal techniques and discourses to forward their own interests, though, it must be recognized "under conditions of unequal clout" (Boelens 2013, p. 249). In the next chapter, I explore how and why some people were moving from subsistence to commercial crop production in Huashao, a process that seemed to be moving in the opposite direction to state efforts to impose techno-economic control over water use and management practices, as demonstrated in this chapter.

Chapter 7 : The role of people in water use change - flower production as a recent livelihood activity

7.1. Introduction

If new water use institutions were being put in place to promote more 'efficient' ways of using water supplies, as illustrated in Chapter 6, and leaders of the community had agreed to assist ALA in their efforts by incorporating these into the techniques for using and managing water, how had flower growing, as a water-intensive activity, started and why? The ongoing shift from subsistence to commercial crop production happening in the Callejón de Huaylas and the pressure that commercial crop production appeared to be putting on water supply in places like Huashao appeared to juxtapose the increased presence of water authorities calling for the people to adapt to what they understood as accelerated glacier retreat and water scarcity (see my central puzzle, Section 1.3.1.). This chapter analyses accounts from male and female producers, a factory owner, and leaders of *Unidos Venceremos* and their actions to explore how and why flower growing emerged as a valued livelihood activity in Huashao as part of diversified sets of livelihood activities, what motivated their involvement and what the issues with production were. The aim is to shed light on why producers valued new commercial activities, whether, and if so, how, their actions influenced the institutional arrangements structuring livelihoods and water use (research sub-question 2).

While there is little to celebrate when it comes to glacier retreat and climate change, and the vulnerable and marginalized position of communities cannot and should not be denied, I wondered whether, as glaciers retreat and lose mass, increases in runoff might be welcomed by downstream users in the immediate pursuit of their livelihoods. I was uncomfortable with these questions though as they implied a less negative experience of change depicted in the vulnerability and climate change literatures, but they also resonated with Don Elmer's rendering of climate change adaptation as a positive, opportunity-offering phenomenon.

The opening section of this chapter examines the physical and social context of flower production and activity in Huashao and the implications for communal water management structures. The following section explores how and why people had decided to start growing flowers. In the subsequent section, I expand on this question by examining in more detail the rationales of different groups of producers to understand its meaningfulness in the context of existing diversified livelihood strategies. The final section looks at the effects of flower growing on community life in the context of a changing climate and the challenges these raise.

7.2. Production activities, effects on social life and water use

As illustrated in Chapter 5, the people of Huashao were engaged in mixed livelihood strategies, often combining subsistence cultivation of seasonal crops native to the Andes, such as quinoa and manioc (also sometimes sold commercially, when yields allowed) with livestock rearing, tourism activities in the national park, and other less common activities such as construction. As my fieldwork progressed, I came to see that the commercial production and selling of flowers was also occupying an increasingly large proportion of my host family's daily activities, as well as those of neighbouring families. The whole family would help to plant, pick and carry newly harvested batches to the porch, while Don Heracio would primarily take responsibility for watering. I learnt that Alstroemeria was a thirsty, disease-prone plant, and required intensive irrigation, sometimes daily during the dry season, and regular fumigation to ensure continued growth. At the porch, Don Heracio, his wife, Sofia, and daughter (and the children when they got home from school) prepared an area where they pruned and sorted the flowers according to colour, then bunched and placed them in buckets of water, ready for packaging the day after. Like a production line, they divided up the tasks according to the different skills each had developed in their respective activity. For instance, Don Heracio's daughter kept a record of the number of bunches packaged per load, estimating how much they would earn per shipment. This way she monitored the size of the yield, variations in productivity and income. Packages were shipped to Lima on a truck that passed through Huashao twice a week (see Figure 7.1). Sofia often brought a load, small enough to be carried in her *lliklla*, to Acho, a market

dedicated specifically to the sale of flowers, located just outside the valley town of Caraz. The harvesting activity happened over the course of a day, with final packaging left until either the following morning, or the same night, if there were leftover flowers to be brought to local markets early the next morning.

Figure 7.1 Photograph of package of Alstroemeria, Lima-bound. Source: own.

Floriculture, or flower farming, in Peru started in 1978 with the foundation of Flores Esmeralda, owned by Dutch flower owner, Peter Ulrich, in the city of Sayán in the department of Lima, targeting the export of carnations, statice, and gypsophila varieties to the United States and Europe (Fumagalli Galli, 1995). The business was subsequently extended to Caraz in the Callejón de Huaylas located at 2,200 metres above sea level; the Andean climate providing the ideal conditions for the production of a high quality gypsophila variety in particular (ibid.). From 1984 to 1990, it became increasingly difficult for Peruvian flower farmers to compete in the international market however, due to high fuel and energy prices and the terrorism that devastated rural areas (ibid.). The difficult economic conditions of the 90s made exporting unprofitable with the result that many businesses moved elsewhere, but left a small burgeoning national market behind, fuelled by the skills and expertise created by export-oriented businesses and an increasing demand for luxury items from a growing middle class in Peru. The import of tropical species from Colombia and Ecuador, such as irises and gingers, also piqued interest in the national

market (ibid.). What started out as an export-oriented business became of more national and local interest and appeared to be creating employment and income generation opportunities for Andean populations in villages like Huashao.

Having witnessed the activities in my host family's home and as I familiarized myself with Huashao, I could see that the flower dominated many of the *chacras* and appeared to have influenced the physical landscape to varying degrees. New wooden structures were being put in place to provide the shade needed for flower growth[19], particularly in the land adjacent to the plantations of business owners (see Figure 7.2) and in the larger family-run flower farms. Irrigation sprinklers were gradually added to the plantations and were steadily replacing hosepipe irrigation in some fields, although hosepipe irrigation was still used, especially where flower production was a minor activity. These kinds of accumulations of infrastructure in the built environment could signify increasing willingness to invest in a sector in growth.

Figure 7.2 Changing physical landscape in Huashao – new shade for flower cultivation. Source: own.

[19] The basic conditions for growth of Alstroemeria include ample shade and large volumes of water.

Production activities had effects on how water was used, how much and when. As Don Heracio noted, flower farmers irrigated their crop approximately three times a week, whereas with other crops like peas and maize they watered every fifteen days, using mostly hosepipes. Wealthier producers were switching to sprinklers. While those using sprinkler irrigation may have been using less water, they were irrigating more frequently. The Secretary of the central committee, but not a flower producer himself, told me he was observing the practice and noticed that water was being used "continuously", "daily", "permanently" and "practically there are no water turns". The plant needed water constantly so people had to "extract water" he said, but this is not allowed in the statute and therefore "deserved to be sanctioned accordingly". This suggested that some flower producers were not waiting for their allotted time or turn on the schedule, instead extracting water from the *acequia* outside their turn to irrigate their flowers, which was a forbidden practice under community's internal statute. Flower production and the switch to sprinklers, then, seemed to compound the difficulties already facing the central committee with implementing the turn system to organize distribution (see Section 4.5.1.).

The production process also seemed to be affecting social life in Huashao. On pick-up days, small scale producers congregated in the spots where their packages had been placed for collection, exchanging opinions on price, the quality of the harvest´s batch and new varieties they are thinking about trialling. The number of pick-up days had increased from one day a week to three days a week by July 2015. The passing of the pick-up truck was usually preceded by a hubbub of preparatory activity and once that week's yield had been hoisted with hundreds of others, with a shout to the driver reminding which buyer it should go to, there was a sense of accomplishment in the air. On regional market days in Acho, Sofia would rise at 3am, sometimes earlier, to catch the *colectivo* (local taxi) down to Yungay with other female producers, where another *colectivo* awaited to transport them on to the flower market. *Colectivos* were sometimes arranged specially to cater for the increased traffic on market day[20], without which the women risked missing out on early morning sales with wholesale buyers from Lima.

[20] The *comunidad campesina* runs its own *colectivo* service to and from Yungay and a percentage of the income generated contributes to community funds.

At the market, female producers met with their buyers from Lima to arrange payment and exchange thoughts on current demand, obtain new varieties etc. Sofia would keep her eyes peeled for new varieties floating about, even picking up rare buds she spotted on the ground to try out at home. On one occasion, at a meeting with her buyer at the market, Sofia, again on the look-out for opportunity, asked her buyer if she could obtain a bud of godetia for her, which was particularly popular at the time. She usually sat with other female producers from Huashao, while passers-by perused the offering and, as morning broke, gradually reduced the price on poor-selling days, sometimes selling three or four bunches for as little as one nuevo sol. The market was usually cleared by 8am, after which Sofia would meet with buyers and avail of the opportunity to shop for groceries at the market in Yungay on her way home.

The different phases of production affected where social interactions took place and how aspects of social life were experienced both in Huashao and beyond. Those who produced within their families usually grew their crop in plots close to their homes. This proximity can be explained by how labour-intensive crop maintenance was and the physical need for producers to be close-by, but it also had the advantage of enabling greater yields year-round, being able, as they were, to quickly transfer harvested crop to prepared areas adjacent to homes for pruning and sorting, and avoiding long walks to plots in upland areas, where more seasonal crops like manioc were grown. This is not to say that they did not also participate in harvesting seasonal crops, but flower production provided year-round production and offered a more regular source of income as a result (see next section). Being close to home also meant that the whole family could work together and work could be planned around mealtimes and school: Sofia could prepare meals while the others carried on with harvesting activities and could be there when the children returned from school. Furthermore, the regional flower market at Acho was a place where relationships with both fellow producers and buyers were forged and developed and possibilities to expand production in different ways explored.

This section has shown the growing importance of floriculture in the diversified livelihood strategies and everyday social life of the people of Huashao. It illustrated the kinds of infrastructural accumulations these activities led to which symbolised a desire to continue growing and investing in production. It also demonstrated the increasing interactions and

relationships with local and national markets that seemed to enable people to sell on a broader scale and explore new opportunities. Highlighting claims that flower producers used water on a continuous basis showed the effects of this new commercial activity on the waning reliance on the *turno* as a community irrigation practice (see Chapter 4).

Given apparently increasing flower production activity, I became interested in understanding how and why it had started in Huashao: what had motivated producers in Huashao village to start producing and selling and how were they making it work, in other words, what was it that piqued their interest and made the activity spread? In the next section, I look at the reasons cited by producers for taking up production, as well as reactions to obstacles.

7.3. Starting out

Production activities first spread through Huashao due to interactions between the factory and relatives of workers. The factory owner claimed that the knowledge and skills gained by those who subsequently sold independently had been copied and learned from him. It had become so popular because "they have all copied me… many have been my workers, they have worked here, one or two as competition sent spies. Not everyone has learned but yes, the great majority, 70-80%, have copied me". The women stated that they had started to grow by listening and observing *peones* who had been trained in the production process.

Access to knowledge about growing was problematic between the factory owner and Huashaoinos. The factory owner endeavoured to protect his knowledge and business interests, granting seeds only in exchange for labour in the beginning (around 2006). He criticized the incorrect combination of micro and macro-elements used by "them" in fumigation, citing this "mistake of theirs" as a rationale for poor earnings from their produce, compared to his highly productive yield. He referred to them as "spies", who had imitated activities learnt at the factory and passed on knowledge to family members. The factory owner resented this, appearing to feel slighted by the lack of appreciation shown to

him by Huashaoinos for the wealth he claimed to have brought to the area. This was also implied in his determination to point out his superior knowledge and what other producers did *not* know. He clearly set himself apart from independent producers along lines of knowledge, suggesting potential social divisions and power differentials between small-scale and large-scale producers.

From the women's perspectives, they noted how difficult it was to start out because the factory had placed a very high price on seeds to prevent them from starting their own enterprises, "they frightened us when we wanted to sow. 25, 35 soles for a bud", as one shopkeeper in Huashao claimed. While production activities could be learnt by observing and discussing how to distribute costs and the quality of crop yield, acquiring seeds or buds in the first instance to enable families to produce and sell independently, was not straightforward. Others talked about the accepted practice of business owners to offer buds in exchange for labour – another female producer whose main livelihood strategy was flower growing, described her son's experience at a factory as "a misery". These perspectives on the circumstances surrounding initial start-up would appear to reinforce the protective stance assumed by the factory owner.

However, these barriers to start-up did not necessarily act as deterrents as people saw opportunities to learn from each other and expand their own production, despite apparent constraints imposed on price or the working conditions at the factory. Don Heracio's daughter had worked at the factory before branching out on her own and showing her parents what was involved in production. She lived at her parents' house with a child of her own; her partner had left her when she was heavily pregnant. For her, having her own income and sense of independence from her parents was important. She was taking a machine-knitting course in Huaraz, which she juggled with looking after her daughter, tending to her flowers and being in Huashao for harvesting the flowers, as well as for seasonal harvests of native crops such as corn and *olluco*. She often helped with her cousin's harvest too, in a reciprocal arrangement that usually meant exchanging labour in return for labour or food. This account was not unique among the women as others echoed the value of having an occupation – for some, flower production was the first opportunity to do non-domestic or childcaring work or to have occupation during the time when they were waiting for food crops to grow. It seemed the women were prepared to tolerate and

withstand the initial constraints involved in production if it meant having the opportunity to work or to expand their existing set of livelihoods. Working at the factory, while apparently unpleasant, appeared to serve as an entry point into what could later become a more independent arrangement around family-based production.

Flower growing had been received with interest by one of the male producers, now a large-scale producer in Huashao, due to its perceived potential to contribute to an existing set of diverse livelihood practices, actively choosing to start growing as a means to avoid a loss in overall income generated from diverse livelihoods. One producer mentioned that prior to signing the tourism contract with SERNAMP, his family had been one of the clusters of families benefitting directly from tourist-related-income-generating activities. However, once the tourism contract had been signed, and it became clear that his employment conditions were about to change, with the consequence that he would no longer be able to earn a direct income from this activity "the idea to sow flowers came to him". He detected "movement" and decided to "acquire seeds". In this way, he viewed flower production as a means of expanding livelihood activity while making up for a loss in income he understood to be looming in livelihood activities generated by tourism.

The tourism contract with SERNAMP had been in place since 2013 and was offering the opportunity to earn an hourly wage to the people most in need in the different sectors of the community. This was a stipulation in the contract and the idea behind it was that opportunities provided by the relationship between *Unidos Venceremos* and the national park should be distributed more fairly, following years of domination by a small cluster of powerful families, such as that of the producer introduced in the previous paragraph (for more, see Section 4.3.). This producer's interest in flowers to expand his family's array of livelihoods was motivated by his desire to earn an income by whatever means possible, which, when considered in light of the expanding income-generating activities offered by the tourism contract, suggested that there was a growing desire for income generation in the wider community.

Therefore, while starting out was considered a risk by many producers, it was a risk that appeared to be taken quite lightly and as part of an empirical experiment because it represented an opportunity to expand livelihoods in order to make money. Another producer was sold the seeds "in hiding" in 2005 and with 60 plants he "risked it"; chuckling,

he remarked, “it was *chistoso* (amusing), we didn’t even cover our fare with our earnings”. He acknowledged that they did not know how to manage the plant in the beginning, at one point applying too much nitrogen fertilizer that led to burning. But in time and as they gained experience, the plants were strengthened and their crop yield began to grow. Their initial foray was described with a sense of amusement and incredulity looking back at their inexperience. In the space of a year, this family was employing approximately 6 *peones*, producing up to 10 tons of flowers and had acquired their own vehicle for transporting their produce. While it had started as a casual experiment, it was backed by serious concerns about the desire to make money and had subsequently become a significant income and work generator for this family, based on empirical experience of growing.

One business owner ran the operation with his son who traveled from Yungay on a daily basis, along with a number of others traveling to avail of the surplus work. Business appeared to be growing as owners were generating significant employment and income, evidenced by the demand for *peones* and the increase in private transportation to and from Huashao. This mode of transport set them apart from the family producers, who had to rely on their use of an immense truck that transported hundreds of tightly-packed *bultos* to Lima.

This section showed how and why people engaged in flower production activities, despite the constraints posed by the difficulties associated with start-up. Flower farming in Huashao involved family-based enterprises, drawing only on family members to help out with production practices, and family-led businesses which differed from the enterprises in that they employed *peones* who made the journey from surrounding areas, including Yungay. The families in Huashao harvesting and selling independently in local and national markets had learnt the trade from a family member or friend who had previously worked for the business owners and subsequently passed on their skills and knowledge. As more and more households came to be involved, there was less interaction with business owners and more family-to-family communication and exchange, as varieties were shared or requested from customers in Lima. Information about the new activity spread through word of mouth, with rumours about the advantages of growing and profit-making strategies exchanged in the *colectivos* to and from the market. Activities seemed to move away from a largely dependent relationship between a cluster of business owners and their

peones to a more reciprocal relationship between family-run enterprises. Having started out as an enterprise dominated by one factory owner, and then a small cluster of businesses, production in Huashao had become a commercial activity, involving many family-led enterprises, who saw the opportunity to produce and sell independently. It was approached with curiosity by some and had come to be identified as a means to broaden an existing set of livelihood practices and a way to spread the risk associated with other diminishing sources of income and employment, such as those offered by the tourism trade in the national park.

The *comuneros* and *comuneras* gave different reasons for this engagement. For the men, it was an opportunity to diversify and for the women, producing flowers provided a desirable occupation outside the home, however both groups saw it as an opportunity to earn an (extra) income. While they highlighted the constraints on production, showing awareness of structural constraints, this did not prevent them from taking action.

This section therefore demonstrated the power these producers had or perceived to have to influence the conditions of their everyday lives (for example, the generation of income, infrastructural accumulation) by engaging in a new production activity. The next section examines the meaningfulness of flower production in more detail as producers explain the advantages when compared with other types of production activity and irrigation methods.

7.4. Sustaining production

7.4.1. More regular source of income and occupation

Flower farming was seen by many small-scale family producers in Huashao to provide a more regular source of income than the income generated by the sale of food crops. A significant part of production activities in Huashao were historically centred on subsistence agriculture - food production for family subsistence - in addition to the sale of agricultural products at markets, however many producers complained about the decreasing market prices for their agricultural products. The flower, however, seemed to offer somewhat of an alternative. As a local shop keeper and small-scale flower producer noted, “the good

thing is that it flowers weekly. It´s not like peas, potatoes, maize…that sprout [every] half a year, 7/8 months for just one harvest". By contrast, the flower could be harvested up to twice weekly and sold to buyers in Lima and the local markets on a weekly basis. This ability to harvest and sell on a weekly basis was the main reason cited for the uptake and growth of this practice by all producers (although they recognised the increased competition and meagre prices). They appeared to have sources of income they may not have had otherwise harvesting crops like potato and maize just once a year.

Similarly, the availability of an additional source of occupation was considered an advantage by most producers, as was the possibility to work for more than one person. The availability of work for those children who finished school at 2pm meant that they now had something "to do"; as a young mother explained, they could work until 5.30 or 6pm, *ganar propina* (earn the daily bread) and contribute to the household income. Many families now needed extra help with their harvest, not just the larger business owners, for example, a young man in his early 20s had chosen to return home from Lima to help out in his family´s small flower growing business on account of the possibility of earning up to 25 *soles* for a day´s work and to avoid what he described as the hardship and loneliness of living in Lima. Having an occupation was perceived by one woman as a way to avoid being idle or suffering; she claimed that before there was barely enough to eat, whereas now only those people who were *ociosa* might struggle to put food on the table. The provision and exploitation of the extra opportunities presented by production activities was welcomed by many and seemed symbolic of a strong work ethic and, potentially, of a fear of being idle or left without occupational opportunities.

The value placed on occupation was palpable in Huashao, as was the preoccupation with avoiding idleness and making a contribution to wider society. Families went to the *chacra* early to make the most of the cool mornings before the burning midday sun and before the evening rains, in the rainy season. While the activity was hard work – the women complained of allergies, calluses and back ache – there was a sense of pride in participation and achievement following a good harvest. Don Heracio spoke proudly to government-contract labourers staying temporarily to work on installing compost toilets in Huashao, about the availability of work and income in Huashao and later invited them to dinner.

Visibly demonstrating to passers-by and external authorities that they were contributing to economic life in Huashao seemed to be valued by flower producers.

Despite an extremely low selling price as a result of increasing competition, the ability to earn whatever disposable income could be earned from a weekly harvest and the purchasing power that this enabled was considered an advantage by the female producers. One praised the sale of flowers for the money it generated to purchase clothes, food, medication and school materials, and another mentioned that food scarcity was no longer a concern. For the small-scale female producers who may have otherwise depended on subsistence agriculture, the purchasing power created by flower selling on a regular basis seemed to outweigh the disadvantage of sometimes selling at a loss due to the ever increasing competition.

7.4.2. Sprinkler/aspersion irrigation

The use of sprinkler irrigation was being introduced by flower producers in Huashao and was linked to sustaining flower production in diverse ways. Some flower farmers were switching from watering their flowers with a hosepipe or using flooding techniques, to using sprinkler irrigation. Many were installing sprinklers on their land. One female producer said her family switched to sprinklers back in 2008; irrigation with hose took too long so "because of a lack of time we changed irrigation". A male producer family also switched five years previously "because the hose requires a lot of manpower". Concerns of time and labour appeared to be motivating the switch.

The factory owner used sprinkler irrigation in his flower farms as, in his view, this technique provided the environmental conditions needed for the plant to flourish. Referring to himself as the "creator of this type of irrigation" in Huashao, he explained that he wanted to recreate the "habitat of the plant" by using sprinkler irrigation. Alstroemeria normally flourishes in the *puna* (the high altitude region of the Cordillera, above 3,800 masl) during the rainy season, he told me, and his goal was to recreate these conditions at lower altitudes in Huashao (an altitude of 2,800 masl) during the dry season by implementing sprinkler irrigation to imitate what would otherwise happen in the *puna*. He elaborates "if this happens…then I will do the same here, I will *produce rain*…for this reason we have

implemented sprinkler irrigation. So you are saying to the plant *hey you are at home*. There are no rains but you are producing the rain…" (emphasis added). The factory owner directly related the use of the sprinklers to the habitat needs of the plant and recreating those conditions in Huashao.

The use of sprinklers contributed to the creation of wealth in Huashao, according to the factory owner. "Producing" water that falls "gently" and "naturally" on the flower, as if like rain, recreates the conditions of the plant's natural habitat, implying that it responds better to this type of irrigation (as opposed to hose or other types). "Making rain [for the flower] in this way", he told me, has "economically changed everyone". Before, he claimed, with other products like "maize, corncob, peas" nobody owned a car or possessed the disposable income that they had now; when the rains have stopped and the dry season begins, producers can continue producing and harvesting a reasonably good flower crop and in turn, continue selling and earning an income. He suggested that the ability to artificially produce the effect of rain in this way was enabling producers to produce good quality yields, thus lengthening harvesting and trading activities into the dry season.

The owner of the factory in Huashao was not wholly responsible for bringing aspersion irrigation to Huashao, according to a number of the flower producers. As described in Chapter 5, some producers had participated in a project carried out by Practical Action in 2005 and 2008 that had recommended the use of aspersion irrigation as a way of adapting to predicted impacts of climate change on water supply variability and endorsed the use of irrigation by turns as a form of adaptation. Therefore, the role of the NGO played a role in legitimizing the use of these technologies in Huashao.

Concerns of saving time and labour thus appeared to drive some producers' decisions to switch from the use of hose to sprinkler techniques to irrigate their flowers. The use of mechanised sprinklers eliminated the need for manual labour according to the farmers. In addition, the factory owner, who had been producing commercially for many years, spoke of the gentler effect of this type of irrigation on the plant compared with other methods, and Don Heracio mentioned the benefits of its use as the crop matured, enabling better quality yields to be produced. It seems that flower farmers were seeing some benefits of installing sprinkler irrigators in their plantations, benefits associated with saving time and manpower and improving flower crop yield. This would suggest that they were conscious

of the possibility of diverting labour to other activities which, coupled with an expectation of a higher quality yield, opened up the potential for more earnings. The factory owner claimed that people in Huashao were already reaping the economic rewards of switching to this method. He implied that the increased use of this type of irrigation contributed to the creation of wealth by recreating the habitat of the flower, enabling the continuation of production and harvesting after the rains had stopped and freeing up time for producers to spend on other activities.

Switching to sprinklers was also turned to, to enable and sustain production, because existing methods of flood irrigation, using furrows or rows, were not suitable for the flower, according to the treasurer and secretary of the central committee of the Water User Committee. In a conversation with the treasurer on our way back to Huashao from a committee meeting, we discussed the types of irrigation methods used; as we approached his house, he pointed towards the irrigation rows in his plot calling them "our customs" (*nuestros costumbres*). A flower farmer himself, the treasurer told me that irrigating in this way was no longer useful (*ya no sirve*) for flower production: "now with the flowers, as they have to be sown on higher ground, this irrigation by rows does not work. So, we have to use aspersion". This was relayed to me in a matter-of-fact way; something that needed to be done to enable production as sprinklers were simply "gentler" on the plant. While the secretary seemed more concerned about this change, speaking about it with disdain in the context of wider changes in consumption and cash generation happening in the community, the impact of the switch to sprinkler irrigation on what they both called their "customs" (on separate occasions) did not appear to be of widespread concern. For example, it did not come up as an issue or an item on the agenda at committee meetings, nor had I heard any of the producers mention this in my discussions with them.

One of the ways that producers appeared to be sustaining the practice thus included a new way of using water, which meant switching to the use of irrigation technology. This was understood differently by different actors, but to varying degrees related to the earning potential that could be gained from this. The decision to switch to sprinkler irrigation appeared to reflect the extent to which flower production had come to form part of a family's livelihood strategy and/or the extent of one's experience experimenting with different techniques, drawing on friends' and neighbours' experiences. Those who relied

heavily on flower production for livelihood generation had come to see the benefits of using sprinklers in, for example, the elimination of manual labour needed to irrigate.

Others explain the switch to this type of irrigation as a more efficient use of their time than watering with the hose, suggesting that time was freed up as a result, to spend on other activities such as harvesting.

7.4.3. Emerging obstacles: laboriousness and falling prices

A negative implication of a weekly harvest was the increased time and effort needed to tend the flower, compared with other crops, which appeared to be affecting the availability of producers to participate in other activities. The women were particularly conscious of how "laborious" the practice was – the flowers needed constant attention and patience was key: one women explained the continuous cycle of tasks with little rest "there you are all day. You don't have a day off. You have to harvest, the day after you have to water, after watering, you have to weed, after weeding you have to fertilize, and from there water again…again…harvest". Watering and fertilizing was the most time-consuming – every two to three days, the flower required irrigation and fertilizer every twenty days, in the rainy season almost weekly, according to the women interviewed. Once one started sowing the flower "you have no way out", another woman reiterated. A worker from World Vision also witnessed the impact of flower growing on social commitments. She claimed that many of the volunteers who used to help them out with health projects in Huashao were leaving their positions to dedicate themselves to flower growing; their previous openness to participate in volunteer roles was waning due to absorption in flower growing. The community had moved from one concerned with new business ventures related to tourism and fish farming, she claimed, to one absorbed by floriculture or flower farming. The laborious nature of flower growing appeared to have taken some women away from other activities, be it taking a day off to rest or participating in more social roles, such as acting as health volunteers with NGO World Vision - some women were seemingly more preoccupied with economic endeavours.

Despite the income and the tangible benefits valued, the group of women were increasingly contemplative of the meagre price of the flower and the effect of competition

on price and their ability to continue selling. Some appeared nonchalant about the prospect of losing the practice; others explored the prospect of a price recovery if some producers stopped growing. They agreed that buyers continued to buy from them but that the price was falling, as one explained “we are selling at a loss. They buy but the price is killing us”. As there were many producers competing for sales, the sales agents from Lima paid them “what they want”, enabling them to settle their bills and little else. They saw little alternative but to continue selling when they could though by making the most of market days that proved profitable, consoling themselves that at least seeds were cheap. One female producer posited that they will “mostly make it die out, but some of us will continue, and perhaps if the flower [business] declines, the price will go up too”. Failing that, they accept that if they can no longer sell, they will sell something else. In this way, they base their speculations on their experience with other crops, (notwithstanding the fact that the other crops, even without a market, could be consumed in the home). Their views show an acute awareness of the competition they face, and a sense of recognition of a weak trading/negotiation position with buyers or, perhaps also, a trust in their way of life, in which they appear accustomed to adapting to changing life circumstances.

Therefore, when questioned directly about what might be done if production died out or if it became unprofitable, the female producers felt little attachment to flower growing; there appeared to be little fear of losing the activity as they understood that another crop would easily take its place. However, they were trying to keep activities alive as there seemed to be an implicit desire and/or pressure to at least sustain the benefits and opportunities created by being involved.

This section has shown how flower producers valued the income and occupation generation potential of flower production when compared with other seasonal crops, despite an awareness of an increasing number of obstacles. The possibility of producing on a weekly basis meant increased earnings throughout the year. There seemed to be a sense of pride associated with the availability of work now palpable in households in Huashao that did not previously exist in the area, appreciated particularly by the women producers and young people, even enticing some to return home to the sierra from Lima. Leaders cited flower production as one of the principle economic activities in Huashao. New goods and services were purchased with the money made, and new relationships with customers

in the flower market and Lima established. The ability to purchase a new type of irrigation symbolized increasing cash flow in Huashao. The use of a new type of irrigation was improving the quality of yield and enabling the continuation of production throughout the dry season, generating more wealth in Huashao.

This section therefore demonstrated how flower producers' engagement with a combination of market forces and a development intervention facilitated their use of a new irrigation technology, which was helping to reproduce a new commercial livelihood activity in Huashao. The beliefs and actions expressed by those using sprinkler technology suggest that those who switched to sprinklers took heed of how others in Huashao were visibly accumulating more wealth by their use of sprinklers, such as the factory owner who was more experienced in the use of sprinkler irrigation and the production benefits. While Practical Action was influential in spreading knowledge about the method, and legitimized its use in Huashao, the NGO's rationale for its use as a form of adaptation to water variability was less apparent in the ideas of producers who had started to use sprinklers. In other words, the use of a new technology created opportunities to assert their power to earn money from this activity and sustain production in self-defined ways.

As intimated by the women above, the effects of (over) production were beginning to set in, as the next section discusses from the perspective of community leaders and the factory owner.

7.5. Changing habits and business "heading towards the abyss"

> I see that there are many changes in expectations – everything is money, money, money. They sell their flowers, buy their noodles, sugar, other packaged things and they're no longer eating their wheat, their peas. This is what I see. A lot of change. (Secretary of the YUA Water User Committee)

The effects of the growth of a non-edible cash crop preoccupied some of the authority figures in Huashao, particularly in the context of food production. Historically, agricultural livelihoods consisted of a mixed set of activities, including subsistence food production for

household consumption, as well as market-based activities, like selling surplus food or wood. Some leaders appeared to be grappling with the effects of an apparent fixation on cash generation because of the addition of the relatively new practice of flower trading to existing mixed livelihoods, and in some cases, the move to focus on the flower trading economy as a sole livelihood activity. Market-purchased food replacing food historically produced by Huashao families was a cause of concern for one prominent member of the campesino community, himself also an environmental promoter for an NGO. He understood flower production as an economic endeavour in which people exploit the natural environment in the same way they exploit the mushrooms that grow beneath pine trees or the eucalyptus for wood, that is, in a way that "produces cash". He claimed that "they are changing the food, replacing [it] with noodles and rice…now they rear hens and they buy chicken…they sell their guinea pigs and buy chicken and fish…they have already replaced the *choclo* (corncob) from before with the flower". Similarly, another community leader noted that "people cannot eat flowers": he worried about those producers who have come to rely solely on flower production for their livelihoods, about those who "have turned into consumers"; and the possibility that they will go without food if they are left with no market for the flower.

While these leaders appear to distance themselves from this practice, they too were involved in flower production. Yet, their views imply personal struggles with the effects that the cash-driven choice to produce flowers were having on food and consumer habits. There was a desire to maintain food production and associated food types in Huashao, but there was also an awareness that this wish was at odds with an increasing desire to trade and generate cash flow.

A concern for the plants that could be grown to positively address issues of water scarcity and water harvesting, in place of the more dominant cash-generating crops, was also evident in the context of flower production. The environmental promoter mentioned above understood the flower in the same way as other crops that he interpreted as being valued in Huashao for their economic worth and for their ability to "produce *plata* (money)". He likened flower growing to the planting of pine trees and, reflecting on the planting of pine and eucalyptus in Huashao, he was critical of the planting of these types of trees, stating that neither trees should be planted in Huashao as neither "captures water".

He believed alder trees should be grown and other plants that help to "draw out *puquios*" and argued that people in Huashao were not becoming accustomed to water scarcity because they were mostly concerned about generating and sustaining income from the trees and plants around them.

The factory owner raised the possibility that climate change and rising temperatures were affecting the ability to produce particular flower varieties at certain altitudes, with the resulting speculation that the flower growing business would not last much longer in Huashao. With 40 years' experience, he stated that Alstroemeria was no longer producing flowers at a level at which it had previously thrived. He remarked on the rapid variation that he had witnessed, citing hikes in temperatures from a minimum low of 1.5° in the 80s in Caraz to a new minimum of 14°. This was the reason he gave for the distortion in crops, with the result that, in his view, one takes action by either searching for the habitat of the plant or attending to the diseases that will inevitably follow. This had led him and his colleagues to transfer their business from the town of Caraz (2,400masl) where it previously thrived, according to the factory owner, to higher altitudes in Huashao (3,300masl). Visibly distressed, he reflected "by inertia, by need, we have been climbing and climbing and climbing. I do not know how much time we have left here. 10 years? More? Or will I have to go higher again?" Some other producers also stated that Alstroemeria could no longer be grown in Caraz. His empirical experience pointed towards an uncertain future for flower trading in this area.

This section demonstrated the worries of some leaders about the effects of growing consumerism and preoccupation with cash generation exemplified in commercial production activities, for instance flower production. These included a preference for store-bought over traditionally homegrown produce and concerns about generating cash from environmental resources as opposed to protection or conservation concerns, such as water scarcity. However, some of these leaders were also involved in production activities, raising questions about how they would balance and negotiate their different roles and responsibilities as community leaders. Finally, the chapter exposed the concerns of the factory owner who voiced his anxieties about the effects of climate change on the variety of flower commonly grown in Huashao, raising doubts about ongoing production, another potential barrier to production facing producers.

7.6. Conclusion

This chapter has exposed the value placed by different groups of people in Huashao on livelihood opportunities and moneymaking endeavours in commercial livelihood activities, exemplified in flower production. The *comuneras* in Huashao were attracted to having a more regular source of income, more control over their own income, possibly for the first time, and the opportunity to expand an existing set of livelihoods. Their key activities included talking and interacting with fellow producers and maintaining trade relationships with national buyers, through commercial activities at the local market in Acho. For the *comuneros*, flower production was an opportunity to expand an existing set of diversified livelihood practices, also primarily motivated by the potential to earn more money.

The ability of producers to earn a living, despite the acknowledged constraints, demonstrated their agency to influence the conditions of their lives. Furthermore, incorporating the use of a new irrigation technology, influenced by a development intervention, as well as wider market forces, following their own rationale for use, helped them to maintain flower production as a livelihood activity. This demonstrated processes of institutional bricolage (Chapter 3) in action: flower producers who could afford it switched to using sprinkler irrigation, with some claiming that flower producers had replaced the *turno* system of allocation and water-using technologies historically associated with *comunidades campesinas*, such as flood irrigation, with this new form of irrigation. In other words, it demonstrated the agency of water users to take strategic action in light of new relationships and ways of thinking related to commercial production and the messiness of emerging institutional arrangements related to water use (Chapter 3). These kinds of ad hoc and emerging arrangements challenged the norms of efficiency, order and 'formality' underlying water security discourses embedded in policies of water rights 'formalization', as demonstrated in Chapter 6. Furthermore, the flaunting of the *turno* system contradicted the assumption by ALA Huaraz that the *turno* system was an established institution in Huashao, which in turn challenged the ongoing association of this system with *comunidades campesinas* in policy (Chapter 6) and development circles (Chapter 5).

The outcomes of this commercial engagement therefore suggests that issues of water availability or a sense of obligation to comply with communal institutions governing water use and water distribution concerned producers less than the irrigation needs of the crop to ensure productivity and income generation. In addition, a common theme across all producers´ accounts of how and why they got involved in flower production was the priority placed on social and experiential learning in everyday life, which was key to maintaining the associated practices that helped to reproduce livelihoods in Huashao. The apparent move away from using flood forms of irrigation suggest that for those using sprinkler irrigation, flower production was structured by sets of practices (e.g. observing and learning from neighbours) and values (productivity concerns and cash generation) embedded in a flexible water use arrangement, characterised by individualised use of water to maximise cash generation. The latter appeared to trump adherence with communal rules and the use of pre-existing technology for distributing water as these were deemed incompatible with the needs of the crop.

This chapter suggests that the livelihood, water use and management decisions and actions associated with commercial activity in Huashao were operating outside of the assumptions and expectations of water users in *comunidades campesinas* implied in water user rights 'formalization' policies. These assumptions were that water use should be monitored quantitatively by those operating under a water user license and a seeming belief that water management institutions or *usos y costumbres* were unchanging (Chapter 6). I posit that the way water was conceptualized in Huashao was tied up with and weaved through these efforts to reproduce livelihoods, meaning its use was not embedded in any fixed institutional arrangement per se, that dictated how water should and should not be used and valued. Rather, it had to be flexible and amenable to opportunity, as and when such opportunity arose. To this end, in the next chapter, I focus more specifically on how these same groups made meaning of water-specific changes in Huashao.

Chapter 8 : Making meaning of and responding to water loss and the effects of institutional change in Huashao.

8.1. Introduction

What has emerged thus far in Huashao is a sense that the people were concerned less with issues of water availability and complying with communal institutions governing water use and water distribution than the irrigation needs of the crop to ensure productivity and income generation. Chapter 7 concluded that the nature of the livelihood, water use and management decisions and actions underpinning commercial livelihood activity did not correspond with the assumptions and expectations of water user rights 'formalization'. For example, new relationships linked to interactions with a local business owner and national markets instigated a change in water use, contributing to a bricolage of water use arrangements that were not accounted for in prioritized norms of efficiency and 'formality' in policies of water use rights 'formalization´ (Chapter 6). I posit that this was due to producers' association of water with livelihood opportunity, rather than scarcity, built on a way of thinking about water that seemed more flexible and amenable to change and opportunity than the managerial and technocratic approach to water, focused on productivity and efficiency, adopted by the state. In this chapter, I wish to explore this by focusing more specifically on how the same groups were discussing some of the key ideas driving water rights ´formalization´ at national and regional policy levels set out in Chapter 5, especially those related to water scarcity and loss and the effects of new technologies. I ask the following questions: how were they making meaning of and responding to physical changes in water availability, what were the effects of infrastructural and institutional changes on how they were using and managing water, and what were the political and social consequences of new discursive practices espoused by ANA? (research sub-question 3)?

The purpose of focusing on these key ideas is to expand on the conclusions of Chapter 7 set out above exploring the more specific aspects of water-related changes affecting everyday

life that the Huashao local population considered pressing. This exposes the array of discourses, beliefs and attitudes about water, sometimes confused and contradictory, that reveal how diversely changes were understood and shows how the legal discourse propounded by ALA is just one of many discourses at work. This demonstrates both the gaps between the concerns of water use and management in everyday life and the concerns of ANA underpinning the bureaucratic and technocratic changes in water use and management, as well as the social and political consequences of global, national and regional discourses for diverse groups.

The chapter starts with observations of physical changes in water supply described by some men and women users of the Yuraq Uran Atma canal and the reasons given for these changes. The purpose of this section is to contrast the explanations of scarcity and loss of water users in Huashao with those set out in national policy. It follows with a section about how flower producers and water guards were understanding the effects of concrete lining on use and management and how water guards and the central committee specifically were discussing the lining of the canal and what this meant in practice. This section especially exposes some of the social and political consequences of new discursive practices related to the 'formalization' of water user rights and state efficiency measures and some of the contradictions with maintenance problems encountered by the water guards.

8.2. Changing availability - canal lining and disappearing *puquios*

Yurac Uran Atma canal had been lined as part of the state's efficiency measures aimed at addressing limited water availability; measures such as these were needed, according to the 2009 NWRPS, because water users were quarrelling increasingly over their access to water. While conflict may have been a problem for the central committee and water guards at the level of canal management, other non-management water users were not discussing the water loss they observed as a problem of conflict with neighbours.

> Before there was more water. When I was a child, when I was 8 or 9 years old, there was more water but as everything changes now, the water too is disappearing. More than anything because of the canal they have made up there (*comunera*).

The female flower producers were most concerned about the decreases they had witnessed in the underground filtration canals (*puquios*) (Lane, 2014). They linked these decreases to the lining of the piped canal. What used to be "a plain old irrigation ditch made out of mud" had been lined with concrete, the owner of a local travel lodge told me (see Figure 8.1). "They have taken away our springs" said a local shopkeeper, "for consumption it (the pipe) has damaged us…there is not enough water anymore. Before the ditch entered below. Now that it's piped, it no longer filtrates". One flower producer commented on the animals affected: "as it is piped, they cannot get inside to drink water. Little deer, foxes, different birds…they have to go to other places in search of water. It is not good". These women stressed the effect that the lining of the canal had on the consumption of water previously supplied by *puquios* and attributed the disappearance of their spring water used for domestic consumption, as well as the way that they and their animals had been affected, to the lining of the irrigation canal.

Figure 8.1 Photographs of Yurac Uran Atma lined irrigation canal. Source: own.

In the women's accounts, a sense of self-blame for their role and that of the community in the construction of the piped canal emerged. One woman said "we ourselves have made this piping but we have also harmed ourselves. To irrigate, yes well, things have improved. But in terms of consumption we have…damaged ourselves". She struggled to finish her sentence as she looked at the other women and laughed awkwardly. They seemed to backtrack then as if they were trying to reassure me, and each other, that despite their observations, there was still water – one of the more outspoken women quickly added "but more or less we are seeing that there is still water". I sensed that the women did not want to be seen to challenge the status quo in this instance, perhaps wanting to avoid any politically-charged topics, so I did not persist. However, their sense of awareness of their own involvement in what they considered a flawed development initiative was unmistakable.

A dominant theme in these accounts was the perceived decreases being experienced in the natural springs, known locally as *puquios*. Men and women agreed that water supplies in *puquios* were disappearing, water which was used for consumption and domestic use,

however they diverged in their explanations about why this might be happening. The women in particular were unembedded in the more managerial explanations but they were well aware of these discourses; this was clear in their non-verbal interactions as it dawned on them that they had said something that fell outside what might be perceived as a more standard response, but their concerns were different. Their focus on drinking water and attribution of blame to the infrastructure implied a preoccupation with domestic water needs and a search for answers in their immediate environment that might explain decreasing supplies. But most importantly, it gave a sense of their everyday experiences of change. The accounts of the men on the other hand were more embedded in official state discourses.

A member of the central committee was also most concerned about the disappearance of *puquios*, as well as the recession of "our glaciers, the Cordillera Blanca". He himself had access to two springs that his family used to use domestically, but now, he said, only small puddles remained. Similarly, he referenced a map of Lake Queishu that, when compared with four years before, showed spring water had disappeared: "it's terrible. It shows that in reality there is climate change". He appeared to view the disappearance of water supplied by *puquios* as evidence of 'climate change' and receding glaciers.

An environmental promoter in Huashao and water guard stressed the role of people in bringing about change in natural springs. Before, he said, there used to be forests, alder trees and natural springs; "water was plentiful". There were alder trees beside the springs but "man is making the alder trees disappear with cement…there is no conservation. They don't take care…we need to nurture and harvest water. People think I am crazy, I tell them that in times of rain, we need to collect". According to this man, people had lost interest and no longer cared about planting trees such as alders that helped draw out natural springs and capture water, choosing instead to sow trees that enabled them to make money, like pine. The way this man made meaning of disappearing springs is unsurprising, given his role, nonetheless it provides insights into wider consumer trends in Huashao.

None of the men explained shortages with reference to the canal; instead relating changes to glacier retreat, climate change, population rise, and peoples' apparent lack of concern for the environment, for example by failing to plant trees that capture water. The use of more abstract concepts in the men's accounts might reflect a concern for themselves

and/or their community to be part of the discussions on climate change and glacier retreat impacts. The absence of reference to the infrastructure in their accounts might also indicate their more direct involvement in its construction and commitment to its purpose as an 'improvement' to what was there before, that is to say their more direct involvement in processes of development.

This section reveals that scarcity or loss was being felt most acutely in the natural springs. While there was diversity in how men and women made meaning of decreasing *puquios*, neither group attributed scarcity or loss to conflict with neighbours over access in the first instance, highlighted in the 2009 National Water Resources Policy and Strategy as justifying the need for 'formalization' of water user rights. The latter constituted a prime reason for instigating change in how distribution was organized in the Andes, in both the text of the 2009 NWRSP, as well as in Don Elmer's emphasis on peace in his discourses about a 'new water culture'.

8.3. Making meaning of infrastructural and institutional change

Canal lining is part of the Peruvian government's drive to increase water use efficiency and productivity in the transformation of the water sector. The argument is that irrigation provides an important share of global food while water is increasingly becoming a scarce resource. In this section, I explore the prevalence of efficiency norms (water storage and capture) and interests in the discourses of flower producers and water guards surrounding the lining of the canal, taken from my group discussion with the women and a walk to the canal outlet in Mt Huandoy with the guards following a committee meeting. The purpose is to expose any convergences or differences with such discourses and examine the reasons for these given by these groups, particularly the differences and contradictions between the apparent merits of an enclosed piped canal system and the kinds of concerns about the canal's design. What emerges are some of the social and political consequences of canal lining and efficiency discourses for water flow, control maintenance decisions and problem solving from the perspective of the guards who were responsible for self-management.

8.3.1. Concrete lining, lock-gates and dealing with overflow

Some *comuneras* viewed the lock-gates now present and the ability to "shut them with a padlock" (*cerrar con candado*) as the biggest advantage of the canal infrastructure. In their view, the installation of lock gates had meant that they spend less time carrying water and looking after the canal than before and the ability to lock the gates meant that "you cannot open them anymore; they cannot rob anymore". Previously water was released in turns, as is still the case, but they used to spend all day "looking after" the "normal ditch", 10 people per irrigation channel (*toma*). According to one *comunera*, approximately five years before, every Saturday and Sunday, they had to go as far as Mt Huandoy to "carry water… and it took 3-4 hours for it to arrive here. More than five hours you used to have to walk to release water, along the ditch/stream…but it took five hours. You had to go at 2 in the morning". But following the installation of lock-gates, just two people per sector had to get up at 5 in the morning to divide up the water and to bolt the lock-gate "that´s all". The advantages related to time-saving and the reduction in the number of people needed to monitor the canal and operate the lock-gates call to mind the preoccupation with production apparent in their livelihood activities and the pressures to earn.

According to the Water Committee president, "this canal was made to capture all the water so that there is no waste in the *puquios.* Now that we have improved the canal with pipes, 100% of the water passing through here arrives. This is why there have been *improvements*. To capture 100%" [emphasis added]. He explained that before it was lined with concrete, it was "rustic" or "natural" and holes caused water to leak and these were the reasons for carrying out "improvements". Two water guards also echoed ideas of improvements compared with the unlined canal, for example citing the move away from the natural "rustic" ditch, associated with leakages, towards the lined canal that enabled water capture and storage. These accounts suggested that some of the ideas in the discourses of ANA and ALA were beginning to take root in Huashao, at least discursively, among the people responsible for managing YUA canal water. In practice, however, the operation of the infrastructure was presenting problems for the central committee.

When I arrived with the committee members to the outlet of YUA canal, I was struck by the amount and speed of the meltwater flowing from Mt Huandoy, illustrated in the photographs below. In the back of my mind, I wondered whether this flow was greater

than previous years; was I witnessing the effects of accelerated retreat that had been forecast in climate change studies in the Callejón (Baraer et al. 2012)? Of course, I had no way of finding out the answer to a somewhat emotionally-charged question, but, watching the water gushing from Mt Huandoy and the guards struggling to contain it, I did feel a sense of urgency when it came to protecting the water in this place and probably fully appreciated for the first time how complex and laborious the guards' responsibilities were and would continue to be.

The metal sluice-gates installed to replace what were previously plugholes in the sides of the ditch canal, as part of the newly lined canal, were proving problematic and the water guards attributed this to poor design (Figure 8.2 and Figure 8.3). The opening and closing of sluice-gates allowed volumes of water to be distributed from streams, access to which was controlled by the water guards. One of the sluice-gates had become wedged and could not be opened to control the water flow, leading some of the guards to believe that the ditches had been incorrectly measured and poorly designed (the water guards made meaning of the problem with the sluice-gates in diverse ways - according to one water guard, the construction worker misread the drawing; another suggested that the capacity of the canal was mismeasured). This meant that the flow of water through this channel was running too fast, with the effect that "the water is overflowing its banks…it is generating a problem and we can't control it. We are losing water", said one of the guards. Similarly, another guard noted the speed of the water and the effect that this was having on the time spent irrigating and the ability to control the water: "as well as losing water, people lose a little more time, because the more water that is passing, the less time people have to irrigate their properties". The sluice-gates were not functioning correctly due to poor design, according to the guards, which was leading to an increase in flow, a loss of water and a loss of ability to control water flow.

Figure 8.2 Photograph of lodged sluice-gates. Source: own.

Some irrigators/farmers had taken matters into their own hands and attempted to resolve the problem of overflow and water loss themselves but the water guards disapproved. A plank had been placed in the canal to stop the overflow but this merely displaced the overflow to the other side and one of the guards voiced his dismay that no authorization had been sought to do this: “nobody authorized it but people do it anyway”. This water guard disapproved of ad-hoc efforts to control water that had not been approved by the water committee.

Figure 8.3 Photograph of plank in canal. Source: own.

In their search for a solution to the broken sluice-gates, the water guards explored the possibility of requesting authorization from the assembly to finance a further construction project; hiring a construction worker to resolve the problem for them. According to a leader of the committee, it would not be "that difficult to find a solution. All we have to do is measure it – how many litres of water per second come out of the sources and in the ditch canals…how many litres per second could they supply". In his opinion, it was "obvious that they still [had] to undertake a project". Despite this apparent axiom, he did suggest to the other water guards that they consider carrying out the work themselves, however this received some strongly-worded replies: "but what are we going to do if we don't know (how to fix this). This work does not belong here", said one guard. This was reinforced by another guard's doubts about their ability to resolve the problem: "how do you think we are going to manage this? Honestly if we don't change this, they will have made an

investment in vain, we will not be able to use this water source". While the option to carry out the work themselves was discussed, this was less popular than the prospect of looking for funding for another project.

The discourses reflected in the accounts of the Water Committee president and guards stem from the legal and technocratic language of the state, coming to the fore in the negotiations of the members of the Committee in their search for a solution to a canal maintenance issue. ´Water for all´ and efficiency discourses are particularly apparent among the guards – water loss was a serious problem that had to be solved/controlled, reflecting the state's preoccupation with avoiding water loss to address scarcity and the importance of asserting control over resources using technical means. The prevalence of these concepts in the accounts of the president and committee members and the extent to which their adoption had begun to steer their attitudes towards their own practices show some of the social and political implications of these discourses in the YUA Water User Committee. For example, they had adopted the binaries used in ALA´s discourse that associated ideas such as water 'storage', water 'capture' and the prevention of 'leaks' with the lining of the canal and an 'improvement' from 'rustic' or 'natural' canal infrastructure. The use of these binaries prioritized the technocratic knowledge and solutions of the state, promoted by ANA and ALA in Huashao and significantly influenced how the Committee members understood how they could deal with canal management problems and their (in)ability to do so. The knowledge power of the state therefore materialized in 'modern'/neoliberal ideas about the control and commodification of resources that had entered into the language and behaviour of committee members.

The types of actions discussed by the guards to address the problems of lodged sluice-gates (leading to water loss and poor design) suggest that they considered the necessary repair work to be beyond their abilities, preferring instead to explore the possibility of hiring a contractor. 'Ad hoc' measures taken by users were admonished because they broke communal rules governing the *turno,* the understanding of which seemed to have taken on the state's fixed thinking about its use and association with efficiency, rather than a socially and historically contingent practice. Further, the president suggested 'measuring' the water supply themselves as a possible design solution, showing his further identification with state discourses. I was not the only one who did not know how this could be done; the

guards said that this type of work did not "belong" in the Committee, implying that a solution would have to be found by outsourcing. The adoption of concepts of efficiency driven by the state's preoccupation with controlling water using 'modern' means was therefore out of kilter with the infrastructural reality and complexity of the management tasks facing the guards.

8.3.2. The water committee and user license

The president of the Water User Committee conveyed an urgent concern to protect the ice that provided the water to Huashao and to resolve any water conflicts, as he recollected the struggle they went through to stop the removal of snowfields (see Chapter 5). They took their own actions to respond to the problem and worked closely with SERNAMP, who confirmed that the ice could not be removed without their permission and substantiated their claim against the ice-miners, which culminated in the granting of the water user licence in 2013. Stopping the removal of ice by proactive means implied a definite concern to protect the ice that provided their water and obtaining state advice was almost an automatic part of the response to dealing with struggle or confrontation, symbolising the committee's belief that the state could potentially represent a strategic ally in this respect.

From the perspective of the president, 'formalizing' the water committee meant having recourse to an organizational structure and rules contained within legal statutes to guide the actions of the assembly when faced with water grabbing or stealing by users or encroachment by external entities; the ability to settle confrontations in an orderly fashion, both within and between water committees, was prioritized. He considered the user license to be a useful document in this process. Having their own user license made the users "owners of their canal" (*dueños con su canal*). The contrary would mean that "any moment the state could come and take it from us…saying that you don't have a license. If they sell it to the miners then it doesn't matter because the committee doesn't have a license". In this way, he likens the license to an identity card (*DNI*) and the work it enables:

> When you go to work in Lima, first they say, 'where is your DNI'? Ah [looking at an imaginary card in his hand] you attended secondary school, so you can work. But if you don't have your DNI, you have no work – Chao! The canal is the very same. The canal that has documents is well secure. In other words, it has more power to defend itself. In other words, they cannot come here, not even the state 'no, no this is mine', they can't take it away so easily because we are well organized.

In his view, the water user license thus provided its users with an organization that gave them legal ownership and security over the canal and a means to defend against the demands of the state and the mining sector.

The Committee president explained how the conflict with their neighbouring water user committee over water allocation had started:

> The idea of theirs would be that it be equal, but how can it be equal based on what we have seen…the divine has given us the fair share that he has given us…for what? Why does more come and why does less come? Because in reality they have 500 hectares; because they have less water flow. This is why. They have 300 users which is enough. We have 1,500 hectares and we have 1,200 users. So it doesn't supply us – they still have a little too much water. Naturally we know that this volume of water supplies more hectares, the other supplies fewer hectares, it's because of this. God was so fair when he gave us this natural environment.

Ownership was assumed over the canal and its waters through vocabulary of belonging and justified with reference to the "the divine's" natural allocation of water and combined with a numerical reasoning of supply and demand, as certified by the water user license. As we walked along the *Yurac Uran Atma* canal, the president pointed to where the ice melts high in Huandoy – to the intake of the canal's water – and said "this place belongs to the committee of *Yurac Uran Atma*…from there it melts…what is born there is the origin of *Yurac Uran Atma*". The words of the president implied that God's fair yielding of this "natural environment", referring to the separate water source supplying *Yurac Uran Atma*'s water, is confirmed by the state-recognised water user license, which he compared to a form of identification (*DNI*) that gave the owner the power to say "no, no this is mine". Thus, based on Hugo's account, what was perceived as God-given had been recognised in the state license and had given them a different, legal sense of ownership and security to protect and defend their canal, in the face of encroachment by neighbouring water committees.

The measurements resulting from the valuation of water supply, preceded by the act of reconciliation with Pata Pata (Chapter 5), were welcomed by the administration of the water committee. The ratio of crops to the numbers of hectares being supplied by each individual intake enabled them to prove to the legal authorities that Atma were experiencing more water shortages than Pata Pata and with this information they believed they could address the water conflict with the neighbouring committee. Despite signing an act of reconciliation, however, Pata Pata was contesting the details of the license through an appeal, which seemed to bewilder leaders of the Water User Committee as they wondered what the leaders of Pata Pata could possibly have to question when they had authorized the analysis, as if the measurements and numbers would speak for themselves. The expectation seemed to be that numerical confirmation alone should suffice, for, as Rasmussen (2015) mused "who can argue with numbers?" (Rasmussen, 2015, p. 75) The leaders seemed to have a strong belief in quantitative analysis and the resulting measurements in proving their case and addressing a longstanding conflict with their neighbours.

The president's apparent appreciation for the license, and the technical forms of measuring and allocating that this implied, cannot be interpreted as merely rehashing regional and national preferences to legalize and quantify water to address conflict over access, subsumed under ´water for all´ rhetoric. It clearly reflects concerns to protect the canal's water from encroachment based on the experience of conflict in YUA Water User Committee and to find a way to address this. The concerns of the president were firmly rooted in a long history of conflict over access with other users: with a neighbouring water user committee, with ice-miners in Mt Huandoy, as well as in everyday disputes between users. His disbelief in the neighbouring committee's objection to the conditions of the license suggests that he saw the legal and quantitative route as offering the best way to resolve this conflict. However, his own explanation of how the conflict with Pata Pata started deviates from a legal or quantifiable definition of what constitutes "fair" allocation in the resolution of conflict, as his references to the role of the "divine" in how water was allocated between the committees implies a much more complex notion of rights and fairness than that implied in the state's legal framework. This challenges the technocratic way of thinking that the state is promoting that is devoid of any consideration for other ways of thinking when it comes to water.

8.4. Conclusion

In this chapter, it emerged that the *comuneras* were observing changes in the physical availability of water in *puquios*, which they used for domestic purposes and, in their explanations for why this was happening, they cited that the concrete lining of the state-backed canal was preventing water from filtrating to lower areas. While the men did not draw explicit attention to the state when discussing loss in one-on-one interviews, in my discussions with them at the canal, they argued that water was being lost as a result of the miscalculation of the capacity of the same canal. Thus, the women discussed scarcity and loss first and foremost with reference to the concrete lining of the canal and the water guards were also discussing loss brought on by a flaw in the infrastructure, although in terms of how to prevent it from a managerial perspective.

Though grateful to the infrastructure for time-savings, the discourses of *comuneras* were less defined by 'modern' ideas about the 'right way' to use and manage their water i.e. using concrete lining. They were less concerned with portraying an affinity with state processes; their first instinct was to be critical of the infrastructure. This suggests that they were more attuned to what had been there before i.e. soil-lined canals. Together with their references to loss in the natural springs, this implies a concern for less-easily measured types of water. This may help to explain why, in the pursuit of their livelihood strategies, they were less informed by state-defined ideas of water loss or scarcity and any ´right way´ to address it, and more so by the identification and exploitation of opportunity.

The value attributed to flower production by the women, as well as the ways that they approached water loss, demonstrate the relevance of gendered values and perspectives to changing water use and management. In recognition of this, I highlight the nature of the women's agency in further depth in Chapter 9 (see Section 9.2.), however an expansive gender analysis was outside the scope of the thesis.

Unsurprisingly, the president and treasurer of the Water User Committee had adopted ANA's and ALA's 'modernizing' discourses to describe their (pre)existing ways of managing (e.g. the *turno*) and the solutions to water storage and distribution problems. The adoption of these discourses showed the socio-political consequences of state knowledge about how

water should be managed in this place and the extent to which it had become naturalized among committee members; how they themselves had come to refer to state knowledge as "better" than their own. While individual water users tried to use their own methods of redistributing water, using methods that may have worked in previous unlined canals e.g. grass, planks of wood etc., the central committee admonished this as it seemed the only way to deal with the malfunctioning canal was to solicit project funding and recruit an external construction worker, yet another illustration of the state's influence on their problem-solving capacity.

The state's approach to addressing conflict, by way of legal instruments and economic valuations, was welcomed by the president of the Water Committee. Yet, in the president's depiction of the ongoing conflict with a neighbouring community, one appreciates that the adoption of wider discourses was only part of his understanding of water. The right to water came from a higher power first and foremost, according to the president, which he had combined with state discourses to come to a new, more complex understanding of the state's allocation of water, outside of the narrowly-defined economic and managerial understanding of ANA, ALA and global policy makers.

The connection made by the women between the concrete lining of the canal and decreasing water supplies from *puquios* was perhaps relayed to me by accident. When it came out, it was quickly recast in a more positive light to reassure me that the situation was not as serious as implied – the situation had much improved for irrigation I was told, and the potential effect on water for consumption was retracted and played down as it dawned on them that they themselves, as a *comunidad campesina,* were implicated in the canal's construction. This depicts a sense of pressure to be seen to conform to external norms guiding water management practices and the consequences of adopting these norms were being experienced first-hand by the water committee administration who now seemed locked into this infrastructure. While the water guards and the president of the Water Committee may have had vested interests in their adoption of norms and concepts associated with the state's 'modernizing' agenda in Huashao to define and solve problems of canal maintenance, doing so largely reflected the interests of those higher up the administrative scale i.e. ANA and ALA Huaraz. Unknowingly, the implications of 'modernizing' the canal, then, meant that the committee were in fact less capable of

administering the canal themselves or doing so meant administering it in a 'modern' way i.e. initiating expert-led projects that left very little room for the identification of alternative solutions. Furthermore, notwithstanding the huge obstacle already posed by the existence of concrete to (pre-)existing knowledge forms, the adoption of efficiency norms subordinated the ability of water users to manage water issues in 'ad hoc' ways by subordinating them to ´rustic´ or ´informal´.

The YUA Water User Committee and its operation reflect some of the outcomes of the state reforms aimed at decentralizing water management to water user organizations in Peru. These reforms shaped how water was used and managed at community level: water users shifted from what the president of the Committee referred to as a disorganized system of distribution (Section 5.5.1.) to relying on infrastructure that stored and distributed the water using metal sluice- and lock-gates, as shown above. Soil-made canals previously used to divert water by hand were lined with concrete; before the canal lining, water users were required to walk to the inlets to release water, following construction, fewer people were required for these kinds of maintenance activities. This also meant that decision-making power over canal maintenance issues rested with a small group of men. As holders of a water user license, conflict with neighbouring committees over access to the canal's waters was handled through the judiciary and involved negotiating quantified entitlements. The priority given to a legal framing of water management and to water as a quantifiable resource at national and regional levels was therefore also emerging as important in this water user organization in the use of a water user license as a conflict resolution mechanism and a form of defence against encroachment. Further, the culture of saving among water users adopted and promoted in the IWRM principle of efficiency, as defined in the 2009 NWRPS (Chapter 6), and preference for canal lining at national and regional level was developing among the central committee YUA Water User Committee, demonstrated in their preoccupation with storing and conserving water when figuring out maintenance problems.

Chapter 9 : Coincidences and contradictions of multi-level water discourses and understandings in Huashao

9.1. Introduction

This chapter brings together the findings from the thesis to explore and discuss my overarching research question, how and why did peoples' livelihoods and water use and management decisions and actions interact in different ways with the new institutional rules and norms produced by ANA and ALA Huaraz? To do this, I apply my place-based approach to understand the different groups' decisions and actions in response to institutional changes under the 2009 Water Resources Law, that emerged from my exploration of the interactions between discourses and actions of the different social groups operating at different levels in this study (ALA Huaraz, YUA Central Water Committee and different groups of *comuneros* and *comuneras*, also water users of YUA Water User Committee). It illustrates the socially and politically complex nature of water control and governance in the context of new water management institutions, including the differing perspectives, priorities and interests of different key actors, the differing power to materialize these interests, and the infiltration and ideological effects of dominant discourses of water management.

My first research sub-question queries the nature and origin of the water discourses prioritised in water rights formalization at national and regional level in Peru, considering historically and socially-embedded relations of power, and how do they interact across scale. My second research question interrogates how and why do people value and engage in commercial livelihoods locally and how do decisions to undertake commercial activities influence pre-existing institutional arrangements structuring livelihoods and water use. Finally, my third research question seeks to understand the political and social consequences of new discursive practices and institutional changes in water use and management espoused by state water authorities for how people make meaning of and

respond to physical changes in water availability and the management of water infrastructure locally.

Firstly, my discussion kicks off with an examination of the origin and nature of new commercial engagements in Huashao, how people made meaning of the outcomes of these new engagements for their livelihoods and the agency of producers to influence their livelihoods in new ways within constraining circumstances. I situate new engagements within the local development and climate change context, taking into consideration the influence of leadership agendas and climate change adaptation discourses. Subsequently, I examine the outcomes of new engagements for water use and management practices at community level, and consider what these might mean for different ways of thinking about water, preconceptions of life in *comunidades campesinas,* as well as effects of prolonged marginalization. Together, the purpose of these first sections is to understand the role of people in influencing change in their social lives while living under constraints, thereby addressing research sub-question 2.

Secondly, I consider dominant water discourses at national level and their nature and origins, focusing on research sub-question 1. I examine the sets of ALA Huaraz discourses drawn upon and used strategically in interactions with the YUA Water User Committee at local level. The purpose of these sections is to understand the controlling power of knowledge forms embedded in the Peruvian state's approach to water management and their significance in processes of decentralization and IWRM. Next, I examine the significance and challenges of the water use license as a conflict resolution measure in the YUA Water User Committee in order to understand the kinds of tensions that arose between the 'modern' discourses and practices of 'formalization' and local experience in a conflict situation.

Directing my attention to research sub-question 3, I then discuss the effects of dominant water discourses on the actions of the water guards, as well as the dilemmas that emerged in the process of managing mixed institutional arrangements and infrastructure. The aim is to understand the ways the water guards managed their roles with their everyday lives, in other words how they continued to pursue their livelihood activities within the constraints posed by state requirements to 'formalize' water use and management. The final section expands on the previous two sections by discussing the diverse understandings of water

that emerged in the thesis to illustrate the significance of considering different ways of thinking and acting in processes of bricolage and in the context of water user rights 'formalization'.

9.2. Origin and nature of new livelihood engagements in Huashao and understanding agency

The thesis has shown how groups of *comuneros* and *comuneras* engaged their production activities with different dimensions of change intersecting Huashao, using the case of flower production to illustrate new commercial engagements. The kinds of changes intersecting Huashao included new commercial livelihood activities, institutional changes in water use and management stemming from the presence of, and interactions with, state water authorities, and technological changes in irrigation, influenced by historical interactions with market actors and NGO Practical Action (Chapter 5).

The turn to sprinkler technology in flower production was an important engagement because it symbolized a change in how water was used in Huashao. The spread of its use could be traced to the practices of the owner of the flower factory in Huashao, who had extolled its use because it enabled more productivity and, consequently, wealth creation. The adoption of this technology, and subsequent spread in use, could also be discerned in community members' participation in a climate change adaptation project run by Practical Action in 2008. A report by Practical Action about this project in Huashao cites sprinkler irrigation as an adaptation to the predicted effects of climate change which they define as a technology that optimizes water use in the case of water scarcity or excess.

Chapter 7 showed how these groups put into practice production and irrigation practices learnt from social interactions with business owners in Huashao, connections with markets in Yungay and Lima, as well as their historical encounters with Practical Action and their own practical growing experience. Those more experienced in flower growing bought sprinklers to irrigate their flower crop in a deliberate move away from existing irrigation practices - they had observed that using existing technologies did not suit the conditions needed for crop growth and that switching to sprinkler irrigation was more productive (see

Section 7.4.2). Some less well-off producers, certainly in the case of the *comuneras*, who had worked in the factory, had started to cultivate their own crop with their respective families, putting into practice growing activities they had learnt at the factory. They engaged in production by drawing on experiential knowledge of flower production and learning from social peers. Taken for granted in their accounts was their reliance on reciprocal arrangements with friends and family, to arrange collections and pick-ups on market days, for example, or to lend a hand with large harvests. However, reciprocal arrangements were becoming less and less common as families grew busier with their own harvests and as they started to employ *peones* to help out. Similarly, unacknowledged conditions for action included wider socio-economic relationships that had formed with buyers from Lima, with whom producers interacted at local markets to take new orders and to arrange payment for previous purchases.

The ongoing production of flowers in Huashao depended on the ongoing demand from regional and national markets, and it seemed bound for a downturn with low prices already hampering sales. Producers were suffering the consequences of disorganized participation in a capitalist system, or unintended consequences of action (Giddens, 1979), such as increasing competition, low selling prices and work overload. Yet, such a reading does not appreciate how, over time, this practice had contributed to changing social life in Huashao, which could help to sustain this livelihood strategy. The accumulation of infrastructure and increasing number of *peones* hired by larger producers signalled efforts to sustain production and organize (see Section 7.2).

Even if only of a temporary nature, these producers had created an extra source of income and livelihood activity by engaging with a technology that had been partially and differently legitimized by Practical Action's previous work there, the knowledge of other producers accrued at the factory, and/or by the observed effects on wealth creation in the village. *Comuneros* and *comuneras* were using this method to create money-making opportunities, not for the purposes of water use efficiency. They viewed this new addition to their set of resources as a way of reducing the time spent irrigating, improving the quality of yields and lengthening production times, which implied that their intentions behind the switch were profit-related. Practical Action was influential in the employment of this method of irrigation in Huashao, but the rationale behind its use pointed to concerns not necessarily related to water conservation or water use efficiency, rather to those that better enabled

production and wealth creation. Turning the technology to their own aims, then, *comuneros* and *comuneras* put technology to use to bring the means of production more directly under the family control, away from the factory owner (Section 7.3).

The production of flowers itself appeared to be most meaningful for the control it offered some, particularly the *comuneras*, over their income and employment and the diversification opportunities it offered the *comuneros*, reflecting the wider trends in livelihood strategies in Huashao. Both groups made meaning of the act of planting and harvesting as an opportunity to broaden existing livelihood strategies in terms of its potential to generate more regular production and in turn a more regular source of disposable income and employment than the production of food allowed. Their awareness of boom-bust cycles and the effects of new habits for food production created by increased economic trading, did not deter them from producing for as long as they possibly could. This signalled an increasing need for families to supplement farm production as they were further absorbed into cash-based economies, but also the desire to achieve some semblance of 'development', regardless of how hard they had to work and how little they earned. Flower production was reproducing historically defined, subsistent ways of life that maintained *campesinos* in a marginalized position in wider society, yet, within which some people found "room to manoeuvre" (Bebbington, 2000, p. 495). An example of this "room to manoeuvre" is the agency asserted by the *comuneras*, which showed the importance of considering the influence of time in order to understand how they thought about and acted with regard to new commercial activity. Examining this further helps to understand why they continued to be involved and how they shaped their lives, despite and within the constraints depicted above (Section 7.4.1).

The *comuneras*' interpolation of historical experience of working at the factory, or awareness thereof, into an understanding of the benefits of participating in a new livelihood activity, considered in light of their core priorities, illustrates how they contemplated their actions over time. Their assessment of the difficulties associated with starting out when compared with what, in time this activity came to mean in their everyday lives shows the ongoing, continuous process of contemplation involved in the women's actions and behaviours. For instance, the possibility of having a more family-based enterprise, characterised by some degree of independence, or working in a non-domestic occupation for the first time, gave an insight into what the women considered some of the

elements of a desirable way of life (in other words, not just material), which also went towards explaining why they came to appreciate the activity, despite their acknowledgement of the financial constraints, either starting out, or with regard to more recent competition. They were aware of, and had reflected upon, the constraints, but nonetheless had identified what they viewed as beneficial in their lives and made the judgement that it was worthwhile to continue producing. Part of this process involved a stream of connected occurrences that gave commercial activity meaning and created opportunity to reproduce activities, such as the forging of relationships and the selling of produce in local and national markets (Section 7.2). In other words, new activities were not a random or discrete set of decisions and actions somehow strung together to achieve an outcome, often implied in state authorities 'informal' understanding of livelihood practices in *comunidades campesinas*, but rather a contemplated set of connected actions developed over time.

With regard to their structural position in society in Huashao, while the actions of *comuneras* were initially structured by historically defined relationships between members of the *comunidad campesina* and large landowners along line of domination (Section 7.3), this involvement also constituted a way into production. Intended or not, this way into production later enabled some women to branch out on their own and act on their own behalf, showing how social structures can be drawn upon to enable action. Once they had branched out on their own, the actions of the *comuneras* were no longer structured by any relationship-defining conventions but rather by social and experiential learning. This showed the creativity of the women to negotiate and strategize around existing social structures.

This thirst for control over livelihoods and the means of production was unsurprising given the strong emphasis placed on maximizing opportunity and money-making in the wider community, emanating from the mainstream development discourses of leaders of *Unidos Venceremos,* as well as by Don Elmar from ALA Huaraz. Excited by the prospect of having "its own development", the president of *Unidos Venceremos* heavily promoted the generation of income so that they might expand their control over their own means of production in similar ways to the expansion of opportunity and control that the tourist contract had enabled (Section 5.3). The rationales behind the decisions to be involved in this new livelihood activity imply a strong identification with national aspirations to

'modernize', promoted by leaders of *Unidos Venceremos*, who celebrated the increasing generation of income and employment. They considered these factors priorities in the route to a desirable way of life, despite their acknowledgement of the effects of increased economic trading on eating habits and water.

The framing of climate change adaptation as a livelihood and income-making opportunity, in the language of Don Elmar from ALA Huaraz, supported the rush to make money in Huashao (Section 6.3.2). He proposed that the people of Huashao should further diversify their income and livelihoods to "capitalize" on the possible advantages of changing rainfall or water availability. Such a framing meant that not only was climate change a problem that could be addressed, as criticized by Orlove (Orlove, 2009a), but a problem that could be taken advantage of in the short term and in an economic sense, closely aligned with the IPCC definition of adaptation. This was worrying on a number of levels: framing climate change as an opportunity fitted well with mainstream development discourse, which meant little change with respect to dominant capitalist agendas promoting unbridled growth. While in some ways the emphasis on what could be gained in the short term was understandable given the immediate often subsistence needs of people in Huashao, it also conveys the water authorities' acceptance of a culture of short term fixes. Such a view exposes the intentions behind neoliberal policy reform as more about protecting powerful interests invested in the dominant paradigm than any benevolent goal to protect those most affected by the worst impacts.

9.2.1. Outcomes of new engagements: changing and increasingly mixed local water governance practices and institutions

The engagement of *comuneros* with local and national markets via links with business owners and other producers, as well as the historical interaction with Practical Action, shaped the ways that they were engaging with existing communal institutions governing water use in Huashao. Some producers had stopped using pre-existing flooding techniques to carry water to the flower beds because they were no longer suitable, in their view, given the choice of sprinklers. I argue that the use of sprinklers was individualizing water use, evidenced in claims by water guards that flower producers were not respecting the *turno* system of scheduling water allocation. This engagement was contributing to the spread of

new sprinkler technologies, informed by an individualized perception of water use based on the needs of the crop, rather than thoughts of water sharing. These new arrangements were folded into an existing bricolage of institutions governing water use in Huashao.

In exploring the practices and values associated with water embedded in new commercial engagement, for instance the use of new irrigation technology, a particular way of thinking emerged. How the *comuneras* valued water was often opportunistic and detached from any fixed water use/management arrangement, implying that their engagement with water in their livelihood practices was unstructured by norms of efficiency and order in new state mechanisms, but instead seemed to emerge from the contemplated efforts to reproduce livelihoods, as examined above; they prioritized the water needed to sustain their livelihoods, the use of which was not necessarily guided by the rules of the community *turno* nor the need to conform to state-imposed practices. This points towards a particular kind of way of thinking driving their decisions and actions to seek further control over their livelihoods and operating outside dominant norms (discussed further below in 9.4.).

At first glance, it may appear that the implications of the switch to sprinklers and non-use of pre-existing irrigation methods produced by these new engagements were moving *comuneros* in Huashao away from their use of community structures; in other words, that they constituted a constraint to their use of historically-derived methods. However, it may be simplistic to see the implications of this switch as a constraint alone, given that there was widespread flaunting of the *turno* system in the community that was not wholly attributed to flower production (Section 5.5.1). The use of earthen banked canals to transfer water was not pre-given as their use was combined with, where possible, the movement of water via the concrete-lined canal. Conceptualizing the engagement as a constraint therefore assumes that producers identified with, and valued equally, the *turno* and the use of earthen-banked canals in their everyday practices. Whereas, while the *turno* system of scheduling is often referred to as 'traditional' or as part of a community's *usos y costumbres* in the Andes (Section 2.4.1), the majority of *comuneros* of Huashao did not associate the *turno* with 'tradition'. The outcomes produced by these engagements enabled new interactions that were valued for the opportunities they created to make money and generate employment; while some leaders viewed the sprinklers as partially constraining existing communal structures, *comuneras* emphasized the opportunities to

make money that new engagements produced. This highlights the important role played by people in influencing structural change, depicted in Giddens' structuration theory. As people identified with new institutional practices of water use produced through interactions with market forces and development initiatives, they increased the range of overlapping rules governing water use in Huashao through the use of individualized methods, sometimes alongside, sometimes conflicting with community-defined institutions.

A consideration of commercial activity and different ways of thinking and acting draws attention to the (what might seem like) contradictions with which people live as members of a *comunidad campesina* and what can be understood by 'community'. As shown above, their ways of thinking and acting are not wholly defined by community structures but also by interaction with wider processes of change, meaning that they define themselves in complex ways, diversely influenced by individual and collective interests. While members may agree on generating outcomes for the benefit of the community, as illustrated in the case of tourism (Section 5.3), the views of the president and leaders suggest that in *Unidos Venceremos,* such a consideration for the wider group did not foreclose the freedom of *comuneros* to identify and exploit opportunity that might also bring financial reward to their families. (Appreciating that *Unidos Venceremos* was not some fixed, cohesive entity, in the context of social change, is important to bear in mind in the following section where I discuss how ANA and ALA Huaraz were approaching community practices).

This section suggests that people in Huashao shaped the conditions of their everyday lives through an engagement with market and development processes, which contributed to changing practices structuring water use in ways that enabled them to continue producing. I argue that the thirst for 'development' and money-making imply a longing for inclusion in Peru's long-awaited economic development in what I sensed was an almost palpable desire to disassociate from narratives of 'inefficiency' and 'unproductivity' historically associated with *comunidades campesinas* among the country's political elites, particularly invoked in Alan Garcia's 2007 statement (Chapter 2). The new engagements seem to respond to Garcia's demoralizing judgement of life in *comunidades campesinas*, their apparent lack of financial capital and failure to use technology in an assessment of what the country needed to progress. In Huashao, this came forth in the focus on generating employment, the fear

of idleness, the importance of showing the fruits of their labour with cash and in the appearance of productivity through engagement with business. While the situation in Huashao seemed to reflect a near-internalization of this marginalizing rhetoric, the extent to which such engagements enhanced control for some people over their lives should not be underestimated, nor the sense of pride with which the president and people of the community spoke about the growing set of livelihood opportunities on offer in Huashao. The prospects offered by the tourism contract served as somewhat of an anchor for other livelihood pursuits, too, transferring a confidence and assertiveness to experiment and to perhaps ignore potential socio-economic barriers.

Thus, while the direction of social change happening in Huashao may align with what political elites and some state authorities might wish to see occurring in many *comunidades campesinas*, probing the outcomes of new commercial activity for the effects on water governance arrangements paints a more dense and complex picture. This picture highlights the importance of understanding social change in *comunidades campesinas* in ways that appreciate the complex and (seemingly) contradictory ways that people carry out their livelihoods. As illustrated above, while at first glance, the decisions and actions of *comuneras* to get involved in new commercial livelihood activities may appear to contradict new state norms of efficiency, these decisions and actions were not contradictory from their perspectives: how they used their water was based on a contemplated understanding of a specific and ongoing set of actions that developed over time, based on a set of priorities defined by them, encompassing material and symbolic meanings.

9.3. Expanding state legal control through 'modernizing' water use and management

This section shows the discourses of water use and management, their origins in the 2009 National Water Resources Policy and Strategy (NWRPS) and the consumption of policy ideas at local level in Huashao (Chapter 6). Drawing on Foucault's (1980) understanding of power is useful to explore the spread of state control in Huashao, as well as the movements of norms from global to local levels, via seemingly objective knowledge forms

and institutional arrangements. This allowed me to trace how knowledge about pre-existing ways of thinking and acting were judged by authorities operating at different levels and to understand the effects of this on the (re)definition of water users' frames of reference and actions as they attempted to self-govern. I argue that the knowledge forms favoured by state water authorities and the reproduction of power inequalities through knowledge production and accumulation, revealed in the thesis, operate through "apparatuses of control" (Foucault, 1980, p. 102) in Peru's new water management system. This section reveals some of these apparatuses of control at work and their effects.

Constituted by a legal and economic framing of water security, the national policy prioritised principles of efficiency that promoted norms of order and 'formality' in water use and conservation. It states that legally framing water security contributes to ordering and 'formalizing' the country's productive activities and could be achieved by disseminating new management norms in water user organizations and state authorities and by creating a 'new water culture' (Chapter 2). It prioritized the granting of water user licenses to instil a culture of water use efficiency applying economic instruments and to address 'informality'. The labelling of types of water use as economically 'efficient' and assertions about the need to 'order' and 'formalize' productive activities and water use practices, are powerful because they contain judgements about, and therefore legitimize, some practices and actions, while delegitimizing others. The presentation of knowledge forms as objective or naturally given reflects a normative understanding of water that prescribes certain actions and solutions to problems as inevitable and subordinates those that deviate from the standard, preventing a consideration of water uses embedded within evolving processes of social relations (Trottier, 2008). In the line of Foucault (1980), the state's objectification of water knowledge forms constitutes a kind of instrument of techno-economic control over peoples' productive activities and water use and management decisions and actions.

The IWRM approach favoured by the Peruvian state was strongly influenced by the 'modernizing' projects of multilateral organizations. As Lynch (2012; 2014) found, the financial support of the BID and the World Bank enabled the institutional changes recommended to achieve the 'new water culture', which included the expansion of the 'formalization' of water user rights, a process that had been triggered in the 1969 General Water Resources Law. Similar to Lynch's (2012) review, the 2009 NWRPS is strongly biased

towards principles two (decentralization) and four (water is an economic good) of the Dublin Principles.

At national level, the discourse of 'water for everyone' was driving the Peruvian state's goal to implement IWRM and achieve water security (IWRM is the approach, whereas water security is the policy goal) (see Chapter 6). The 'water for everyone' discourse comes from the globalizing discourse of IWRM. It stems from the global framing of questions of water scarcities that view water problems as universal, affecting us all equally, making local contexts seem unimportant, for instance minimising context-specific issues of distribution or social relations of power. The registration of water titles recommended, partially motivated by the global popularity of private property rights as a solution to the global crisis, discursively constructs all water users as equal, for example, with the effect that measures that serve the controlling interests of the state, private developers etc. are often rendered invisible (Joy et al., 2014). Universalizing water problems tend to neutralize the political choices underlying questions of distribution and allocation and separate water problems from their specific socio-political contexts (ibid.). This serves as an instrument to place unpleasant questions of distribution outside the domain of public deliberation.

The effects of universalizing water scarcity became apparent in how the *comuneras* defined and understood water scarcity. By contrast to the state's explanations, their definition of the problem of water loss implicated the state as a possible contributor to the problem (Section 8.2). Rasmussen (2015) contends that "conflicts over water are as much a symptom of relations with the state as a question of water scarcity itself" (p. 59). Although there is no conflict as such in Huashao, the women's accounts nonetheless draw attention to the tensions created, from their perspective, by the state's role in water management, which were underplayed and taken-for-granted in the globally-embedded 'water for all' discourses of the water guards and central committee. Reflecting on the women's accounts calls attention to the YUA Water User Committee's preferred approach to water management and the controlling interests of the state behind this. The state's emphasis on lining canals to store and transport surface water to the coast, in other words more easily engineered water, rather than attempts to understand the issues of changing water availability locally from the perspective of groups like the women, for example, feeds into wider criticism of increasingly coast-oriented national priorities (Carey, 2010).

Similarly, the way that local water rights are recognized in the policy is through a legal framing of *usos y costumbres.* This calls for the alignment of local systems into existing legal frameworks, which fits well with the overwhelming emphasis on technocratic and 'modernizing' measures, following preferences in law and policy schools for interventions, rather than empirical analyses of what existing everyday rights and practices might look like (Boelens and Seemann, 2014). The engagement of the term with this wider legal framing that dichotomizes 'formal' from 'informal' practices, delegitimized socio-cultural and historically-embedded ways of thinking and acting that are not easily confined to these categories. The legal framing of all practices, gives secondary status to practices that do not fit with legal ways of managing water, conceived in this policy as the 'right' i.e. 'modern' way. The expectation to 'modernize' water use and management practices that conform to technocratic understandings looms large at national level and reflect the desire for state control over water, despite (ambiguous) references to the need to decentralize.

The ideas and concepts in the 2009 NWRPS represent some of the more abstract sets of meanings behind the implementation of the 2009 Water Resources Law that are shaping the possibilities of action due to their increased currency in areas where ANA is rolling out institutional changes in water management in Peru. They show a preference for globally-defined universal, economic and legal rules and 'modernizing' knowledge forms, through discourses such as 'water for everyone'. In this section, I have argued that the objectification and naturalization/globalization of knowledge forms depict some of the "apparatuses of control" that contribute to the power driving the techno-economic approach to water management preferred in national water policy.

I suggest that the interests of the state to extend control over water as a resource, as well as over how people think about water and themselves, masked in these wider abstract discourses, are uncovered in the sets of discourses drawn on by ALA Huaraz in interactions with the YUA Water User Committee explored in the next section. It explores the political, strategic use of dominant water policy discourses and prioritised concepts locally.

9.3.1. Undermining community water governance practices - a call for local transformation

Civil servants from ALA Huaraz were at the forefront of the dissemination of legal and institutional norms in the region, as demonstrated in the discourses drawn upon by a key knowledge broker who seemed to be charged with awareness raising and 'educating' the users of YUA Water User Committee about how to change their habits (Chapter 6). The 'water for all' globalized discourse and the universal merits of canal licensing was reproduced at local level. In addition, the water discourses employed gave some insights into the IWRM principle that commits to respecting the *usos y costumbres* of *comunidades campesinas* missing at national level, which, in turn, shed light on the interest of ALA Huaraz in working with existing institutions.

The discourses of ALA Huaraz stressed the need for transformation in community governance practices and drew on discourses of diverse origins to justify this. A discourse of climate change adaptation emphasised the need to store and increase water supply and reflected a combination of an institutional, technological and physical/structural approach. The depiction of the glacial lakes of the Cordillera Blanca as natural drinking glasses was used to justify the need for lining canals and for changing habits. In discussions of existing irrigation practices and infrastructure that were causing water loss in the YUA Water User Committee, the language was peppered with binaries, such as good/bad, 'modern'/rustic, 'efficient'/'inefficient', 'formal'/'informal' that illustrated his subordination of existing ways of using and managing water. Similar to the objectification of knowledge at national level, the use of historical knowledge forms related to irrigation and unlined distribution canals were judged as 'inferior' and 'subordinate' compared with the norms set nationally, as if they belonged to some past realm and it had long been established that the only way forward, with regard to valuing water, was to quantify use and to line soil-made canals with concrete. Indeed, another reason for the need to change how they were living was that *campesinos* no longer knew when the rains were coming. The commodification of the glaciers shows a 'modern' discourse that, together with the conviction about the waning climate knowledge of *campesinos*, constructed the rationale for the need for institutional and structural change in the YUA Water User Committee.

References to the *turno* system of allocation emerged in local discourses in ways that suggested the term was employed in language strategically. Its employment as a concept evoked the ways in which it had been legitimized by Practical Action in their projects that gathered data on experiences of 'technological adaptation' in communities including Huashao, findings from which had been used in Peru's Second National Communication to the UNFCCC. The organization had defined the *turno* as a ´local´ or ´traditional knowledge´ that, Practical Action discovered, was being used by the people of this place as a form of adaptation to changing water availability, as they defined it. The use of the term *turno* suggests a strategy to manifest awareness of what had come (and gone?) before; a way, perhaps, to allay possible resistance from YUA Water User Committee to what was, to all intents and purposes, a call for outright transformation of pre-existing ways of using and managing water that did not conform to 'modern' methods.

While I also cast a critical eye over the categorization of adaptation measures, especially given that the use of the *turno* was not a widely accepted institution governing water use in the YUA Water User Committee, the work of Practical Action had been an attempt to acknowledge the *turno* as a practice in its own right, alongside others. However the use of the term by the civil servant from ALA Huaraz functioned as part of his performance to affect an apparent appreciation of life in a *comunidad campesina* (Section 6.3.2). Yet, the ongoing use of *turno* in the YUA Water User Committee was only recognized insofar as the scheduling system that it represented could somehow be used to transform existing methods into measurable amounts.

The terms 'traditional' or 'local' knowledge and climate change adaptation were not employed in the discourses drawn upon by ALA Huaraz in discussions about their existing practices and the use of the *turno* in the YUA Water User Committee. Instead, the discourse of *usos y costumbres* was employed in ways that appealed to everyday livelihood practices also referred to as 'informal' and rustic. On the one hand, the discourse of *usos y costumbres* was used as a veil for the underlying agenda to transform existing practices. On the other, the superficial use of the term did not capture the diversity, dynamic nature and sometimes-contradictory uses of the water use and management practices in operation in Huashao. For example, assuming that the *turno* was a commonly-accepted community structure governing water use by the water users of YUA Water User Committee was

shortsighted and underestimated the rate of change happening and complexity. As discussed in Section 9.2. above, the case of flower production suggests that fewer people were following the *turno* to structure water use in their everyday lives, not heavily motivated by a sense of obligation to comply with community norms and those who were adopting what seemed like more efficient technologies e.g. the sprinkler, were not necessarily motivated by concerns of efficiency. The use of entrenched ideas, then, of 'formal'/'informal' and 'modern'/rustic, together with a contrived and discriminatory employment of *usos y costumbres*, illustrates the dangers of institutionalizing communal practices in legal frameworks in the YUA Water User Committee. 'Formalization' policies under-ascribed distinctiveness such that pre-existing ways of managing were excluded. This meant that, in YUA Water User Committee, the extent of change and flux happening in peoples' livelihoods that affected how they were using and managing their water was overlooked, as well as the ways that individuals and families were exerting their agency to influence that change.

While the climate knowledge of campesinos was no longer 'useful' from an institutional perspective, *some* of their water management knowledge, in this case the *turno*, was 'useful' because of the potential to engage the practice in the conversion process to more 'modern' techniques (Section 6.3.3). Though the latter was part of the flimsy veil covering a call for transformation of practices, the rendering of knowledge of a social institution as valuable only in instrumental forms also acted as a type of institutional control over other, apparently less useful knowledge forms in the context of climate change. This referred to ways of thinking and acting that did not conform to 'modern' – legal and economic – knowledge forms. These represent some of the increasingly subtle ways that the water authorities wield power over lesser-known ways of thinking and acting. I posit that this controlling power was serving to spread the interests of the state, as well as perpetuate existing unequal power relations between *comunidades campesinas* and other social groups.

A blanket approach to the use of the *turno* suggests a rigid belief in a uniform system of management across the community and a lack of appreciation for evolving and multiple livelihood strategies and complex interests at work putting pressure on the ways water was used and managed. People in Huashao were involved in diverse livelihood activities related

to subsistence agriculture, but also market-based activities that were generating accumulation and wealth creation. The increasing involvement of *comuneros* and *comuneras* in commercial activity was leading to less reliance on communal irrigation structures, demonstrating the evolving process of social relations and effects on water uses (Trottier, 2008). However, the uses of water that implied a more individualist or consumption-oriented livelihood mix were overlooked by the water authorities.

In processes of decentralization and IWRM, the discourses shown in this section to be influencing ALA Huaraz civil servants suggest a disinterest on the part of ALA Huaraz to work with existing institutions. It echoes the claim made in the 2010 World Development Report that the 'usefulness' of ´traditional´ agricultural and water management practices in the Cordillera Blanca in dealing with rapid climate changes was declining, mirroring Lynch's (2012) study that suggested that ANA were disinterested in working with existing water management institutions, despite the regional push to decentralize. In the case of the *Yurac Uran Atma*, the discourses of ALA Huaraz gave the appearance of collaboration with the *turno* system of irrigation, but only in terms of its usefulness for the transformation to more 'modern' techniques. This disinterest therefore shows the preference of ALA Huaraz for water use and management practices that rely on legal and economic knowledge forms and mechanisms, in other words, 'formal' water user rights, and the expectations of the state for water users in the YUA Water User Committee to conform with a 'modern' and globalized view of the world.

The reproduction of global and national norms and preferences at regional level by Don Elmar suggests that ALA Huaraz were firmly responsible to the centralized authority of ANA. While unsurprising given it is a devolved authority, at the same time it contradicts efforts to decentralize under IWRM by maintaining centralized power over water, adding to arguments already made by Lynch (2012) and French (2016) that, despite a partial assimilation of IWRM principles, decision-making responsibility has largely remained with the centralized authority of ANA. Furthermore, once ALA Huaraz had communicated the new normative arrangements and expectations, the burden of responsibility fell on the Water User Committee to source the funding needed to comply. This implied that they wished to free themselves of any responsibility locally, again reiterating a certain allegiance to the centralized authority. Thus, coupled with ALA's disinterest in working with existing

institutional arrangements, the interests of those higher up the administrative scale were represented locally, more than the interests of the users of YUA Water User Committee themselves.

The strategic use of water discourses depicted in this section appears to legitimize the Peruvian government's ongoing historical disregard of local water management practices, and preference for infrastructural interventions characteristic of coastal projects, more suitable to the bureaucratic and technocratic arrangements espoused by these rules. The financial support provided by multilateral organizations for the expansion of the 'formalization' of water user rights, a key recommendation to achieve the 'new water culture', reinforced this sense of disregard, by ignoring the history of socially, and culturally diverse water management practices. Instead, it promotes the homogenization of existing practices in favour of 'modern' ways of thinking and acting. As illustrated, local water management practices are often more complex and dynamic than the binary, unmoving suppositions of 'modern' approaches.

For those with an interest in conforming and for those who had assumed a responsibility to enact change in how water used was used and managed within the state's water management approach, such as those in the central committee, it was not clear to me how they were expected to transform their methods. While my research is limited in this regard, in that I did not get the opportunity to ask members of the central committee whether it was clear to them what they were required to do, the interactions of the guards and other members of the central committee with a neighbouring committee in a conflict scenario, as well as the dilemmas that emerged in the process of managing mixed institutional arrangements and 'modern' infrastructure, gave an insight into the powerful effects on local management of multi-level water policy discourses and practices and their significance.

9.3.2. Water user license - addressing or compounding social conflict?

A major goal of the water user licence granted to the YUA Water User Committee was to address a conflict over water access with a neighbouring committee, based on a belief in the ability of bureaucratic institutions to resolve social conflict. The national and regional policy landscapes, insights into which have been provided in the 2009 NWRPS and in the set of ALA Huaraz discourses examined above, define the problem of limited physical availability of water on the Pacific slopes of the Peruvian Andes as the cause of an increasing number of conflicts between users over access to water (Section 6.2.1). As shown above, the solution to this is constructed as the need for institutional change in water management that should be orderly and 'formal' to ensure peace and achieve water security. In Huashao, the most significant institutional change was the legalization and quantification of water use vis-à-vis a water use license, which was preceded by a valuation of the water supply, involving ANA, aimed at resolving a 40-year-long conflict that had been ongoing with a neighbouring water committee (Section 5.4.2). The framing at national level of the problem of limited availability as a cause for conflict locally was consistent with the historical experience of the central committee of YUA Water User Committee, however drawing out the assumptions of the national framing of solutions about how to divide up the water between committees gives some insight into why the conflict was still ongoing by the time I left Huashao.

The Committee have a long history of conflict with both ice miners and their neighbouring *comunidad campesina*. The prevention of conflict was what brought members of *Unidos Venceremos* into initial contact with the local water administration. The president of the *Yurac Uran Atma* Water User Committee, closely followed by the water guards, had embraced the state's 'formal' arrangements to address an historical conflict with their neighbouring community over water distribution. The president was proud that the Committee was a license-holder; they could use it to ´formalize´ the committee itself so as to give order to the community's previously disorganized distribution. More importantly, accustomed to a long history of territorial struggle, the legal sense of ownership offered by the license offered the Committee a form of defence of their right to the water passing through their territory against encroachment. The president implied that the engagement

of the Committee with the legal language and processes of state 'formalization', was helping to preserve the territorial integrity and resource base of this *comunidad campesina.*

The economic valuation of their water supply had 'proved' to YUA Water User Committee that, numerically, and compared with the water and crop needs of Pata Pata Water User Committee, they were not receiving enough water from Mt Huandoy to cover the needs of their crops. However, despite the signing of an act of reconciliation with their neighbours, this did not resolve the feud, baffling the leaders of YUA Water User Committee. The explanations given by the president of YUA Water User Committee as to how the conflict had started imply that the Pata Pata Water User Committee had believed in the moral code of 'water is life', that is, that the members of YUA Water User Committee would somehow work out together how to share their supply 'equally' as fellow *comuneros* (see Section 5.4.1.). However, their understandings of what constituted equal and fair share did not seem to correspond; while the president of YUA Water User Committee invoked a belief in a God-given right to water, his references to hectarage, numbers of users and water flow depict an assimilation of the state's 'modern' discourse of 'formalization' to make meaning of why they needed more water and to control in a particular way, whereas the meaning of equal, embedded in the use of 'water is life', suggests a less-easily definable social relationship, based on moral and ethical, rather than economic and/or legal, judgements.

While it is clear that this new 'formalized' approach offer YUA central committee a way of dealing with conflict, the challenge with the adoption of this approach by central committee members, also *comuneros*, in that it assumes that a legal, economic approach is *the* best way to avoid conflict, when in fact, as illustrated in the ongoing dispute with their neighbouring committee, this approach to conflict resolution does not allow for the less visible socio-cultural institutions that may also enable conflict resolution and cooperation. The president seemed resolute in his acceptance of the merits of the dominant 'formalized' approach to resolve the conflict, blinded to the social relations involved, which would seem unhelpful in the search for a resolution to the conflict with Pata Pata. This suggests that the spread of ANA's 'formalized' approach, underscored by 'modern' ways of thinking, may, in some cases, compound feuds between communities who engage differently with, or accept to varying degrees, the state's conflict resolution mechanisms. However, as demonstrated above, while the central committee illustrates one group who adopted the 'formalization'

discourse in quite a blinkered way, at the same time they show how accepting the state's 'formal' institutional approach to water management leaves little room to manoeuvre or to backtrack on decisions made, especially when infrastructural change accompanies or precedes new 'formalizing' norms and procedures e.g. canal lining, as discussed in the following paragraphs.

Exploring whether new interactions with the state have instigated a change in some peoples' perceptions is also important to consider to understand what groups of people might be changing their perceptions and why. For example, what aspects of the changes are particularly appealing, what interests might be behind the adoption of state techniques and to what extent can this adoption be considered a change in perceptions of water or strategic manoeuvring?

9.3.3. Strategic action and (self-)subordination in reductionist policy

The adoption of 'formal' arrangements by the central committee did not end with the adoption of the state's legal/economic approach to dealing with conflict. Discursively, the guards came to refer to the concrete lining of the canal as an 'improvement' to the old 'rustic' canal in the same way as the state referred to it, enabling water 'capture' and 'storage' (Section 8.3). Similarly, the language of the committee president strongly reflected the adoption of state measures such as the importance of having recourse to internal statutes and legal regulations in the assembly to resolve conflict and sanction disobedient users. One way that they were 'formalizing' the committee, according to the president, was by punishing water grabbing by fining perpetrators the equivalent of 5 daily wages or 125 soles. The discourses of the guards had come to incorporate the kinds of organizational restructuring brought about by legal regulations and state institutions, now viewed as allies in the management of water.

The state's system of water rights allocation had therefore undermined the pre-existing knowledge and practices of *comuneros*, through the discourses of both ALA Huaraz and the adoption of state discourses and practices by the central committee, themselves *comuneros*. This suggests self-subordination or the internalization of the belief that their

own knowledge and practices in the management of water were inferior and needed to be 'modernized'. This apparent self-subordination seemed unavoidable considering that there seemed to be no alternative arrangement to managing their water if they wished to continue their alliance with the water authorities and, conversely, if they wished for external authorities to continue viewing them as part of a *comunidad campesina* open and willing to change and collaboration, for example to be able to access funding opportunities to assist with the management of infrastructure. Employing the dominant discourses is equally unsurprising in light of the history of marginalization and apparent efforts in *Unidos Venceremos* to eschew associations with discourses of inefficiency etc. as I argue above. However, as also shown above, this cannot be understood as a case of superficial adoption of dominant discourses: the president showed his adeptness at engaging with legal forms to suit their concerns to protect their canal, based on historical experiences of conflict. This meant actively seeking the help of authorities to help with conflict resolution which culminated in the granting of the canal license, a bureaucratic institution highly valued by the president.

However, the ways that water guards could make strategic use of legal techniques and discourses to forward their own interests depended on wider social conditions and embeddedness in power relations. The kinds of control that new arrangements implied for the ways water guards could address problems were making any pre-existing flexibility in how the main canal was managed increasingly difficult. For example, in the problem of canal overflow and repairing broken infrastructure, they felt inadequately trained to deal with the problem of increased flow and water loss, which left them with little alternative but to outsource repair work. The installation of infrastructure that could only be maintained using technical engineering know-how did not just reduce any choice of local management of the main feeder canal away from the guards – it all but removed the availability of choice to deal with the problem themselves, even though they had wanted to (Section 8.3.1.). The removal of the power to act locally meant the guards were left with no choice but to conform to the dominant 'modern' way of dealing with canal overflow i.e. contracting out repair work to engineers for a fee. This resulted in a loss of power over the water flowing through their canal, given their perceived lack of knowledge to deal with the issue, as well as the pressure it put them under to source the money that would be needed for the repair work.

This power to define courses of action associated with state-backed infrastructure relates to dominant conceptualizations of efficiency, which is, according to Zeitoun et al. (2016) is characteristic of a 'reductionist' approach to water security policy. A reductionist approach is one that stems from research that seeks to reduce complex water-society challenges, for example, in efforts to increase water supply tend to be presented as investments in hydraulic infrastructure and institutions, which can lead to less flexible water management arrangements. The 2009 NWRPS shows that efficiency is measured by the number of legal licenses issued to users, who will then, it is assumed, have access to supply and will no longer use water 'informally'. This paves the way for the installation of dams, canals and storage schemes but with little consideration for their pitfalls, such as problems of 'lock-in' i.e. an inability to adapt to future hydro-social-climatic conditions, as well as the possible "lack of fit" to existing water distribution infrastructure (ibid., p. 148). As shown above, some of these cracks were beginning to show in Huashao – the water guards did not know how to deal with the increased flow they were witnessing from Mt Huandoy which seemed to be above the capacity of the infrastructure (Section 8.3.1). Some water users grappled with finding a fit between historical ways of diverting water from the main canal and the new concrete canal, with one user breaking into the side of the concrete to try to access and redirect the water to his plot. Narrowly conceptualizing efficiency in efforts to increase water supply, presented as licenses and investments in canal lining, by no means guaranteed access to water, on the contrary it appeared to be reducing the flexibility of existing ways of distributing and managing or at least those used historically.

The central committee of YUA Water User Committee seemed to have partially assumed responsibilities normally adopted by the state in what could be paralleled with what Rasmussen (2015) has called the emergence of a new water regime in the Andes, based on a type of water ownership characterised by legal regulations and state institutions (see Section 8.3.2). However, while the internalization of state discourses could be contributing to a gradual ideological shift in the way water is viewed by water managers, given the silence around water use and management in other areas of life, for example in the case of flower production, the extent to which this discursive turn is strategic is a moot point. As Giddens (1979) notes, the ways in which an actor rationalizes or makes meaning of his or her behaviour is the main basis upon which a judgement is made about a person's competence, but cannot be directly linked to an internalized norm. The new discursive

practices of the state were less apparent in the day-to-day livelihood activities, which suggests more of a strategic arrangement from the perspective of the water guards than an internalization of norms per se.

To my knowledge, specific household allocations of water had not taken place while I was in Huashao, but was gradually being introduced, as illustrated in Chapter 6. So, the integration of these bureaucratic arrangements into how flower producers were managing their livelihood activities, based on specific allocated quantities, was either not yet happening or beyond my linguistic reach. What was clear, however, was the discursive adoption of bureaucratic institutions by the water guards, as discussed above, which seemed to contradict the lack of discussion about flower production by the same water guards. How were water guards managing to keep the local water administration onside, something they appeared so eager to do, while also managing the everyday water politics e.g. compliance with community governance structures of water management between users and pursuing their own livelihood activities? Water grabbing by individual users was on the radar of water guards in their monitoring duties, however, as previously mentioned, they did not make explicit the connection between flower producers' disregard for the *turno* system and water stealing. The president was preparing to increase his production of flowers with the construction of a new wooden structure for his family to work under and to shade his harvest. This suggests that the disregard for the *turno* was overlooked by the central committee because it would involve implicating themselves and their neighbours as flower producers in the process, revealing a conflict of interest on the one hand, and potentially a break in non-verbal, mutually-beneficial bonds of trust, on the other. This demonstrates the ways some leaders were adapting their obligations to ensure compliance with bureaucratic institutions to fit with their own and others' livelihood needs and interests.

Similar to Don Elmar's masquerade of an appreciation for community life, then, the central committee employed the discourses of 'formalization' strategically in contexts where they were judged necessary, for example, in conversations with me and at official events. Abstaining from using the state's approach to water management in contexts outside of these types of situations, for example, overlooking how water was being used by flower producers, demonstrates their agency to manage their roles as committee members while

pursuing livelihood activities also derived from new engagements that did not necessarily comply with the state approach. In other words, through strategic action, they showed their capacity to manage both roles or identities.

The nature of this agency seems to derive from the separation of social responsibilities as overseers of water use and management at community level, answerable in some degree to the state water authorities, from their other identities as *comuneros*, part of a family striving to make a living and exploit opportunity in the same way as others. The treasurer of the committee, for example, was also a driver of a *colectivo* and worked as a security guard in the nearby town of Caraz while his wife produced flowers as supplemental income in Huashao. Understood in light of the legitimate appreciation shown by the central committee for the canal license, the ability to separate leadership roles from the role of *comunero* suggests that, perhaps, the members of the central committee made a distinction between the bureaucratic arrangements that protected the canal from external encroachment and those combined institutional arrangements. An example of this distinction is the individualized use of sprinklers, with the ongoing enforcement of the *turno* system of allocation as a community structure that governed the use of water *within* the YUA Water User Committee. They valued the former given the history of conflict, while also showing flexibility and empathy in the latter, given their own and others' interests in making a living and exploiting opportunity.

9.4. Diverse understandings of water alongside dominant 'modern' thinking

The female flower producers stood out as a group who had not adopted the discourses of 'formalization', nor of water loss or scarcity. In our discussions of changing water availability, they did not prioritize the impacts of glacier retreat on water supply in their everyday livelihood decisions and actions. However, they did express concern about the decrease in the water available in *puquios*, a water source that had not been accounted for in the state's emphasis on quantification and concrete lining in their efforts to store water in the upper areas, but nevertheless a crucial source of groundwater for the women, for

irrigation and domestic use. Unlike the male producers, the women did not make meaning of this decrease as a consequence of climate change, but as a result of the infrastructure that was, in their view, blocking filtration to their *puquios* (Section 8.2). In other words, from the perspective of the women, the state's solution to the problem of water loss and storage was decreasing another source of domestic water supply, neglecting the valuable role that *puquios* played in the lives of the people of Huashao which for them meant that there was less freely-available water for consumption. The latter was another effect of reductionist' approaches to water security (Zeitoun et al., 2016) that tend to prefer easily measured or engineered water like surface water, bypassing in the process less easily measurable, but nonetheless valuable, types of water.

The women's inclination towards less-easily measured types of water, as well as their criticism of the state's intervention, suggests that they still identified with what had been there before, before the canal had been lined with concrete. Their ways of thinking about water and its use had not been heavily influenced by new state norms of efficiency and 'formality' that promoted legal and technical interpretations and economic use. Rather, how they used water was tied up with the identification and pursuit of strategic and emergent opportunities that characterised their efforts to control their livelihood activities. These kinds of opportunities related to how they could earn money and/or have work for themselves and their children. This implied an understanding of and relationship with water that was characterised by opportunity, the latter embedded in livelihood concerns and seemingly undetermined by categorical assumptions about how it should and could be used and managed, embedded in wider ideas about how life should be lived in a controlled and apparently ordered way as determined by state authorities.

I argue that this identification with historical ways of seeing water might explain why the female flower producers did not link water scarcity with the use of water in their livelihood pursuits in the same way as ANA and ALA Huaraz. In the past, while the central committee referred to "total disorganization" in how the water in Huashao was used and managed, this points towards the use of more contextualised practices rather than bureaucratic arrangements that may have been preferred by the women (Section 5.5.1). This seeming preference for contextualized judgement, together with their concerns for less measurable types of water in the disappearing *puquios*, may explain why the women were leaning

more towards an opportunistic approach to water use, based on social and experiential learning, than the legal and economic approach to water and its use and management depicted in the globalized discourses of ANA and ANA Huaraz.

Exploring the different interpretations at work alongside the dominant 'modernizing' water management approach of the state and the initiatives that these were triggering is important to show the complexity of socio-cultural and historical ways of thinking and acting that challenge the idea that enforcing uniform water rights is the only way to achieve control over water and livelihood activities and/or find meaning in everyday life. How the women were not only making meaning of the problem of scarcity differently, but acting upon this in ways that defied state-imposed norms of efficiency shows how they were changing their own circumstances for the better in their eyes, even if these constituted short-lived improvements. As Cleaver (2003) notes, "livelihoods are not simply technically and economically rational sets of survival strategies but are clearly linked to ideas about a desirable way of life, to practices in relation to resources, to other people and to aspirations that are heavily loaded with symbolic meaning" (Cleaver, 2003, p. 21). For example, while sprinkler irrigation was beginning to be used by producers, the rationale for its use was not valued for its water use efficiency but rather the symbolic potential it offered to make money (see Section 7.4.2.). Overlooking their agency assumes the superiority of dominant 'modern' ways of thinking and acting that monopolizes and monotonizes ways of thinking that block space for creative action and subdue less dominant, but no-less-capable, voices and initiatives, assuming that all ways of thinking and acting that fall outside of 'formal' rights frameworks must be discredited and transformed (as demonstrated in the norms promoted by Don Elmar from ALA Huaraz). This push to transform people and their ways of life to 'formal' life further marginalizes members of *comunidades campesinas*, who often make choices to pursue their livelihoods in creative and opportunistic ways for their benefit and the benefit of their families.

To refer to action as opportunistic does not infer that actions were less valid, but rather decisions to take action were based on a way of understanding that did not make connections in the same way as the one dimensional way of thinking and acting apparent in dominant 'modern' discourses that tend to give top priority to scientific and legal-economic knowledge forms. The women's accounts and actions suggest that they drew on forms of

knowledge that were fluid, experiential and adaptable to socio-economic change, uneasy arrangements beside the strict binaries of 'modern' discourses and dominant knowledge forms.

Similarly, the discussion of the historical conflict in Section 9.3.2. showed how, despite the central committee's adoption of the state approach to conflict resolution that relied on legal instruments and economic valuation, they had failed to find agreement with their neighbouring committee. The evocation of the domain of 'water is life' by members of the other committee clashed with more fixed ideas of fairness and distribution underpinning the 'modern' approach adopted by the central committee, suggesting that this conflict was related to a conflict of understandings and different connections in how ideas about water were understood. Even the president's understanding, who had largely adopted the state discourses of 'formalization', was far from straightforward. Summoning a higher power to denote his belief in a God-given right to water conflicted with the economic right to water propounded under legislation and global principles, assimilating the state's technocratic approach to managing the YUA canal into his own set of beliefs and understandings. To ignore the different understandings at work in organizations like the YUA Water User Committee is to ignore the historical contingence of water values, norms and practices and their embeddedness in social and political relations that influence how they take shape in the context of new junctures such as the introduction of new global water rights frameworks. It also rules out creative possibilities, such as the potential that there might actually be another way to store and transport water that does not involve, often irreversible, concrete.

9.5. Conclusion

In this chapter, I have argued that the state water authorities were pursuing a reductionist approach to water security policy, prioritizing globally embedded and marginalizing/derogatory discourses that were spreading state control over existing use and management practices in subtle ways. The subtle workings of the "apparatuses of control" affected the ability of members of the central committee to deal with problems of

supply and storage themselves, and masked the negative impacts of the state in water management in the YUA Water User Committee. Effects also included the bypassing of less measurable, but valuable types of water, in the state's preferred approach to water storage. Within this increasingly global and homogenizing environment, however, there were instances of strategic action and alternative ways of thinking and acting that defied new arrangements. I argue that *comuneros* and *comuneras* were shaping water use practices in new ways by turning historical engagements with Practical Action and connections to the local and national flower markets to their own devices, contributing to changing social life. The central committee had adopted the state discourses of 'formalization', however in a strategic way, seeming to prioritize the license in situations of conflict at the level of the canal, while showing more flexibility in ensuring compliance with new water use and management norms in new livelihood practices. While this may reflect the inability of ALA Huaraz to monitor everyday use and/or the early stage of adoption, it shows how the committee members were asserting their agency to manage their committee member roles, alongside their own, and their fellow *comuneros,* everyday life priorities. Unembedded in state discourses, the *comuneras* provided an insight into possibly different ways of thinking about water. Their views were informed not by constricted ideas of technical and economic value systems, but rather opportunistic and contextualized judgements that reflected socially embedded ways of thinking about livelihood opportunity that perhaps harked back to a time when water was less confined to techno-economic fixes.

Chapter 10 : Understanding responses to new water governance frameworks

10.1. Introduction

The overarching aim of this research was to explore how people were living with and responding to state-imposed bureaucratic change under policies of 'formalization' in how they used and managed water in their everyday lives, in the context of wider socio-economic change in Peru. The goal was to uncover potentially lesser-heard and examined socio-cultural and historical understandings and values in the rapidly changing social and physical region of the Callejón de Huaylas, where the state is becoming increasingly involved in the control of water use and management in highland communities. The thesis connected insights from the case study to aspects of institutional change (the water user license, for instance) resulting from state water governance arrangements. Specifically, it investigated dominant views of social relations in institutional thinking that emphasize 'formalization' and rights in new institutional arrangements and drew out empirically the negotiations of everyday social life given the diversity of pre-existing water use and management practices. In doing so, it contributes to debates about the socio-political consequences of global governance arrangements in local contexts and the negotiations that take place as people and their lives and existing institutions are affected, raising questions about how global constructions of water travel and shape understandings of water issues locally.

This research found that the pursuit of livelihood opportunity was a more powerful force driving peoples' everyday decisions and actions related to their water use and management than the effects of climate change or state responses to climate change in the form of a new water governance framework and policies of 'formalization'. Discourses of 'formalization' were not influencing significantly how they were using and managing their water in their everyday lives. The *comuneros* and *comuneras* of Huashao pursued commercial livelihood opportunities that had an influence on pre-existing water management institutions in ways that did not adhere to understandings of *comunidades campesinas* portrayed in 'formalization' policies, often based on stereotyped and fixed

understandings of community ways of life. For instance, the *turno* had been categorised in state water discourses as a climate change adaptation measure used in *comunidades campesinas*. The thesis found, however, that peoples' engagement with new commercial opportunities led to the use of a new type of water using technology, aspersion irrigation that influenced community water management structures including the *turno*. The growing use of aspersion to irrigate commercial crops led to the disregard of the *turno* system. The use of a new water using technology instigated by increased engagement with commercial livelihoods thus contributed to the pre-existing bricolage of water use and management practices structuring water use. In other words, rather than staying within the structural confines of community-defined water governance and state-defined efficiency, they decided to engage in new activity based on changing circumstances and emerging opportunities, to reap the potential benefits that these could offer to them and their families in their everyday lives, not to necessarily optimize water use in line with state norms.

Having said that, state power, with its heavily globalized influences, was increasingly prevalent in everyday water management practices in Huashao, and is likely to have an increasing influence on how people define and negotiate their relationship with state water authorities. The power of state water authorities was evident in the employment and spread of objectified and naturalized knowledge forms and their effects on how water guards conceptualized pre-existing ways of managing water. Water guards and the central committee had assimilated 'modern' discourses of efficiency/inefficiency and 'formality'/'informality' and followed associated courses of action in their responses to water loss and in the maintenance of their infrastructure.

Exposing the value attributed to commercial livelihood activity and what this meant for water use and management, alongside an examination of the effects of new water discourses and practices of local water users in Huashao, demonstrates the importance of understanding new water governance frameworks and responses to the effects of glacier retreat within larger, historically produced societal contexts (Carey, 2010; Drenkhan et al., 2015; Rasmussen, 2015).

In this concluding chapter, I set out the meta themes emerging from my place-based approach to research that show the nature and outcomes of peoples' decisions and actions

in everyday life: their agency – how they act and why they act the way they do (the different ways they make meaning of their actions based on their own frames of reference), and the outcomes, given the multiple dimensions of change at work in a place, including state water policies aimed at 'formalizing' water user rights. In doing so, it offers some concluding statements about the ways that the thesis has addressed the key concepts of place, agency, discourse, and institutional bricolage that, together, contribute to understandings of how and why *comunidades campesinas* may experience and react to external interventions in surprising ways, as this research has shown in the case of commercial livelihoods. This also allows some insights into the forces driving societal change and the merits of taking a place-based approach. It concludes with implications of my thesis for future avenues of research.

10.2. Insights from my place-based approach

Taking a place-based approach to understand peoples' livelihoods decisions and actions has enabled an in-depth understanding of the diverse practices and apparently contradictory behaviour in people's everyday lives that call into question persistent stereotyped depictions of *comunidades campesinas* and their water management practices in discourses of 'formalization'. Associations of 'backwardness' continue to permeate new governance arrangements aimed at helping local communities adapt to climate change by 'formalizing' their water management practices. Exposing everyday practices, their dynamic, unstable and situated nature, shows that *comunidades campesinas* are not cut-off from wider national and global societies, uninfluenced by the consumption of global goods or the use of new technologies that affect how they use and manage their water supply. Yet, while livelihoods are increasingly linked to local and regional markets, livelihoods are not wholly defined by market ideals; they engage with new water-using technologies, for example, in ways that suit their own priorities and ideas about what constitutes a meaningful way of life. While the ways people construct the meaningfulness of their livelihood activities may not correspond with the ways of thinking promoted in 'modern' discourses, they nonetheless follow a contemplated rationale based on fluid and experiential knowledge forms. Therefore, what might seem like contradictory behaviour

from a 'modern' approach to water management is in effect a different way of thinking and acting or a differently meaningful way of thinking and acting. Thus, by taking in the wider social context and the aspects of this that are of most concern and value to local people, my place-based study created space for the emergence of alternative ways of thinking and acting in *comunidades campesinas* to those underpinning dominant discourses of climate change (adaptation) and water scarcity.

Analysis of empirical, ethnographic and historical contexts provides depth and complexity to understandings of experiences of rural life and change that challenge the general claims made in post-structural and neoliberal approaches to understanding life and social change in *comunidades campesinas*. Post-structural readings of the socio-economic and water rights 'formalization' happening in the Andes tend to emphasise the ongoing marginalization and subordination of livelihood and water use and management practices of *comunidades campesinas* by state agents and the destructive effects of an engagement with market processes on community life (for example, Boelens and Vos, 2012). In analysing livelihoods, they focus on the ways that people in highland communities can make living meaningful through struggles for political autonomy and self-realization. Focusing on this alone, however, gives the impression that the power of *comuneros* to enact or influence change in their lives is minimal, often assumed to be on the receiving end of oppressive state management measures and/or at the behest of market forces. A neoliberal take, as evident in the state's approach to water management, emphasises the economic competitiveness of current livelihood strategies, singling out the (un)profitability and economic (in)efficiency of livelihood and water use and activities, missing the cultural and symbolic meanings associated with livelihood production and water. On their own, these frameworks offer only a partial view of rural life in the Andes.

In the thesis, I have taken a more holistic approach by developing Bebbington's (2000) call for a theory of agency in understandings of social change in highland communities. Working at the level of both structure and agency helps to incorporate different concerns of both post structural and neoliberal approaches to show how places are continuously produced and livelihoods made meaningful, both materially and symbolically. Understanding these dimensions and their outcomes allowed me to gain a deeper insight into why people react or respond in particular ways to new bureaucratic arrangements and

discourses in water management, which reveals the complexities, and clarifies the seeming contradictions in peoples' actions in the context of wider social change.

10.2.1. Livelihood interactions sowing the seeds of social and institutional change on their own terms?

This research shares Bebbington's (2000) contention that "power, meaning and institutions are constantly being negotiated" in *comunidades campesinas* in ways that uncover potential spaces for social and institutional change. Focusing on peoples' agency and understanding this within their historical context and in relation to the multiple dimensions of change influencing livelihood strategies shows that *comuneros* and *comuneras* are not averse or resistant to incorporating market logic or ideas and technologies promoted by development organizations into their everyday lives. Rather than resist new practices, they negotiate and make meaning of new ideas and practices introduced by development initiatives with their livelihood concerns and their own frames of reference in mind, to find ways that they can employ new practices to improve their livelihoods and imbue life with meaning (Chapter 7). The intersection of peoples' everyday practices with the practice of development organizations and market interactions can create opportunities that help them to build something of their own within wider circumstances of market constraints.

Furthermore, it is clear that *comuneros* and *comuneras* value moneymaking and occupation-generating opportunities opened up by engaging in new market relationships (Chapter 7). There is often more than money at stake. Understanding the dual nature of livelihoods - as both material and meaning – allows us to consider that the value placed on moneymaking and accumulation of wealth reflects not just a concern for the material reproduction of livelihoods and place. They also symbolize the value they attach to their agency to respond to prolonged marginalization by the state by extending their control over production in their locality and participating in the country's socio-economic development in ways that invest life in their *comunidad campesina* with more positive meaning than historical associations of inefficiency and unproductivity (Chapter 5 & 7). While primarily monetarily driven, the ability to maintain and expand control over production takes on symbolic meaning in the ways that people develop new relationships and achieve something of their own that responds in their own way to institutionalized

marginalization (Chapter 7). Understanding how people negotiate opportunity and what this means in their wider circumstances provides an insight into why some people may be attracted into commercial livelihood activities.

As mentioned above, the outcome of these engagements with new commercial livelihood activities contributes to the existing diversity of water use practices, amounting to a bricolage of water use practices and institutions. This diversity includes new individualized practices and rules associated with the uptake of aspersion irrigation due to new commercial livelihoods (Chapter 7), pre-existing community water use and management structures (Chapter 5) and new bureaucratic arrangements (legal and efficiency measures) introduced by the state to address scarcity and conflict (Chapter 6).

The engagement of *comuneros* and *comuneras* with ideas and practices promoted by development organizations and market players shapes pre-existing water use and management practices and technologies governing water use and management in ways that respond to new commercial livelihood opportunity outside of new management discourses (and vice versa). The pursuit of new commercial livelihood strategies can reduce the reliance on historical community structures governing water use (Chapter 7). In other words, their actions, informed by ideas and practices promoted by market influences and development projects influence the social structures that historically guided how they managed their communal water supply. This reinforces the importance of understanding that human behaviour is not necessarily rule-bound and that people often draw on structure to influence action (Giddens, 1979). People assert their agency and draw upon structures to change the control over their livelihoods and the resulting outcomes for pre-existing institutions, for example, new rules and practices for how people use water, feedback into the recursive development and reproduction of social structures (ibid.), sowing the seeds of institutional change in how water is used and managed and of wider social change shaped by their own ideas and actions.

10.2.2. Challenging 'formalization' - institutional bricolage

Understanding peoples' engagement with commercial livelihoods and how these interactions affect community dynamics of water use and management and interactions with water authorities, challenges the institutional thinking in new 'formalization' policies with its origins in global frameworks. An example can be found in the type of agency apparent in the actions of the central committee of the Water User Organization.

As shown in Chapter 6, national water policy assumes people act in a technically, and economically purposive way, to optimize water use and management. The strategic actions of members of the central committee, such as turning a blind eye to those breaking the rules of the *turno* while adopting the dominant 'modern' discourses of 'formalization' (Chapter 8), challenge the assumption that the introduction of efficiency measures such as canal licenses will lead to techno-economic water use. The central committee borrowed from the discourses and practices of state-imposed bureaucratic institutions, as well as from historically and contextually derived social practices at different times and in sometimes-contradictory ways (Chapter 8). The central committee had constructed a technique for managing resources, based on the management of multiple and intersecting identities and motivations, and ways of thinking that appreciated and sanctioned the livelihood concerns of, not just themselves, but also of a large portion of the other water users belonging to YUA Water User Committee. They also appreciated the changing nature of livelihoods that was opening doors to opportunities in commercial production. Understanding the agency of water guards shows processes of institutional bricolage in action.

These processes of institutional bricolage (Cleaver, 2003) demonstrate the complexity of social relations within which new arrangements develop, and importantly the ways that actors shape those institutions in more diverse and complex ways than those implied in 'formalization' policies, for instance in ways driven by a concern for maintaining relationships with fellow community members. It also shows how appointed leaders on 'formal' committees negotiate norms and practices outside of 'formal' institutions, whether out of self-interest or in the interest of wider livelihood pursuits. Complex social relations within the community – self-interest, relationships of trust with neighbours and

family – influence how leaders interact with community rules that have been sanctioned under new bureaucratic arrangements.

As shown in the previous section, the *comuneros* and *comuneras* of Huashao incorporated a new water using technology into an already diverse range of water use and management practices, drawing on ideas and practices espoused by development organizations and state authorities, while largely ignoring state expectations about communal water use. These decisions challenge the belief in a uniform system of management across *comunidades campesinas*, suggested in the use and employment of the *turno* and *usos y costumbres* in the water discourses of the ALA. Furthermore, the reasons and motivations for adopting new water use ideas and practices espoused by development organizations and state authorities often differ widely from the norms of water use efficiency that drive them. Chapters 8 and 9 showed how the *comuneras* in particular understood their livelihood choices: they drew from a way of thinking about and acting around water that was opportunistic and amenable to change and influenced by historical experience of livelihood opportunity and change. This way of thinking influenced their use of water, and institutions governing water use, in ad hoc ways, outside community management structures. These provide some insight into the differing socio-economic priorities, cultural associations, and historical context that inform how different groups of people make connections in their understandings of livelihoods and water use and arrive at decisions to take action or not to take action, as the case may be (Chapter 9), both within and outside of pre-existing community management practices. They show the diverse agencies affecting how water is used and managed, of which the techno-economic approach to management is just one, albeit a dominant one.

This research thus adds to understandings of the complex ways that *comuneros* and *comuneras* interact with the increasing diversity of institutional demands and changing livelihood priorities. People make decisions about how to use and manage their water, and the institutions and/or new practices they draw on, in what might seem like contradictory ways if viewed from a narrow concern of efficiency or with an instrumental view of social structure. The latter constitute some of the principles on which faith is placed in 'formalization' policies and discourses. The thesis is critical of these, however, as it showed that meaningful decisions and actions are rarely constructed on scientific and legal-

economic knowledge forms only. Different groups of people develop their own ways of understanding and anchor new arrangements in deep-seated understandings of what constitutes their ideas of the right way of acting in the world, giving them legitimacy (Chapter 8). The latter disputes the persistent normative ideas in policies of water user rights 'formalization' that there is one right way to think and to act, advocating instead for a more flexible understanding of how individuals and groups act and interact in their everyday lives.

10.2.3. Water discourses - spread of control as knowledge power

The language and texts guiding interactions between the state and a local water organization revealed structurally ingrained ideas and concepts across the water governance scale and the subtle ways that power is dispersed through water authorities. The thesis demonstrated the ways that knowledge power transfers across the water governance scale, with ideological effects that constrain possible courses of action locally. Doing so offered a window into the weight of expectations in the discourses of water authorities disseminating new water governance arrangements locally, and the pressure on local water users to conform and leave behind pre-existing ways of using and managing water that do not take after the technical and efficient image of the state. Additionally, situating the everyday livelihood and associated water use and management issues exposed to new governance frameworks on a scale, demonstrates the differences and resonances between the ways that water authorities at higher levels define water problems and local experience. This case illustrates that the extent to which local water users identify with global frameworks can depend on their historical experience of water conflict and how adept they are at negotiating legal frameworks. Further, how they identify with global frameworks will depend on the nature of their historical relations with state authorities and how open community leaders are to interacting with the state.

The use of objectified and universalized global definitions of water problems (e.g. 'water for all') across the governance scale help to legitimize the national policy goal to 'modernize'/transform/'formalize' existing practices at local level (Chapter 6). These carry the assumption that all people are affected equally by problems of water scarcity and that

there is just one 'right way' of resolving this: to 'modernize' and make 'efficient' (Chapter 9). This allows for the persistent subjugation of forms of knowledge that do not conform to dominant state understandings of efficiency and suggests that objectified knowledge forms promoted in global discourses serve to legitimise the state's ongoing disregard for, and disinterest in working with local water management practices (Chapters 6 and 9). Regional authorities recognize pre-existing practices and behaviour only when the latter can be visibly identified, which gives these credence in discourses of 'formalization'; in other words only practices that lend themselves to definition are entertained by state authorities (Chapter 6). The national and regional association of institutionalized and stereotyped understandings of forms of water management historically associated with *comunidades campesinas* (under *usos y costumbres*) serve to subordinate the existing diversity of rules such that *comunidades campesinas* remain marginalized in new water governance arrangements (Chapters 6 and 9).

Therefore, the spread of global framings of water problems, emphasis on efficiency norms and seemingly objective knowledge forms by regional authorities primarily serve the interests of the state (Chapter 6). The foregrounding of one dominant knowledge form (technical and engineering approaches to water management) ascribes normative meaning to particular actions, e.g. canal lining, converting to sprinkler irrigation technology, improved scheduling or market mechanisms. This moves the focus of attention away from diversity in local socio-political contexts, instead homogenizing ways of using and managing water, limiting the agency of local water users to draw on historical practices that do not fall in line with the dominant approach (Chapter 8) and signalling the state's preference for unified water governance arrangements more suited to coastal irrigation.

While it is important to understand the extent to which definitions of water problems defined globally and nationally can distance problems and solutions from local experiences, the thesis also revealed instances where water problems defined at national and global levels resonate with or appeal to local circumstances. As a means of defending water supply, a water user license can offer water user organizations a possible way forward in addressing an historical water conflict (Chapter 5). Despite the limits that adhering to new state norms place on the actions of local water managers, especially where concrete-lined canals are already in place, local managers can also actively pursue a state licence to serve

their own political interests. This allows an understanding of interactions with water authorities along lines of negotiation (of existing practices with new legal frameworks), as opposed to resistance (to interference in Andean irrigation) (Pærregaard, 2013). Like the changing state/community relations explored by Pærregaard (2013) in the context of increasing daily conflicts due to water scarcity, the history of conflict over access in *Yurac Uran Atma* Water User Committee prompted water users to recognize the role of water authorities in their community, despite previous resistance to the introduction of water tariffs. These insights point towards new allegiances between communities with histories of conflict and state authorities in new governance settings in the Andes (ibid.).

As Rasmussen (2015) argues, such new allegiances are advancing a change in perceptions of water in the Andes with regard to ownership because of the influence of legal regulations and state institutions; new interactions between divergent groups with diverse interests, norms and values, technical solutions, and internal organization. This appeared to be happening in the YUA Water User Committee (Chapters 8 and 9) with the consequence that water users were assuming responsibilities that appeared to belong to the state, even though the YUA Water User Committee was formally separate from the state and originally part of a union for the country´s irrigators. They regarded new legislation as allies in the negotiation of sharing and distributing flows of water. According to Rasmussen (2015), the latter is symbolic of the state´s increasing interest in controlling the flow of water.

Combining the concluding themes outlined above, then, the influence of the actions of *comuneros* and *comuneras* on the direction of water use and management shows the difficulty of overemphasizing the effects of 'formalization' policies in *comunidades campesinas* as homogenization of socio-cultural and historical water management (Boelens, 2013b; French, 2016). Though this is of course one element of the story (10.1.3), it does not capture the ways that people interact with other processes of change (market, development initiatives) that also influence the ways they value, use and manage their water. As shown while their use of new technologies of water use may outwardly align with state norms, for example using lined canals and sprinkler irrigation, their reasons and motivations for adopting and adapting them might be quite different (Chapter 7 and 8). People make strategic decisions and actions, or choose not to act at all, depending on differing socio-economic priorities, cultural associations and historical experiences with

authority figures, including the effects of living in a prolonged subordinated and/or marginalized condition. This reinforces that understanding the effects of new governance arrangements as homogenization of existing water use and irrigation practices may not necessarily be an adequate interpretation of how they are interacting with new 'formalization' policies. Instead, this research suggests that focusing on the agency that people have to shape their everyday lives reveals a much more complex picture. This is particularly important to consider in places like Huashao, where peoples' interactions with market and development initiatives, as well as new governance arrangements, affect the intertwinement of pre-existing water use and management practices and norms with new arrangements of water use that follow distinct understandings and priorities, and are influenced by their historical marginalization and lack of political voice.

Given the clout of global and state resources and interests behind these frameworks, however, they constitute dominant ways of thinking in water governance and, therefore, the kinds of assumptions and power relations embedded in associated discourses cannot go unchallenged. The case of YUA Water User Committee was an example of why it should not go unchallenged: despite the freedom people appeared to be exercising in their livelihood choices, control of water supply was gradually being subsumed under the techno-engineering state model, making self-administration unidirectional. While responsibility for operating, maintaining and administering infrastructure was firmly under the control of the committee, the type of control increasingly took the form of the state. Despite the rhetorical embrace of participation and decentralization in IWRM, the authority given to a technocratic understanding of how water should be used and managed and the emphasis on the state as the source of change leaves little room for involvement of other types of practices or understandings. It remains to be seen whether IWRM would take a form other than a state-central one.

10.3. Relevance to climate change adaptation

10.3.1. Conceptual framework

What, then, does my framing of this study offer current thinking on climate change adaptation? Adding Cleaver's concept of institutional bricolage to Bebbington's place-based approach to understanding social change, focusing on livelihoods at the intersection of multiple dimensions of political economic changes, policy changes in water use and management and the outcomes, my conceptual framework puts Peru's efforts to adapt to accelerated glacier retreat through formalization and institutional change into larger histories of a place. The thesis showed that water authorities in Peru combine institutional, infrastructural and technological options, under the umbrella of IWRM, assumed to incite change in peoples' behaviour and adaptation to climate change. However, the thesis also revealed that peoples' everyday experience of change is often more complex and contradictory than the assumption that knowledge about an environmental problem (in this case, water scarcity and/or variability) will lead to particular outcomes. My conceptual framework, a place-based approach for interpreting peoples' decisions and actions in their everyday lives, thus (re)connects climate change adaptation, its meaning and assumptions and associated concepts, with everyday experience and understandings of change.

Therefore, my conceptual framework pushes forward climate change adaptation thinking by advancing a broader concept of change, that is, framing my research around an integrated understanding of change based on critical empirical research on place, as encouraged by O' Brien (2012). Similar to O' Brien (2012), I contend that, rather than focusing on solutions-based environmental knowledge in the pursuit of change, for instance promoting less resource-dependent behaviour that leads to precarious water security, it may be more desirable to focus and reflect on the issue of change instead. This includes understanding how individuals and groups approach change, as well as the assumptions underlying how science and policy communities define how change comes about, which could involve climate change scientists, for example, stepping outside their preferred paradigm to consider alternatives. Why? Because accepting pre-defined problems and solutions as given leaves little room for alternative thinking, promoting instead staid thinking about vulnerability reduction through adaptation.

My research questioned the assumptions, beliefs, values and identities of individuals and groups that influenced their decisions and outcomes for action. This revealed a complicated range of perspectives and actions around water use that many in the climate change community might consider irresponsible. Yet, analysing perspectives and actions, as well as challenging dominant beliefs and assumptions can facilitate collaboration between people who harbour diverse ways of thinking and acting, with competing interests and beliefs about how the world works that present possibilities for agency and dialogue. In doing so, my conceptual framework offers the possibility of moving beyond "business as usual" scenarios.

Stemming from this, my fieldwork experience advanced my own conceptual thinking about climate change adaptation in different ways. Firstly, it allowed me to fully appreciate the importance of viewing climate change adaptation as part of a suite of managerial **discourses** related to water and its interlinkages with other discourses (e.g. 'usos y costumbres'). This revealed the political and strategic undertones of its use in language and the exclusionary and marginalizing effects of this on water control and values. Furthermore, situating the discourse along a **scale** showed the extent to which the global definition of adaptation (IPCC) adopted locally could be used to promote dominant capitalist development patterns. Secondly, closely connected with the rationale for my conceptual framework, is how my work with the people of Huashao reaffirmed my belief in the need to understand the meaningfulness of peoples' ways of thinking and acting in a sustained and in-depth study of **place**. This is crucial where the latter seem to be following dominant economic development paths in areas understood to be dramatically affected by the impacts of climate change because it reveals how the wider political economy continues to shape how people become tied to new developments, despite new measures to address climate change impacts. Thirdly, showing the nature of different peoples' **agency** emphasising the role of people living with predictions of water scarcity, exposed the layer of engagement with everyday life that Peruvian water authorities missed in the focus on institutional, infrastructural and technological measures to adapt to scarcity/variability, rather than everyday livelihood priorities and local understandings of water scarcity. Finally, exploring beliefs, perspectives and actions **over time** became very important to understand the different types of agency I observed on fieldwork to avoid making overly rash judgements about a person's or a group's behaviour. This meant

stepping outside my own paradigmatic, westernized comfort-zone to develop a deeper understanding of behaviours that at first seemed contradictory (e.g. using water intensively despite awareness of water scarcity discourses). This reinforces my belief in the need for a broader concept of change – understanding *how* change comes about – in current climate change adaptation thinking, to understand how people live with climate change impacts.

10.3.2. Research findings

Just as Carey (2010) argued that the pressure on highland communities to adapt to scarcity was misguided on the basis that development agendas and vested political-economic interests were in fact increasing their water use; so too the thesis argues that the subsequent policy measures (canal lining etc.) used to adjust peoples' behaviour and address this apparent scarcity are misplaced. The research found that political economic forces were leading to fewer people relying on the communal system to organize their irrigation, and to the increased take-up of individualized methods. The focus on improving infrastructure through canal lining and on a normative, stereotypical idea of communal irrigation practices in climate change adaptation measures appears misguided, then, in a context where people are finding ways to live with climate change impacts, relating to water in flexible and dynamic ways, sometimes contradictory and never strictly technical and economic. The prioritisation of water use efficiency through institutional change and infrastructural improvements draws attention away from the same political economic forces behind dominant development agendas that play a role in shaping how people use and value their water and therefore respond to adaptation measures. Ignoring these forces, such as how, over time, production originally aimed at the export market, for example, may become folded into peoples' everyday livelihood activities affecting how they relate to water, fails to appreciate the level of change and the kinds of changes influencing people and their livelihoods in the highlands.

Thus, rather than assume scarcity is a significant concern for people and focusing on physical infrastructure and changes to institutional arrangements around water, the thesis findings suggest that those working in the field of climate change adaptation must rethink how people in the highlands relate to water within their wider, historically produced contexts. How people relate to water stems from their interactions with wider processes of political and economic change in ways that are meaningful to them: in the case of Huashao,

people were influencing their water use and water institutions in ways that respond to desires to generate cash and work influences, less so in response to scarcity and infrastructural change. Understanding this gives a sense of the kinds of societal changes that are of most concern to the people of a place and how climate change, in this case water variability, is adapted to peoples' lives, often tactically.

When viewed in the context of climate change, then, new commercial production activities, such as those that have taken root in Huashao, make people more vulnerable to the impacts of climate change, because people are increasingly drawn into the dominant capitalist development paradigm, and into the kinds of consumption that infrastructural and technological changes incited by this engagement. Yet, despite this, people stand to benefit to some extent from engaging with economic development processes in their immediate, everyday lives. How does one reconcile this concern for increasing vulnerability to climate change with the human desire to seek and create a meaningful life in the prevailing dominant economic development paradigm? With this conundrum in mind, practitioners (NGO) and government officials (water authorities) working in the field of climate change adaptation must challenge the assumptions of adaptation discourses that emphasize the integration of 'indigenous' or 'local' knowledge into existing institutional structures in empirically grounded ways. As shown in the thesis, when understood empirically, such definitions often tend to underplay the agency of people to engage with wider processes of change and the outcomes of these engagements can sometimes fall outside the boundaries of externally defined ideas of 'indigenous' or 'local' knowledge. Rather than focusing on some normative ideal about how people should be valuing their water supply based on institutional assumptions in *campesino* communities, engaging with peoples' everyday interactions with wider processes of political and economic change in efforts to address climate change could provide avenues for engagement and dialogue in ways that are more legitimate to people locally.

Policy makers and practitioners who define problems in dialogue with local perspectives and needs, who do not shy away from attempting to understand the social relations and power dynamics of a place and who are open to fluid and dynamic conceptualizations of water and peoples' relationship to water may pave the way to more creative, varied and flexible engagements. While by no means an easy task, such dialogue may serve to shift attention from a focus on infrastructure to political economy forces shaping people's

relationship with water. It holds the potential of engaging with the realities of everyday life and the socio-economic links across time and scale. This may reveal opportunities to share different types of knowledge, heralding more balanced decisions about adaptation measures and responses where the pressure to adapt or to change water use practices does not fall wholly on highland users, but where the role of industries and global players behind increasing water use in the highlands is also recognized and taken into account.

10.4. Implications for future research

To move beyond 'business as usual' type climate change adaptation responses to promote more place-based research, a future avenue of research could be to explore alternatives to physical infrastructural arrangements. By alternatives, I mean to refer to the historically accrued knowledge developed by people locally to live with changes in water availability. For instance, based on the value attributed to the *puquios* as a source of both domestic and irrigation water supply in Huashao, a potential research question might be, how have people historically dealt with variability in groundwater in *puquios*? This is not a rejection of the need for physical infrastructure per se, especially for dealing with long-term water scarcity. However, my research findings showed the implications of what happens when physical infrastructure, such as lining canals, is wholly prioritized in national policy aimed at ensuring water security and what is missed out on when the voices and the experiences of people living closest to the new infrastructure are not taken into consideration. Such implications include the undermining of other types of water, such as groundwater, due to inflexible policy approaches, the failure to recognize that not everyone conceptualizes water and its issues in the same way, nor have the same influence in society, and limited investment in new infrastructure by those least involved in its construction and management. Such research may pave the way for more nuanced interpretations of 'usos y costumbres' and 'local knowledge'.

Furthermore, through the course of the research, gendered values and perspectives to changing water use and management provided key insights into changing water supply in the *puquios.* The women raised questions about the problematic nature of canal lining on water use and highlighted the importance of considering different types of infrastructure.

However, the role of women was overlooked in national water policy, despite the recognition of the central role played by women in the provision, management and safeguarding of water in the third Dublin Principle. A natural next step for this research would be to delve deeper into gender considerations, perhaps in a community that continues to rely on historical methods of distribution or that has rejected state preferences for canal lining. This may serve to highlight further how women, their perspectives and experiences with water can contribute to our understanding of how people manage diverse institutional and infrastructural arrangements.

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12. Appendix

12.1. Plan for Resource Map Activity

Description:	The Village Resource map is a tool that helps us to learn about a community and its resource base. The primary concern is not to develop an accurate map but to get useful information about local perceptions of resources. The participants should develop the content of the map according to what is important to them
Objectives:	To learn the women's perception of what natural resources are found in the community and how they are used. To understand how women understand the development of the flowers in Huashao, compared with other crops and the future of this product.
How to facilitate	1. Find a large open place to work. 2. Start by placing a rock or leaf to represent a central and important landmark. 3. Ask the participants to draw the boundaries of Huashao or *comunidad campesina Unidos Venceremos*. 4. Ask the participants to draw other things on the map that are important. Don't interrupt the participants unless they stop drawing. 5. Once they stop, you can ask whether there is anything else of importance that should be added. 6. When the map is completed, ask the participants to describe it. Ask questions about anything that is unclear. Use the key questions to guide a discussion about resources in the village. Take a picture of the map and draw a picture of the map on a piece of paper. Be sure that the final map includes direction indicators (N, S, E, and W).
Materials	Sticks, pebbles, leaves, sawdust, flour, dung or any other local materials e.g. flower petals,
Key Questions	• What resources are abundant? • What resources are scarce? • Does everyone has access to the land? • Who makes decisions about who has access? • Which resource is posing most problems? Why? • Were you affected by the 1970 earthquake and landslide? What was the aftermath like?

	• What do you do for work? • What does it mean to be a member of *Unidos Venceremos*? Advantages/disadvantages? If you could change something about living in the community, what you it be and why? • What are the most significant changes you have witnessed in the last 20 years? Why do you think these changes are happening? • Are you doing anything in response to these changes? If so, is this helping you in your everyday life? If so, in what ways? • What are the biggest concerns facing the community now and into the future? • When did you start to sow and harvest flowers and how did you learn? • Where did the idea come from to sell flowers here? • Does the time you spend working in flower production influence the time you spend on other activities? If so, how? • Have you experienced any problems with regard to flower production since you started? If you did, what were they and how did you resolve them? • What type of products do you use to help you to produce? From what companies do you buy? • What would you do if tomorrow you could no longer sell the flower? • How did you find your buyers in the market in Caraz and in Lima? What type of relationship do you have with them? • Do you like working in flower production? Why? • What has this activity meant for you and your family? • Are you going to continue to grow into the future? Why/why not?