Earthscan Food and Agriculture

MULTIPLE CAPITALS APPROACH FOR UPLAND AGRICULTURAL SYSTEMS

Lois Mansfield

Multiple Capitals Approach for Upland Agricultural Systems

This book focuses on upland agricultural systems and applies a multiple capitals approach to explain what they can provide at a time when many are struggling to survive.

Marginal upland agricultural systems have been distorted and derailed by modern economics, politics, and the drive to intensification. This book argues for the application of a multiple capitals approach to resource management challenges for marginal upland agricultural communities. Instead of considering what upland agricultural systems lack, the book showcases how a multiple capitals framework can demonstrate the importance, interrelationships, and relevance of the suite of capitals (natural, human, social, cultural, and financial) to achieve better outcomes for upland communities, broader ecosystem services, and wider society more generally. It is designed to connect theory to practice to provide underpinning knowledge and guidance to help upland agricultural communities thrive. Drawing on case studies from the UK and Japan, as well as making comparisons with Central and South American countries, the book recommends tools for monitoring different forms of capital and suggests a management process driven by multiple capitals to create resilience in upland agricultural systems.

This book will be of great interest to students and scholars of agriculture, natural resource management, ecosystem services, rural development, and those interested in applying a multiple capitals approach more widely within policy and landscape management contexts.

Lois Mansfield is Emeritus Professor and previously Director of the Research Centre for National Parks and Protected Areas at the University of Cumbria, UK. She currently works as an independent research consultant running her own company, Environmentors Ltd.

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Contents

Figures

Tables

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Acronyms

AES	Agri-Environment Scheme (UK and EU)
AFN	Alternative Food Network
AHCI	Agricultural Human Capital Investment
AIAB	Analysis of individual attribute behaviour
AKIS	Agricultural Knowledge and Innovation System
ANOVA	Analysis of variance
AV	Audio visual
BNG	Biodiversity Net Gain
BPS	Basic Payment Scheme (UK)
CBA	Cost- Benefit Analysis
CCB	Community Capacity-Building
CCF	Community Capitals Framework
CD	Community Development
CE	Choice Experiment
CICES	Common International Classification of Ecosystem Services
CNC	Critical Natural Capital
CONAIE	*Conferacion de Nationalidades Indigenas del Ecuador*
COP10	Conference of the Parties 10th Session
CPÑU	*Comité de Páramo Ñukanchik Urku*
CPR	Common Property Resource
CVM	Contingent Valuation Method
EIA	Environmental Impact Assessment
ELMS	Environmental Land Management Scheme (UK)
EMA	European Model of Agriculture
ENA	Extensive Needs Assessment
ENCA	Enabling a Natural Capital Approach (UK)
ESS	Ecosystem Services
EU	European Union
EVRI	Environmental Valuation Reference Inventory
FAO	Food and Agriculture Organisation of the United Nations
FARC	Military wing of *Partido de Comunista Colombia*
FIF	Farm Investment Fund (scheme, England)
FIMO	Farm-Based Investment Management Operations

FiPL	Farming in Protected Landscapes (scheme, England)
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GET	Global Ecosystem Typology
GHGs	Greenhouse gases
GIAHS	Globally Important Agricultural Heritage Systems
GM	Gross Margin
HBFA	Hamlet-Based Farmer Association (Japan)
HNV	High Nature Value
IAD	Institutional Analysis and Development (framework)
ICC	Intangible Cultural Capital
ICH	Intangible Cultural Heritage
ICOMOS	International Council for Monuments and Sites
IK	Indigenous Knowledge
INA	Individual Needs Assessment
IPA	Importance-Performance Analysis
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPSI	International Partnership for the Satoyama Initiative
ISI	Import Substitution Industrialisation
JA Group	"Japan-Agriculture" Cooperative Group
J-MAFF	Japanese Ministry of Agriculture, Food and Forestry
J-NIAHS	Japanese Nationally Important Agricultural Heritage Systems
LAC	Limits of Acceptable Change
LAG	Local Action Group (EU)
LEADER	*Liaison Entre d'Actions de Developpment l'Economie Rurale*
LFA	Less Favoured Areas (EU)
LKS	Local Knowledge System
LM3	Local Multiplier 3
MCA	Multiple Capitals Approach
MEA	Millenium Ecosystem Assessment
MET	Metabolic Equivalent of Task
NCA	Natural Capital Account
NCP	Nature's Contributions to People
NGOs	Non-Government Organizations
NPK	Nitrogen-phosphorus-potassium fertilizer (manufactured)
NUCNP	Northern Uplands Chain Nature Partnership (England)
OECD	Organisation for Economic Co-Operation and Development
OUV	Outstanding Universal Value
PCA	Principal Components Analysis
PDO	Product of Designated Origin (EU)
PES	Payment for Ecosystem Services
PGI	Product of Geographical Indication (EU)
QALY	Quality- Adjusted Life Year
SBP	*Socio Bosque* Program (Ecuador)

SCAP	Supreme Commander for the Allied Powers
SEEA-CF	System of Environmental Economic Accounting – Conceptual Framework
SEEA-EA	System of Environmental Economic Accounting – Ecosystem Accounting
SEPLs	Socio-ecological productive landscapes
SES	Socio-Ecological Systems
SLA	Sustainable Livelihoods Approach
SLF	Sustainable Livelihoods Framework
SNA (1)	System of National Accounts
SNA (2)	Social Network Analysis
SPP	*Socio Paramo* Program (Ecuador)
SROI	Social Return On Investment
SWOT	Strengths-weaknesses-opportunities-threats
TEEB	The Economics of Ecosystems and Biodiversity
TEV	Total Economic Valuation
TSG	Traditional Speciality Guaranteed
UK	United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organization
WHC	World Heritage Convention
WHS	World Heritage Status/Site
WTO	World Trade Organization
WTP	Willingness to Pay

Part I

Overview

1 Upland Agricultural Systems and Capital

1.1 Introduction

For many people, the word "capital" conjures up visions of piles of cash, how it has led to the development of "capitalism", and the primary ways in which economies of the world operate. It can sound grubby and uncaring, focusing on entrepreneurs making and selling things to improve their personal wealth and trampling on the dispossessed and less fortunate. You will be pleased to know, therefore, this is not a book about capitalism, nor even capital in the strictest sense. Instead, this is a book about how we can invest the assets we have as individuals, communities, and/or societies to create a better standard of living and quality of life to make society and the environment more resilient and adaptable to change in upland agricultural systems. In other words, these assets or capitals should be perceived as Coulson et al. (2015) suggest, as a metaphor regarding the positive benefit of environmental resources, our own individual capabilities and capacity, how we work together to solve challenges, our culture, and where we get the wherewithal to make change happen to improve our circumstances. If it sounds complicated, it is. These capitals have many individual components which work in isolation or collectively; they can improve or deteriorate, appreciate, or depreciate. They can be shaped by place, space, or time (past, present, and future); they can be influenced by endogenous or exogenous processes and influenced by individuals, groups, or organizations. Consequently, no two landscapes present the same capital combinations.

Upland agricultural systems are those intermediate farmed landscapes that reside between the lowlands (below 300m asl.) and true mountains above 2500m asl. (Kapos et al., 2003). Within this zone, agriculture has evolved in line with a range of limiting conditions where there is a close relationship between the environment and economic activity. The limiting factors of climate, topography, and soil necessitate that societies have had to adapt their means of production to work within certain environmental thresholds, as well as limit their choice of enterprises to fewer options than their lowland counterparts. This adaptation is a double-edged sword. On one side, it can lead to an agricultural system more in tune with local ecological conditions, with a rich biodiversity and cultural heritage created through a close relationship between people and place. On the other hand, any driver that exerts change in the system for whatever reason can easily destabilize it, leading to

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rapid resource deterioration through exceeding the environment's natural carrying capacity. Maintaining the balance between agricultural use and over-exploitation, therefore, becomes a key skill for the workforce living and farming in these locations. For many uplands across the globe, this situation has led to a range of almost subsistence-level socio-ecological agricultural systems evolving, which are recognized, and now protected to some extent by international cultural organizations such as UNESCO (United Nations Educational, Scientific and Cultural Organisation) through their World Heritage Convention (UNESCO, 1972), agricultural ones like the Food and Agriculture Organisation of the United Nations (FAO) and their Globally Important Agricultural Heritage Systems (GIAHS) (Koohafkan & Altieri, 2017), and IPSI (International Partnership for the Satoyama Initiative) through their recognition of the socio-ecological productive landscapes (SEPLs) concept (UNU-IAS & IGES, 2017).

Unfortunately, these extensive upland agricultural systems are under threat. They are under threat from the very humanity that seeks to protect them, as they represent a power struggle between the duality of capitalism and nature. This duality emerges because these balanced agricultural systems are trying to operate in a world where economic growth is perceived as the "only way" to develop. As a result, the orthodox view from exogenous agencies and governments is that these systems are operating sub-optimally, leading to poor standards of living and quality of life. In response, agricultural and rural development policies have been and are employed, which focus on improvement through finance in the form of grants and loans for pesticides, fertilizers, machinery, or enterprise diversification, production subsidy, and/or forms of land restructuring, all designed to increase productivity.

Logically, if these solutions worked, we would expect to see economic development in upland agricultural businesses, related societal improvements in living standards, and the evolution of a more resilient farming system producing reasonably priced food in an ecologically biodiverse environment. Instead, we have seen a range of short-term, ill-conceived grants and subsidies with unintentional consequences, such as increased financial hardship for upland farmers, ecological deterioration, farm and land abandonment, and rural depopulation. Furthermore, public response to subsidies and the array of negative externalities has not been a positive experience (Mansfield, in press). If this capitalist-led approach worked, upland agricultural systems, their farm businesses, and families would be thriving rather than the reality of surviving (and in many cases abandoning, as is seen in Spain and Italy).

The reliance on a growth-led model of development for upland agricultural systems, therefore, seems at odds with its desired outcomes. In other words, adopting this capitalist approach in uplands jeopardizes the fragile balance within these socio-ecological productive landscapes. The corollary is a bastardized farming system that is neither one thing nor the other, a blend of different modes of production, trying to increase profit in an ecological environment never designed to be highly productive. This entire state-of-affairs suggests there is a philosophical flaw in the process of applying neoclassical (orthodox) economic theory to agricultural and rural development policy in uplands, and instead, a more subtle,

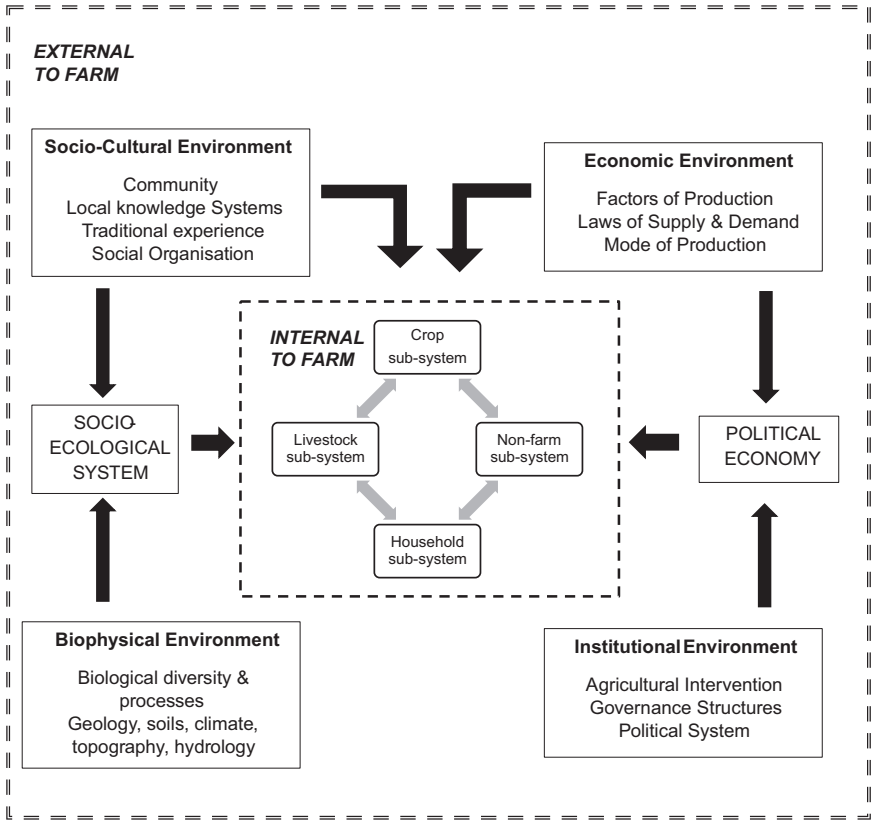
heterodox[1] approach is needed. Ideally, society needs to employ an approach that provides the benefits of development for people whilst at the same time retaining the socio-ecological advantages provided by these agricultural systems. In other words, money is not the only output of value from an upland agricultural system, nor the dominant priority.

Idealistically, we could allow upland agricultural systems to revert to their original subsistence setting, supporting re-extensification or even a form of rewilding, but morally and ethically, why should people in these uplands be expected to live in an almost "Disneyland" biodiversity ghetto simply to salve society's ecological conscience? A fairer solution would be to find a way of allowing these socio-ecological systems to become more resilient with the ability to thrive within a capitalist economy, whilst simultaneously providing a range of additional benefits society also seeks, such as landscape, biodiversity, or flood mitigation, now referred to as *ecosystem services*. Suggesting a mechanism to achieve these two requirements is the subject of this book, through the application of a Multiple Capitals Approach (MCA) creating other benefits beyond just profit and natural capital.

1.2 Upland Agricultural Systems

The process of food production on a farm, like many biological activities, can be investigated through the application of a systems approach. A system is a set of phenomena working together as parts of an interconnecting network; these components interact with each other in enumerable ways to influence each other positively or negatively. Essential components for agriculture include inputs (variable and fixed costs), outputs of food and by-products such as ecosystem services or waste, and throughputs in the form of nutrient cycling and storage, including breeding livestock and fodder crops.

From these fundamentals, a range of more complex agricultural system conceptual frameworks have been proposed from different disciplinary perspectives. With respect to agricultural science and the biological process of producing food, farms are recognized as a web of different internal sub-systems (crop, livestock, household, and non-farm) influenced by external sub-systems such as institutional arrangements (e.g. policy), the behaviour of the economic environment, local community, and biophysical influences (e.g. Caldwell, 1994). Building on this are conceptual ideas from agricultural economics, whereby there has been a focus on relationships of the economic factors of production of land, labour and capital internal to the farm (e.g. Morgan & Munton, 1971). Other disciplines have focused more on the anthropological aspects of farming systems; archaeologists are interested in tradition, experience, and social organization for food production (e.g. Fowler, 1983), and sociologists see contemporary agricultural activity operating as a local knowledge system, whereby people living in certain environments learn how to exploit its food resources without negatively impacting on it. Over time, this knowledge is passed from one generation to another, usually through oral tradition (Barnes, 1974; Blaikie et al., 1997). Finally, there are ideas from geography and resource management that see agriculture as a



(Adapted from: Morgan & Munton, 1972; Fowler, 1983; Caldwell, 1994; Blaikie et al., 1997; Adger, 2000).

Figure 1.1 Orthodox Agricultural System.

socio-ecological system where the resident agricultural community relies closely on their surrounding ecological environment (Adger, 2000). The reality is that agricultural systems are a blend of all of these, and if we follow orthodox economic principles of how humans make decisions when faced with resource scarcity, this leads to the production of three key outputs: product (meat or crops); by-product (unintentional benefits like landscape); and waste (unintentional costs such as pollution) (Figure 1.1).

1.3 Marginality

A perception often levelled at upland agricultural systems is their marginal nature. We noted above how these systems operate within a series of limiting conditions (i.e. slope, altitude, climate, soils, etc.) and, as such, people have adapted their production to fit within these restrictions. Traditional economic theory recognizes

this as a weakness because production occurs either where physiological needs for healthy crop or livestock growth are right at the biological limit or where artificial techniques to overcome these physical limitations are so economically costly that they outweigh prices obtained at sale (Grigg, 1984). These ideas of marginality are, nevertheless, very much focused on the productive capacity of land within the context of a capitalist economy, where profit is the most important consideration; in other words, uplands are perceived as deficient when compared to their lowland counterparts. There are others who see marginality extending beyond these land potentials to include the position of people on the edges, who have limited access to resources, opportunities, freedom of choice, or their ability to develop their individual capabilities (Von Braun & Gatzweiler, 2014). We can therefore expand the concept to include the interrelationship between biophysical, economic, and social systems, summarized thus:

> An involuntary position and condition an individual or group at the margins of social, political, economic, ecological and biophysical systems, that prevent them from access to resources, assets, services, restraining freedom of choice, preventing the development of capabilities, and eventually, causing extreme poverty.
>
> (Gatzweiler et al., 2011: 3)

While this holds true for most upland communities, it is important to recognize that often it is the political economy of capitalism that has pushed them into this corner. Historically, before the drive towards capitalist industrialization and increased resource pressure through population growth, upland agriculture worked within its environmental limitations, physically manifesting itself as a series of low input-low output socio-ecological systems, remnants of which have been recognized across the world as SEPLs, GIAHS, or cultural landscapes designated as World Heritage Sites (WHS). By marginalizing these systems, they exist on the periphery of economic development now because contemporary society does not value, or has forgotten what they can offer, and only perceives them in terms of what they lack (from a capitalist point of view), rather than what they offer (Thirsk, 1987 cited in Winchester, 2000).

Recently, there has been a shift in this attitude, partially driven by the development of the ecosystem services concept, whereby upland agriculture offers a range of goods and services previously perceived only as by-products, such as flood mitigation, carbon offsetting, and biodiversity reservoirs (Miyanaga & Shimada, 2018; Leroy & Garcia, 2021; Faccioli et al., 2023). Nevertheless, many upland agricultural systems are still pilloried for the damage created by forcing what is essentially a subsistence economy to operate within the misguided confines of a capitalist one (Monbiot, 2013; Schofield, 2022). The pendulum has swung too far the other way and to push it back, we need to develop tools to enable these marginal farming systems to return towards their more balanced socio-ecological status without undermining their rural economies. Offered here is one such strategy: the application of a Multiple Capitals Approach (MCA).

1.4 Capital

To facilitate a Multiple Capitals Approach, we need to acknowledge the role of orthodox capital. At its simplest, in economics, capital refers to money. The relationship between capital, agriculture, and food production is nevertheless a complex one because the former concept has developed two meanings in economics, both of which are highly relevant to our investigation. Prior to Adam Smith's (1776) "*An Inquiry into the Nature and Causes of the Wealth of Nations*", the idea of capital solely related to the accumulation of money either to invest or as an income from some sort of venture (Hodgson, 2014). Smith, instead, perceived capital as either circulating (money) or fixed (productive goods), with the latter including machines, buildings, land, and skills acquired by individuals. It is this latter definition that has been embraced by contemporary economists, relegating circulating capital to second place. In other words, capital as a concept should be viewed as a metaphor for a range of assets beyond just money (Coulson et al., 2015).

Understanding Adam Smith's ideas of capital has become more complex because people have separated out the elements of fixed capital into different types. Disaggregating fixed capital leads to buildings and machines being classified as physical capital, land as natural or economic capital, and skills as human capital. In fact, Hodgson (2014) identifies over 20 types of capital from the academic literature. Closer inspection of these shows that many are simply the same thing labelled in a different way, subsets of other forms, or combinations of different dimensions of each. As a result, as our understanding of the concept has matured, it is suggested here that there are five main types of capital:

- *Natural* – assets derived from the natural environment including non-renewable resource such as hydrocarbons, renewables such as fish and drinking water, and environmental services, for example, flood control or nutrient recycling (Costanza & Daly, 1992).
- *Human* – that which an individual brings through education, skills, life experience, and entrepreneurship to improve their quality of life and standard of living (Becker, [1964] 1993; OECD, 2001).
- *Social* – "features of social organization, such as trust, norms and networks that can improve the efficiency of society by facilitating co-ordinated actions" (Putnam et al., 1993: 167).
- *Cultural* – how a society relates to the natural environment and modifies it for its own needs, through commonality of agreed action reflecting their intellectual and spiritual development along with related works and practices (Williams, 1981; Bourdieu, 1986). It manifests itself through tangible structures such as buildings, monuments, and landscapes, as well as intangible processes, which include traditions, language, custom, and practice (Throsby, 1999).
- *Financial* – Pre-Adam Smith to refer to money and how its use can penetrate agricultural activity and businesses, reminding us of its positive as well as a negative (not a capital) experience.

Physical capital, Adam Smith's buildings and machines, is not listed here as a separate type. Arguably, the building element can be included as part of cultural capital, particularly with upland agriculture where geographical and historical specificity has led to different styles of vernacular architecture for specific agricultural uses or local environmental conditions, such as Japanese paddy field terraces or field barns found in the Yorkshire Dales of England (Figures 1.2 and 1.3). We could consider machines and/or equipment in a similar fashion if those implements are not generic to other farming systems. Therefore, a tractor is not cultural capital, whereas a trained dog used for rounding up sheep in upland England is. The other important elements of physical capital are the inputs of seeds or livestock, and given the local environmental constraints, often these are adapted solely for that upland environment. For example, endemic potatoes grown in the paramo (Earle et al., 2022) or Herdwick sheep in the UK Lake District (Brown, 2009). Thus, these too could be classified as forms of cultural capital given how intrinsically tied they are to their respective landscapes.

Investigating how these different types of capital interact and affect each other is crucial if society is to support the continuation of upland agricultural systems (Bebbington, 1999; Gutierrez-Montes, 2005; Pigg et al., 2013). To illustrate, Figure 1.2 shows the upland landscape of the Yorkshire Dales in northern England. This is a pastoral system focused on sheep and cattle enterprises that has evolved

Figure 1.2 Yorkshire Dales Field Barn, United Kingdom.

over 1,500 years. To manage the stock, drystone walls to delineate fields and barns for overwintering livestock were built along the valley bottoms and sides (cultural (physical) capital). These structures, built from the local limestone geology, now support a range of calcareous grassland types and related biodiversity of limited geographical extent (natural capital). To maintain the walls, buildings, and habitats, localized knowledge and skills are needed (human capital). Forming part of the farmed landscape are communally grazed grass moorlands above the valley sides, where the local farmers come together to manage the vegetation and sheep (social capital). The entire farmed landscape is then an amalgamation of geology, structures, processes, and people that has combined to produce a unique Yorkshire Dales landscape (cultural capital). Limited enterprise choice in this constrained upland environment has meant profit margins have been tight. To resolve this, farmers can either intensify production and, in the process, eliminate biodiversity (negative natural capital) or shed labour to reduce the costs of production (negative human and social capital). To avoid intensification and maintain the environmental values of part of the Yorkshire Dales, the UK Government, between 1987 and 2014, introduced an agri-environmental grant known as the Environmentally Sensitive Areas scheme (financial capital).

Figure 1.3 shows the traditional terraced rice paddies around *Maruyama Senmaida* in the Mie Prefecture of Japan, constructed in the 16th century. The stone-faced terraces were created by the local community (human & social capital) for

Figure 1.3 Rice Paddies at *Maruyama Senmaida*, Mie Prefecture, Japan.

food production at altitudes over 700m asl on steep, volcanic slopes (natural capital). Since 1945, many of the 2,200 paddies fell into disrepair due to rural depopulation (loss of human and social capital). Recognizing the value of preserving the paddies and traditional farming practices for the nation (cultural capital), local government worked with the community to revitalize the system by developing novel paddy rental systems for urban dwellers (financial capital).

This brief description of these two farmed landscapes tells us four important facts:

- An upland agricultural landscape is made up of different capitals
- These capitals work in tandem with each other
- Capital can be created or destroyed
- Capitals combine in unique ways to create different upland agricultural systems

Using these four ideas, we can develop a Multiple Capitals Approach that identifies and supports the types of capital and their sub-components (dimensions) responsible for the creation and continuation of farming in an area. From this, we can identify specific dimension attributes that are unique to the upland agricultural system in question (e.g. rice terraces). The process also helps us identify capital attributes that are central ("keystones") or peripheral to farm household resilience, and thus which we need to protect and/or promote or can divest. Simultaneously, society gains additional goods and services (e.g. ecosystem services) derived as by-products beyond food production.

1.5 Multiple Capitals Approach

A Multiple Capitals Approach works by recognizing that individuals, communities, and/or businesses have a range of assets (or capitals) to draw upon beyond just finance to achieve their goals (see Chapters 9 and 10). Initially explored by Flora and Flora (1993) for rural community development in the United States from a sociological perspective, Serageldin and Steer (1994) applied the idea as an enabler for sustainable development. They focused on four types of capital: human-made (latterly referred to as "produced[2]"), natural, human, and social. They were particularly interested in explaining how increasing the world's stock of capital would enable future generations to have as many opportunities as those of us living today, ideas that were latterly adopted by the World Bank. Scoones (1998) and Bebbington (1999) took these ideas, added cultural capital, and explored how a multiple capitals approach could be used to address rural household poverty in the developing world. Flora et al. (2003) reappraised their ideas and deepened their understanding to encompass seven types of capital: natural, cultural, social, human, political, financial, and built.

In this book, we will explore how five capitals (natural, human, social, cultural, and financial) can be combined to make upland agricultural systems more resilient in the contemporary world. We will do this in three main stages: setting the scene, reviewing our understanding of the individual capitals, and exploring

a Multiple Capitals approach. The first part of the book (Chapters 2 and 3) will critically review current orthodox views as to why upland agricultural systems are considered marginal, using a range of concepts employed by various academic disciplines. Environmental determinism, margins of cultivation, historical and geographical specificity, carrying capacity, enterprise selection, and perceptions of farming communities will be explored. This will be followed by an evaluation of previous and contemporary concepts and techniques used to identify and assess the character and value of the upland agricultural resource (Chapter 3). In doing so, it will demonstrate why a capitals approach can be a more effective tool for managing these marginal systems.

Part II (Chapters 4 to 8) will explore and critique concepts and dimensions related to the five main capitals with respect to upland agriculture. The capitals are laid out in a logical sequential order; we will start with natural capital, which determines the resource base for agriculture, followed by human capital, providing the labour. Next, we consider social capital, as many upland agricultural systems operate through community management. Penultimately, Chapter 7 reviews cultural capital, as its structures and processes are derived from the interaction of natural, human, and social capital. Financial capital is investigated last, as it allows us to appreciate how these agricultural systems have responded to and been distorted by capital penetration through a modified political economy and neoliberalism.

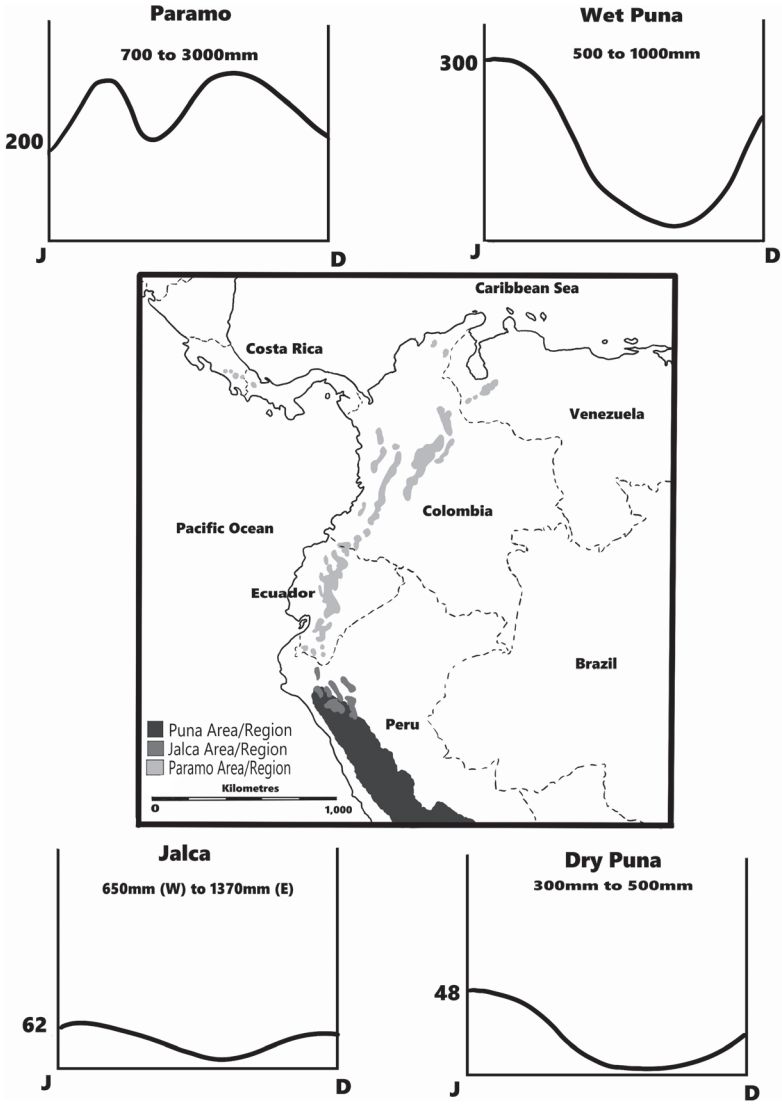
In the final part of the book, we turn our attention to devising a suitable multiple capital framework for pragmatic application to upland agricultural system challenges. Chapter 9 critically reviews the main theoretical frameworks currently available and proposes a suitable system for UAS. The final chapter (Chapter 10) will employ this conceptual framework to develop a practical toolkit for use in upland agricultural systems. It will end by considering gaps in our knowledge and the consequences of not employing a multiple capitals approach going forwards.

1.6 The Upland Farming System Case Studies

Given the diversity and complexity of upland agricultural systems globally, to help explore the principles of a multiple capitals approach, this book will use three case studies from different parts of the world. To help provide the reader with some initial context, a synopsis of each, including its main characteristics, drivers, constraints, and vulnerabilities, is provided here as the remaining part of this introductory chapter.

1.6.1 Andean Paramo

The first case study considers the pan-national páramo ecosystem found in the South American countries of Colombia, Venezuela, Ecuador, and Peru, and to a lesser extent, Mesoamerica (Panama and Costa Rica) (Figure 1.4). Whilst this book cannot do justice to the complex socio-economic political history of all these countries, this synopsis aims to outline the main characteristics and events so that the reader can gain a broad understanding of the drivers operating across the Andean



(Adapted from: Luteyns, 1999; Mosquera et al., 2022, Torvar et al., 2013, Rolando et al., 2022).

Figure 1.4 Distribution of Paramo Vegetation in South and Central America.

paramo and its relationship with agriculture. The reader is directed to Cupples (2022) for depth.

Covering approximately 24,300 square kilometres of terrain (Peyre et al., 2021), between 11° North to 8° South, páramo refers to a range of unique grassland vegetation types that lie above the timberline and below the permanent snowline (3000 to 4800m asl) (Figure 1.5). Recognized as a global biodiversity hot spot and as the main

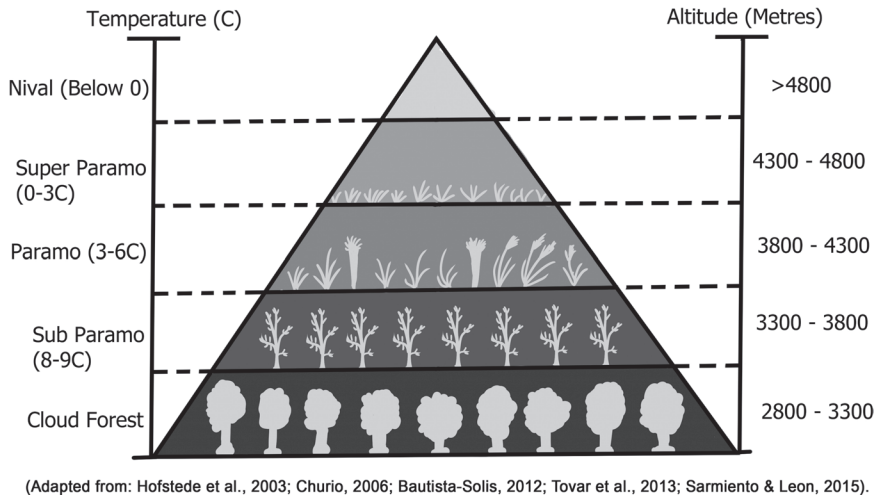


Figure 1.5 Ecological Zonation in the Andean Paramo.

water source for many parts of northern South America (Hofstede et al., 2003; Churio, 2006; Buytaert et al., 2006), this case study demonstrates the tensions between campesino (peasant) food production, biodiversity protection, and extractivism, and how different countries employ varied strategies to resolve it (e.g. Venezuela, Llambí et al., 2005; Ecuador, Bremer et al., 2014; Colombia, Robineau et al., 2010).

Climatic variations influenced by air masses from either side of northern South American continent mean western paramo is wetter (2000 mm pa) and more humid (70 to 85%) than eastern areas, which have a notable dry season (Sarmiento & León, 2015). Consequently, the paramo provides nearly 40% of the domestic water supply for downstream urban populations across the whole of northern South America (Buytaert et al., 2006). Further south, páramo transitions into the drier puna and jalca, both of which have suffered from similar land use pressures discussed here (Tovar et al., 2013; Rolando et al., 2017). The páramo is notorious for diurnal weather fluctuations from below freezing to 10°C, creating multiple freeze-thaw cycles over 24-hour periods. Overall, the mean annual temperature regime is from 2 to 10°C, cooling with altitude (Sarmiento & León, 2015). These conditions lead to acidic soils resulting in few nutrients and low productivity in the vegetation, which impacts grazing potential. The resultant ecological richness has led to much of the paramo being protected through internationally recognized designations, such as Class I and II national parks to the exclusion of people (Dudley, 2008; Robineau et al., 2010).

Despite this harsh environment, humans have lived in the páramo for at least 15,000 years, leading to extensive piecemeal deforestation. Pre-Conquest South America constituted a wide range of complex indigenous societies and cultures, focused on either hunter-gathering, endemic llama and alpaca grazing management, or sophisticated agricultural systems developed for local conditions (Lyons, 2010). The Spanish Conquest from the 15th century onwards re-shaped the continent

through brutal colonialism and the power to control economy, authority, gender and sexuality, and subjectivity and knowledge (Cupples, 2022). With it came torture, genocide, disease, forced labour, evangelization, and eventually the slave trade to replace the indigenous population who had succumbed. In relation to agriculture, the Columbian Exchange brought in exotic plants, domesticated cattle and sheep, and new agricultural technologies. Illegal annexation of indigenous lands and coercive servitude led to the development of the feudal-like hacienda and *encomienda* systems of large estates held in private colonial or Catholic Church hands, intent on exploiting national and international markets. Stock raising became a central element of the system, such as the introduction of ganado bravo cattle in Ecuador (Joslin, 2021). Natural heterogeneity in paramo ecosystems meant that some adapted better to the increased grazing pressure such as in the *Sierra de la Culata* of Venezuela (Matson & Bart, 2013). In contrast, páramo in Colombia and Ecuador became ecologically less diverse, a trend that has accelerated in recent years (Molinillo & Monasterio, 1997). The hacienda system remained after colonial collapse in the early 19th century, and in some countries well into the 20th century (e.g. Peru and Ecuador).

Post-colonial South American countries (1820 onwards) faced various internal political struggles related to the role of the Catholic Church, armed forces, landed elites, and international commerce. Seeking international trade to modernize their economies, exacerbated by a range of clientelist relationships with the US and other Western financial organizations, states became reliant on commodity trading of a few crops, relegating them to peripheral and dependent status. Eventually, large-scale agrarian reform swept across the continent (Cupples, 2022). Wage labour replaced servitude, and land was apportioned back to indigenous and mestizo[3] people. In some parts of the Andean paramo, such as Ecuador, land above the permanent field system returned to collective management by indigenous communities who regained their property rights from expropriated hacienda lands (Lopez-Sandoval & Maldonado, 2019; Joslin, 2021). In Columbia, Molinillo and Monasterio (1997) describe how paramo is divided into roughly three zones: low altitude intensive farming, followed uphill by areas retaining colonial-era features of livestock for ploughing fed on fodder derived from high-altitude forage, and finally, the highest altitude communal extensive grazing known as "Rights to the Paramo". Elsewhere, bordering the paramo large-scale "estate" farms remained, forming the bulk of some countries' agricultural GDP, ignoring the economic contribution of indigenous and campesino agriculture, leading to conflict between the two groups influenced by later neoliberal economics (Lyons, 2010).

The political situation became fraught throughout the 20th century with the rise and fall of different dictatorships, military coups, and paramilitary organizations, some supported by Western states (Cupples, 2022). In response, guerrilla armies, such as FARC in Colombia and the Shining Path in Peru, had as part of their manifestos agrarian reform demanding the return of misappropriated land back to the campesinos (peasants) (Betancur-Alarcón and Krause, 2020). Simultaneously, a range of economic policies were implemented by incumbent governments in different ways, starting with free trade and moving on to Import Substitution

Industrialization (ISI) underpinned by import tariffs, nationalization of key industries, and price control; exemplified by the rise of dairy cattle in Colombia at the expense of sheep (Blake et al., 2023). Whilst ISI benefited urban populations, artificially low food prices undermined rural populations, and small farmers found it increasingly hard to make a living. Eventually, the inward-looking ISI was replaced by trade liberalization, with individual countries making debt/loan deals with the International Monetary Fund, World Trade Organization, and World Bank. This exposed Latin American countries to increased unemployment, wage collapse, and rising poverty as cheaper goods flooded in. In agriculture, a push towards enterprises that generated cash from foreign exchange (referred to as agro-extractivism; McKay et al., 2021) arose; consequently, small farmers lost out, this time to agribusiness in terms of both domestic production and land acquisition. The backlash that followed was bolstered by the replacement of dictatorships by left-wing democracies, for example, Venezuela and Ecuador, many of which operated watered-down neoliberal economics (known as the Pink Tide), and whilst advocating indigenous rights, continued contradictorily to operate neocolonial extractivist resource policies (Renfrew, 2011; Riofrancos, 2020).

Varied political and economic trends in South America have therefore had profound effects on the everyday lives of indigenous and campesino farmers. Agro-extractivism, underpinned by the expansion of agri-business and population increase, has pushed small farm households "uphill" seeking subsistence land, forcing them into the paramo, removing or damaging the ecosystem in the process (Benavides et al., 2019). Simultaneously, this upwards expansion of the agricultural frontier has brought indigenous and campesino farmers into direct conflict with state bodies intent on protecting the paramo's ecological and hydrological value through land-sparing approaches (referred to as *neoliberal conservation* as it promotes agricultural intensification elsewhere; Blake et al., 2023). States have responded in different ways to this predicament, from forced displacement (Robineau et al., 2010), to mechanisms encouraging switches to less destructive activities (Blake et al., 2023) to farm diversification away from stock via Payment for Ecosystem Services (PES) (Bremer et al., 2014). The resultant effect is that indigenous and campesino farmers are squeezed into a smaller and smaller area, leading to even greater environmental degradation and household poverty, requiring alternative solutions such as a multiple capitals approach, as suggested by Bautista-Solís et al. (2012) and Urquijo et al. (2020).

1.6.2 Japanese Satoyama

The second case study explores the satoyama of upland Japan. Satoyama is a form of socio-ecological system whereby a close relationship has emerged between agricultural and/or agroforestry production and the environment. First formally referred to in 1759 regarding land use in mountainous areas, many of its component parts had evolved over the previous five hundred years through a predominantly agrarian society (Takeuchi, 2003). Nowadays, the term has become synonymous with a range of multifunctional features such as indigenous knowledge, communal management, cultural heritage and ecosystem services (Ichikawa & Toth, 2012;

Indrawan et al., 2014; Takahashi et al., 2022). Indeed, Yoshida et al. (2022: 107) note, "*most Japanese farmers do not continue in agriculture for the sake of earning money but to farm and maintain the land because of complex relationships between various motivations involving themselves and their surroundings*".

The Japanese archipelago is dominated by a series of volcanically active mountain ranges located along the central spine of the main island (Honshu) rising to 3000m asl. The full range of natural hazards, such as earthquakes and volcanic eruptions, along with its mountainous terrain (73% of the land mass), has had a profound influence on building construction and related land use. Roughly half of the country's 130 million population are squeezed into the eastern coastal plains facing the Pacific; 53% are found in upland rural communities and 44% of the farming population. Over 70% of upland Japan is forested and accounts for 41% of the agricultural area (J-MAFF, 2018), of which between 60 to 90 thousand km^2 are probably satoyama (Tsunekawa, 2003).

Japan crosses several climatic zones from humid continental to humid subtropical and tropical rainforest. These differences in climate and landscape have allowed the development of a diverse flora and fauna, much of which has been negatively affected by post-1945 re-afforestation and, to a lesser extent, agriculture (Uematsu et al., 2010; Mansfield, 2021). Climatic variation has also led to different forms of socio-ecological satoyama evolving, with grasslands occurring in the higher reaches of the southernmost areas of Japan (Kyushu). In contrast, in southwestern Kii (Kinki Peninsula of Honshu), satoyama is dominated by forests on the higher slopes succeeded by combinations of orchards, vegetables, and rice lower down, interrelated through a communal water management system (Figure 1.6).

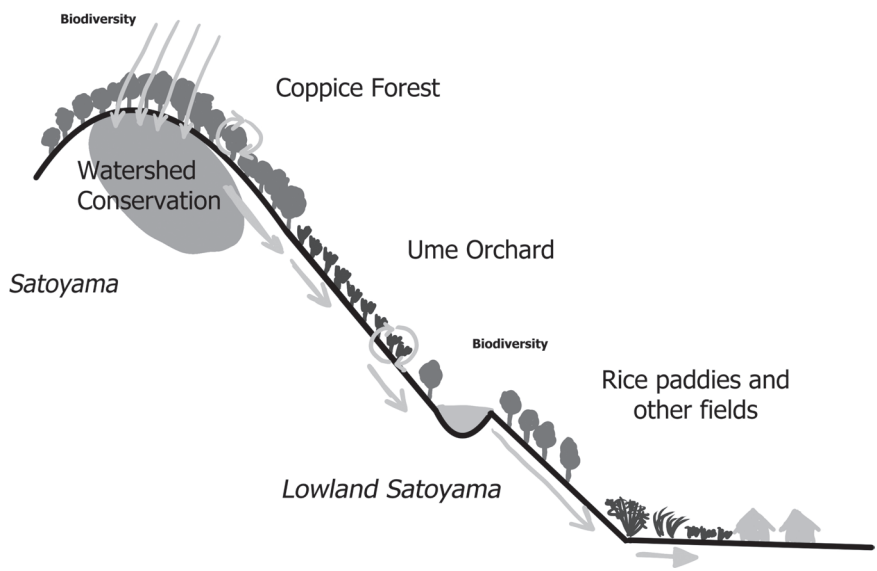


Figure 1.6 Japanese Satoyama Land Uses: Tanabe, Wakayama Prefecture.

Closer inspection of Kinki satoyama shows that the forested areas constitute combinations of native forest in extremely inaccessible locations or religious shrines, historic plantations dating back to the beginning of the Edo period (1625) to provide timber for the Royal Palace in Kyoto, and oak coppice woodland, the latter globally prized for extremely pure Binchotan charcoal (Figure 1.6; Mansfield, 2019). These areas were managed by the *Yamamori* (lit. forest guardians) who oversaw and operated individual tree felling to maintain landscape stability and forest regeneration. Moving downhill, lower and middle slope areas had a range of agricultural enterprises which were interchangeable depending on local conditions. For example, some areas concentrated on rice, such as around *Maruyama Senmaida* in Mie Prefecture where the paddies were terraced to a high altitude (736m asl). In neighbouring Nara, fruit trees (especially *ume* plums) and intensively managed vegetables were grown in tiny fields (often less than 0.1 ha in size) on the mid to lower slopes (500m asl) (Figure 1.6).

Sophisticated water management connected the three land use zones. Afforested areas acted as natural collectors from where the water was gathered downslope through a myriad of stone-lined channels to feed the orchards, rice paddies, and vegetable fields. The system evolved through local communal responsibility and obligation underpinned by the *daimyo* feudal land ownership system, ensuring the water supply was unpolluted and infrastructure functional (Smith, 1959). Japanese Shinto-Buddism was also a fundamental element, venerating the environment, and manifest through a range of food-harvest festivals, now a central part of Japanese cultural heritage (Ichikawa & Toth, 2012).

Major political and economic change came in Japan with the arrival of the Meiji dynasty, which sought to move the country from a purely agrarian society to an industrialized one (see Table 8.2). With feudalism coming to an end and the loss of the communal *daimyo* obligation system, decline in satoyama was inevitable. The next paradigm shift for agricultural production came in 1946, under the auspices of American SCAP, which instigated national land reform to increase agricultural productivity, addressing wartime food shortages through farmland amalgamation (Mason & Caiger, 1997). Simultaneously, a national re-afforestation programme focused on just two tree species (Japanese red cedar, *Cryptomeria japonica*, and Japanese cypress, *Chamaecyparis obtusa*); but based on poorly understood observations from around Kinki, it subsequently led to ecological impoverishment, pest problems, and increased health conditions. A third driver of change in rural Japan came from the 1950s, with industrialization and related urbanization creating the pull of employment, better wages, and standards of living. This combination of circumstances created a watershed in rural living and communal land management, where previously a direct relationship between people and nature, who managed the land communally, was replaced by a situation where the underuse of rural resources became the norm, typified by land abandonment and a decline in communal systems (Takeuchi et al., 2016). The corollary was rapid rural depopulation (82% from 1945 to 2018), a decline in rural labour (71% over the same period), and extensive land abandonment (decline of 69%) (J-MAFF, pers. comm, 2019). With a dwindling aging demographic (most farmers over 75), shrinking

village populations, and extensive forest privatization, the collapse of satoyama accelerated.

By 2018, the situation had become even more acute, with several additional drivers emerging. First, many farms, despite various political attempts, steadfastly remained under 1 hectare in size, and most were part-time, despite repeated attempts to increase efficiency and productivity (Miyake, 2016; Shoji et al., 2019). Second, research by MAFF-J (pers. comm.) shows that once a village falls below ten households, maintaining both water course management and cultural traditions becomes almost impossible. This, in turn, has affected rice paddy viability, pushing more people to leave the land to seek employment elsewhere, and so the situation spirals downwards in the form of positive feedback. Third, at the other end of the system, the forestry industry has also come under stress in recent years due to cheaper imports from SE Asia and China, which has negatively affected all stages of the timber supply chain from building materials to chopstick manufacture, and coppicing collapse (Ogawa, 1995; Mansfield, 2021). Traditional timber markets, where once single trees were purchased, have now been replaced with bulk "lot" purchases as harvesting systems change to clear-fell operations, resulting in the loss of *Yamamori*. Lastly, consumer preferences have changed in relation to house building materials, moving away from traditional timber to cement and plastic (!), and in terms of higher demand for wheat rather than rice, through a cultural desire to move towards a more Westernized diet. So much so that by 2017, wheat outstripped rice consumption for the first time in Japan's history (J-MAFF, 2018).

Faced with this series of complex rural issues, successive 21st-century Japanese governments have sought appropriate mechanisms to slow, halt, or even reverse rural depopulation and all its incumbent challenges (see Chapter 8). Part of their approach is to employ satoyama as a mechanism to reverse these trends, whilst at the same time addressing ecological decline and the provision of other ecosystem services (Knight, 2010; Indrawan et al., 2014; Thelen, 2022). This has been aided by a range of national policies and schemes targeting mountainous areas, as well as international initiatives such as GIAHS (Yiu, 2014; Koohafkan & Altieri, 2017) and the *International Partnership for Satoyama Initiative*, the latter spearheaded by the Japanese government (Morimoto, 2011). Whilst these exogenous top-down mechanisms have much merit, it is nevertheless crucial to recognize the pivotal role the community plays in Japanese satoyama systems. Consequently, it is equally important to encourage communities to have confidence in their own abilities to manage their local assets to develop solutions that fit their circumstances (Feldhoff, 2013; Tashiro et al., 2019, this volume).

1.6.3 Upland Hill Farming in the United Kingdom

The third case study examines the United Kingdom uplands, where an extensive agropastoral farming system has evolved over the last thousand years, at the same time creating a cultural landscape supporting nearly 50% of the nation's semi-natural habitats (Mansfield, 2011). A range of political and economic developments since the 1950s have led to improvements in the farming community's standards of living, but at the

same time, overexploited the resource base, creating less desirable negative externalities, and more recently, begun to erode and undermine the farming system itself.

In the UK, 17% of the land area is classified as uplands (between 240m and 1500m asl). Geologically heterogeneous, with steep environmental lapse rates and strongly influenced by moist temperate maritime air masses from the Atlantic and orographic rainfall, their low altitudes compare to much higher uplands elsewhere. High precipitation (up to 3500mm per annum) combined with these features produces either thin lithomorphic soils or peat formations, which limit growing and grazing seasons focused on livestock production (sheep, beef, and/or dairy cattle). These systems operate through selective foraging directly from the vegetation, which over millennia has produced a symbiotic relationship whereby grazing activity has interacted with local environmental conditions to produce a wide variety of ecologically diverse habitats of high nature value (Bignall & McCracken, 1996; Mansfield, 2010), comparable to the concept of socio-ecological productive landscapes (UNU-IAS & IGES, 2017).

Geographical and environmental variations have led to unique sheep breeds developing that are physiologically adapted to specific environments, becoming part of the uplands agricultural cultural heritage along with aspects of the farming system itself. Upland or hill farming comprises three land types (Figure 1.7):

- Valley bottom (*inbye*) – low-altitude land which is typically enclosed into a field system using drystone walls or hedges. This is the best quality land improved through various inputs (e.g. drainage, reseeding, fertilizers) and usually has limited biodiversity (except hay meadow). Being the most flexible, it can produce a range of winter fodder crops (silage, hay, or roots) or be used as permanent grazing pasture. Fields are privately owned by a nearby stone-built farmstead or through a tenancy agreement.
- Valley tops (*moorland or fell*) – the poorest land, typically comprising mosaics of semi-natural grassland, mire, and dwarf shrub heath habitat. Agricultural potentials are low, operating an extensive grazing regime, but they have the greatest biodiversity. Land can be privately owned or communally grazed.[4] Communal grazing has led to the creation of a network of contiguously grazed areas by different flocks of sheep known *as heafs or hefts*, which are unfenced from each other. Instead, the new generation of animals learn from their mothers where their traditional grazing ground is and instinctively continue to graze there, intermittently re-enforced by shepherds and their sheepdogs.
- Land in between bottom and top (*intake*) – hillsides and steep slopes that are semi-improved and enclosed from the land above. Often, the land is underlain with tile drains to improve fodder production; biodiversity is between the two extremes noted above.

Depending on the combination of the land, two categories of farm exist: hill farms, which have no valley bottom land and are limited to sheep enterprises; they are the most marginal physically and economically, and upland farms encompassing all three land types. The increased flexibility means sheep and cattle enterprises operate in a complex pattern of rotational land use throughout the year. In effect, upland livestock farming is using both comparative and absolute advantage of the environment.

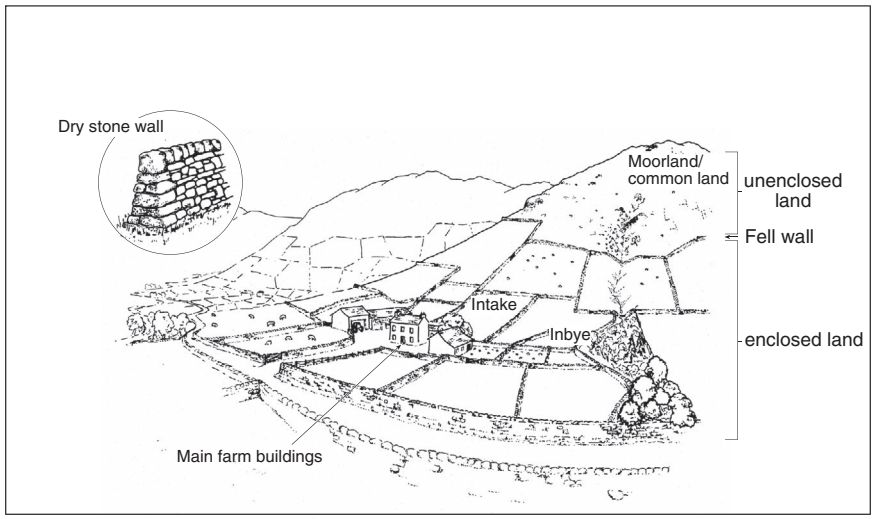


Figure 1.7 Hill Farming System in the Lake District, the United Kingdom.

Sheep production in the UK operates a unique system of cross-breeding and sales known as *stratification*. Hillstock are crossbred with upland stock, which are crossbred with lowland stock; this allows for improved genetics and meat production; the process is then reversed in places. Consequently, without hill and upland farming, the entire UK lamb production food chain would collapse as there would be too much pressure on lowland farmland to divert to increased grazing needs. This stratification system is a ghost remnant of transhumance still practiced in alpine Europe today, where historically, hill farms would have been the temporary summer grazing base (cf. sheilings in Scotland and *hafod* in Wales) but over the last five hundred years this has broken down (Mansfield, 2011; Costello & Svennson, 2018). Instead, valley bottom farms have subsumed transient high elevation summer pasturage into one system. Livestock are now gathered intermittently on individual days for animal welfare reasons, sales, or to avoid the worst excesses of winter weather. The varied land types, physical structures, stratification, hefting, and gathering have become part of the cultural heritage of upland farming systems and communities typical of local knowledge systems, which blend natural, human, and social capital to create a unique low-intensity productive landscape.

Whilst some of these agro-pastoral systems are afforded limited protection through World Heritage inscription (e.g. the Lake District), most form part of the land use of national landscape designations but have no specific protections. This situation is part of the legacy of poorly understood and applied political and economic processes that have distorted the farming system, leading to unwanted biodiversity loss (Monbiot, 2013), as well as financial hardship for these businesses, families, and communities through the cost-price squeeze (Mansfield, 2011, 2019). Previous successive UK governments since 1942 and EU membership from 1972 to 2017, respectively, have recognized that hill and upland farming systems struggle to provide an adequate

living for the farming communities they represent (Table 8.3). Consequently, a plethora of grants and subsidies that aim to encourage innovation adoption, restructuring, diversification, or reward through recognition as High-Nature Value (HNV) farming systems have been tried both nationally (1942 to 1972) and through EU systems (1972 to 2017). Despite all of these, the UK hill farming sector continues to struggle economically, its social and cultural capital diminishing (Mansfield & Morgan, 2024). Recent changes in UK government policy since Brexit (2017), which replace production subsidy with payment for public goods, have yet to demonstrate whether the upland farming system will survive.

1.7 Concluding Remarks

Whilst these three upland case studies seem disparate, they do, in fact, have several features in common. First, they are all socio-ecological systems that have adapted

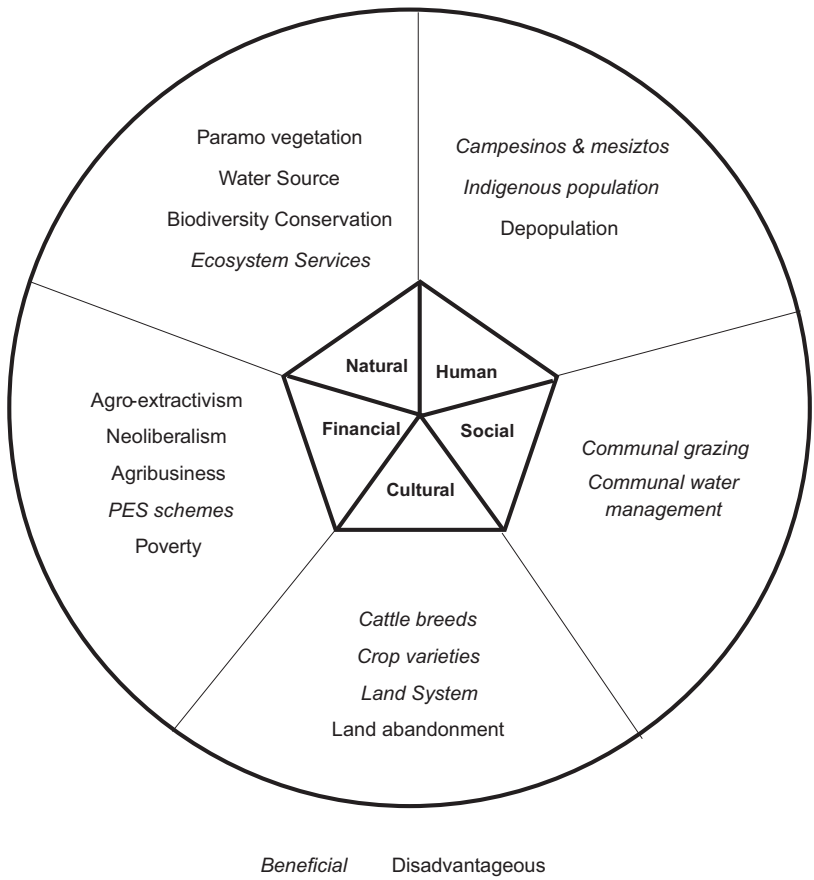


Figure 1.8 Andean Paramo and Capitals.

to specific environmental conditions, operating a varied range of agricultural enterprises. Second, an element of their land management organization is communal. Third, their agricultural system is based upon small family-run farms. Fourth, they provide a range of goods and services for society beyond food; thus, they can be considered multifunctional, of which high cultural heritage value is part. Lastly, all three systems do not fare well under neoliberal capitalism, which distorts and undermines their socio-ecological nature. Nevertheless, the three vary from one another in relation to the threats they face and how they, and the wider political economy, have responded. In the case of Andean paramo, the campesino and indigenous farmers are caught between agro-extractivism and neoliberal conservation, pushing them into poverty. Farming populations in satoyama landscapes are under threat from structural demographic collapse and related land abandonment. Finally, UK hill farming faces a continuous unresolved economic cost-price

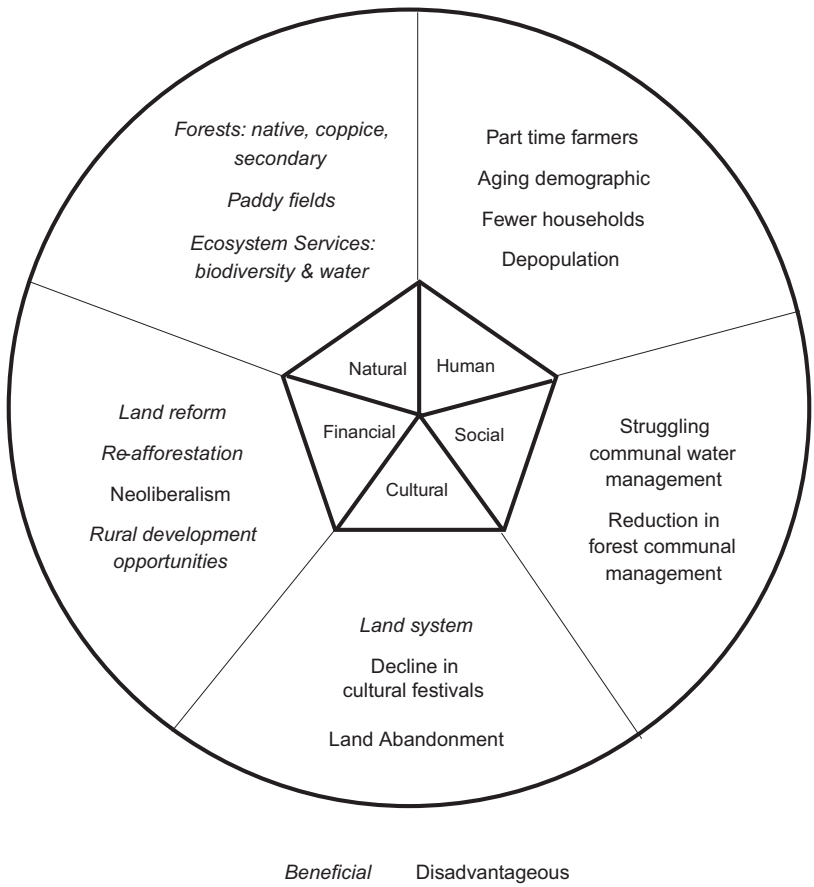


Figure 1.9 Japanese Satoyama and Capitals.

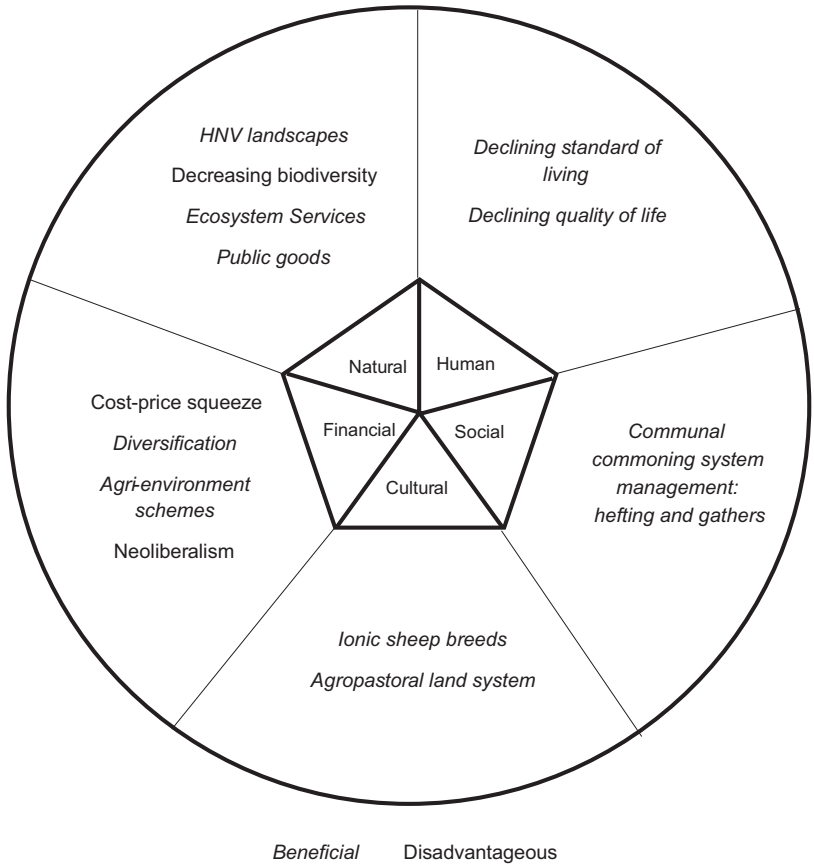


Figure 1.10 UK Hill Farming and Capitals.

squeeze exacerbated by an existential crisis. Political response has been varied, periodically directly responsible and hostile; others ambivalent and, at times, more visionary, employing the system as a development tool for wider society.

The ability to understand and appreciate the similarities, differences, and responses made by upland farmers and political economies is the first step in identifying solutions to build resilience to the complex challenges facing marginal farm households. In this book, the chosen approach is to apply a multiple capitals framework by exploring and critically reviewing our current knowledge about the five capitals of natural, human, social, cultural, and financial. To initiate this discussion, Figures 1.8, 1.9, and 1.10 outline the attributes of each capital operating in the three case study areas introduced in this chapter. It will become apparent as we proceed that there are many themes (dimensions) and attributes identifiable for each capital, which interrelate temporally and spatially, creating complex vulnerabilities and constraints, interdependencies, feedbacks, and symbioses. By understanding these

better and developing a multiple capitals management process, we can help make our upland agricultural systems more resilient, retaining their rich socio-ecological cultures whilst benefiting from their multifunctional character.

Notes

1 Heterodox economics – economic theories and ideas which reject traditional economic theory. An example is ecological economics where human economies and natural ecosystems are interdependent and coevolve temporally and spatially.
2 Human-made capital included here: machines, factories, buildings and infrastructure; arguably this could be construed as Adam Smith's physical capital.
3 Mestizos – people of mixed race heritage usually a combination indigenous, African or European descent.
4 Communal grazing – in the UK this tends to refer to land which is owned by one person, but where a number of others hold the 'right of common', a form of common property resource. Originally laid down by the Statute of Merton in 1257, common rights include the right to: graze livestock, collect fish, cut peat, collect fallen deadwood amongst others.

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Multiple Capitals Toolkit for Upland Agriculture

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