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# MULTI CAPITALS CONCEPTUAL FRAMEWORK DEVELOPMENT

## KEY FINDINGS and PROOF OF CONCEPT

(Unpublished research report to Natural England 2021)



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Prepared by Lois Mansfield, Centre for National Parks and Protected Areas, University of Cumbria as part of the Landscape: character, heritage, beauty, change and the natural capital model – conceptual relationship, evidence and data gaps research project for Natural England. Overall project delivered by:



**HERITAGE NATURALLY**

Front cover image: Solway Coast and Frontiers of the Roman Empire World Heritage Site, NCA 6 Solway Basin  
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## Executive Summary

### Aim

This paper is part of a larger research project designed to consider the relationship of landscape with a natural capital approach and a multiple capital model. It sought to define the different capitals, explore a multiple capital approach to landscape management and consider the key issues relating to taking a multi capital view. The overall aim of this paper was proof of concept of the application of a multiple capitals approach to landscape by creating a conceptual framework.

### Methodology

This paper specifically sets out proof of concept for developing a multiple capital conceptual framework for landscape. It achieved this through building on our initial desk top review of over 70 research papers and studies from the UK, Europe, Asia and Central America that consider landscape, natural capital and other capital. The majority of research focusses on one or two types of capital, often in combination with ecosystem services and assets. We also explored 15 case studies that focus on different capitals, including several that take a multiple capital approach specifically in relation to landscape and from these, the nine most relevant case studies were reviewed in detail and summarised in our Case Study report.

This paper then used the findings of the capitals and Case study reviews to explore further the concept of a multiple capitals conceptual framework for landscape. It did this through a critique of four current multiple capital conceptual frameworks, those considering at least five. These focused on the macroscale broad concepts of capitals. We then explored five papers in more detail (the microscale) which considered the sub-themes (termed *dimensions*) within different capitals and some of the processes available to us to appraise them. Our underlying driver throughout was to evaluate conceptual frameworks to identify those with the most relevance to landscape. Our findings were then synthesised through a series of recommendations from which we built a conceptual framework relating capitals to landscape.

### Critical Review Findings

Initially we explored how the NCEA natural capital framework addresses other capitals along with an analysis of the relationship between Swanwick's (2002) well-known landscape wheel. Our conclusions were that the NCEA frameworks apply a 'black box' approach and that the landscape wheel considers natural and cultural capital only. We then reviewed the following multiple capital conceptual frameworks:

- Bebbington's 5 capital model
- Sustainable Livelihoods Framework
- Community Capitals Framework and allied upward spiralling
- Socio Ecological Systems

There were three overarching conclusions we drew from this first stage review of these frameworks:

- There are no frameworks to draw upon directly with respect to landscape, but those critiqued here have aspects of value for landscape character monitoring and latterly NCEA.
- Landscape is a product of multiple capitals.
- Capitals support the development of each other

The review also indicated we need to ensure we address the following for our proposed model: definitions and dimensions of capitals; the function of the conceptual framework and the value of upwards spiralling; the components to include in such a framework, and the relationships between conceptual dimensions and reality.

The second stage of the critical review explored a number of aspects of developing a conceptual framework by exploring various case studies:

- how to convert theory to practice
- using statistical modelling to measure capital
- measuring human and social capital – this example uses agri-environment schemes
- measurement of social capitals beyond networks
- cultural capital dimensions & valuation – various examples

From this part of the critical review it was re-enforced that there is a need a set of *standardised definitions for capitals and their dimensions*. Second, we should *integrate the DCMS CHC framework* into the overarching concept and cultural capital dimensions and should include (if not already) sense of place, cultural heritage, inspiration, escapism, relaxation, spiritual, learning and recreation. Third, the framework needs to *Re-enforce the role of multiple capitals* most notably the importance of social and human capital for landscapes; and that bonding and bridging social capital is important. Fourth, to *convert theory into practice* we should employ Tveit *et al.*'s (2006) tool (concept > dimension > landscape attribute > indicator); avoid use of statistical tools; use expert & local knowledge; ensure the ability to build bridging social capital exists and develop trust. Finally, *future work* should include: tools to measure intangibles; improve our knowledge on social and human capital (apart from networks), and employ stated preference techniques where appropriate.

### Recommendation 1 – Definitions & Related Dimensions

We propose the selection of the following capitals, along with their definitions, to create a multiple-capital landscape conceptual framework:

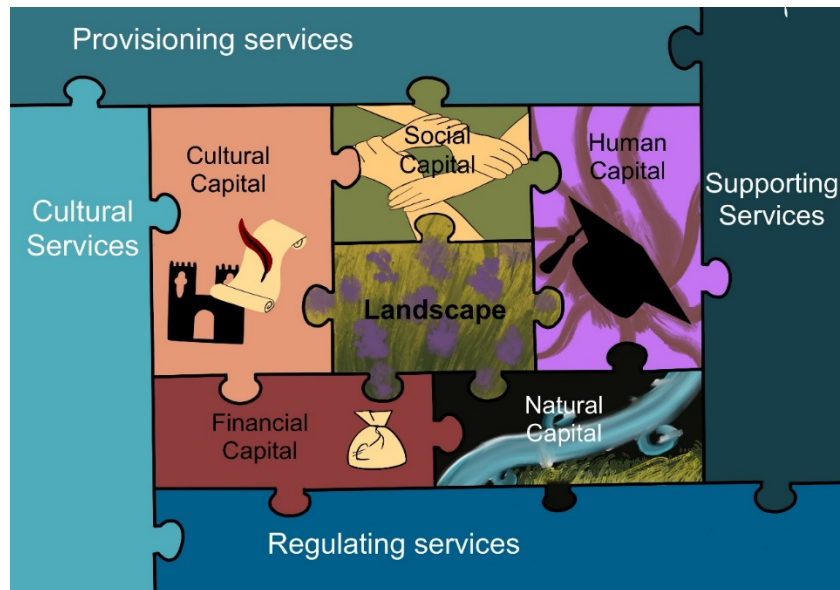
- **Natural** - The aspects of the natural environment that provide benefits to people. England's varied natural environment, its ecosystems, geodiversity and landscapes, provides people with a wide range of benefits, upon which human wellbeing depends. These include food, clean water and air, the regulation of climate and hazards such as flooding, thriving wildlife and cultural and spiritual enrichment. (*Natural Capital Atlases, Natural England, 2020*)
- **Human** - The knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being. (*OECD 2001*) #
- **Social** - The networks of relationships among people who live and work in a particular society, enabling that society to function effectively. Networks together with shared norms, values and understanding that facilitate cooperation within and among groups (*OECD 2001, Capitals coalition*).
- **Cultural** - The many and diverse ways people - in a specific geographical and socio-economic context – deal with and influence nature and natural resources. Cultural capital is made up of tangible (building, structures and locations) and intangible (ideas, practices, beliefs, traditions and values) assets.
- **Financial** - Assets that exist in a form of currency that can be owned or traded, including (but not limited to) shares, bonds and banknotes. (*Forum for the future*)

Building on these, we propose the following dimensions (sub themes) of each capital could be employed for a capitals-landscape conceptual framework:

Capital	Dimensions
Natural	<ul style="list-style-type: none"> <li>• ecosystems</li> <li>• species</li> <li>• freshwater</li> <li>• land</li> <li>• minerals</li> <li>• air</li> <li>• oceans</li> <li>• natural functions and processes</li> <li>• geodiversity</li> <li>• landscapes</li> </ul>
Human	<ul style="list-style-type: none"> <li>• education (formal and informal)</li> <li>• knowledge, skills &amp; work experience</li> <li>• traditional practices &amp; core belief systems</li> <li>• practices</li> <li>• motivations</li> <li>• empathy</li> <li>• life experiences</li> <li>• relationships &amp; social learning</li> </ul>
Social	<p>Relations of trust – values and trust, organisations</p> <p>Reciprocity and exchange - communication channels, membership</p> <p>Common rules and norms - social norms</p> <p>Connectedness, networks and groups:</p> <ul style="list-style-type: none"> <li>• Bonding – within in communities of interest locally</li> <li>• Bridging – between communities of interest locally</li> <li>• Linking – between communities of interest local to external</li> </ul>
Cultural	<p>Tangible structures</p> <ul style="list-style-type: none"> <li>• private goods</li> <li>• common-pool goods</li> <li>• collective goods</li> <li>• tool goods</li> <li>• buildings,</li> <li>• boundaries and</li> <li>• historic monuments;</li> <li>• contemporary built environment</li> </ul> <p>Intangible activities</p> <ul style="list-style-type: none"> <li>• practices and processes, recreation</li> <li>• sense of place, way of life</li> <li>• perception - sight, sound, smell, touch</li> <li>• inspiration, escapism, relaxation, spiritual</li> </ul> <p>Contemporary capitals</p> <ul style="list-style-type: none"> <li>• Buildings</li> <li>• Equipment</li> <li>• Infrastructure (such as roads, ports, bridges, and waste and water treatment plants)</li> </ul>
Financial	<p>Currency - Shares, bonds, banknotes</p> <p>Crypto currency - Carbon trading, natural capital accounting</p>

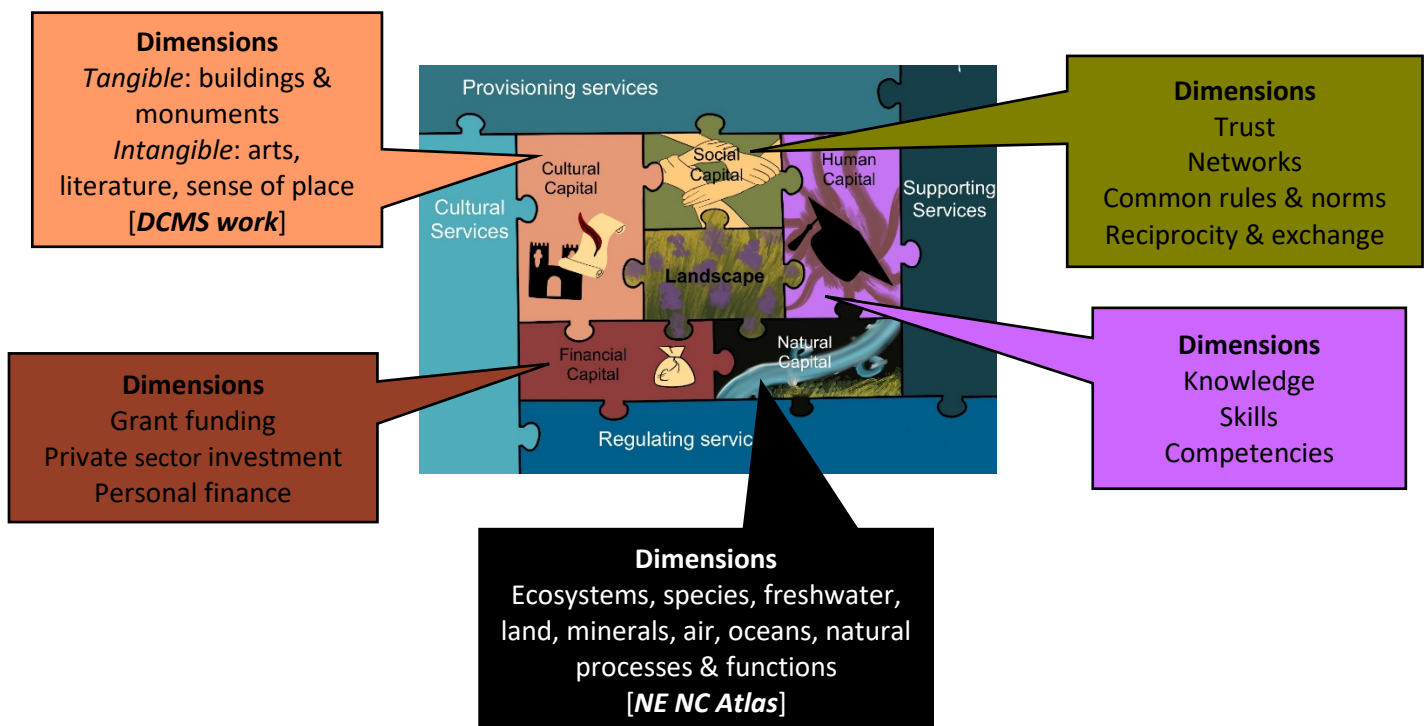
## Recommendation 2 – macroscale conceptual framework

Drawing on a list of recommendations from the critical review of these multiple capital frameworks and a number of more focused conceptual works, a **macroscale conceptual framework** has been proposed, demonstrating how capitals interlink to create landscape. This is shown below:



Using a real case study (Langdale Valley) this overarching framework has then been unpacked to focus in on the **dimensions of the various capitals** present in a landscape.

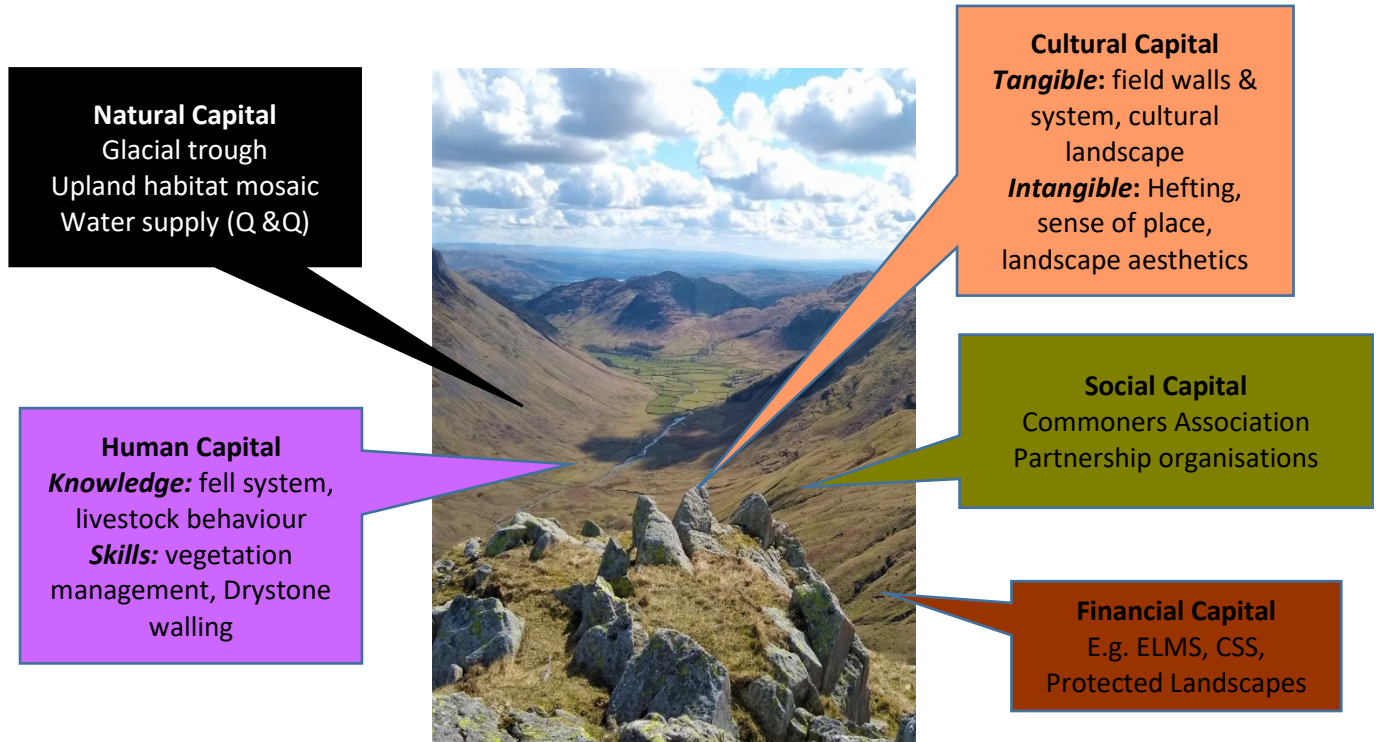
#### Dimensions of capitals in a landscape



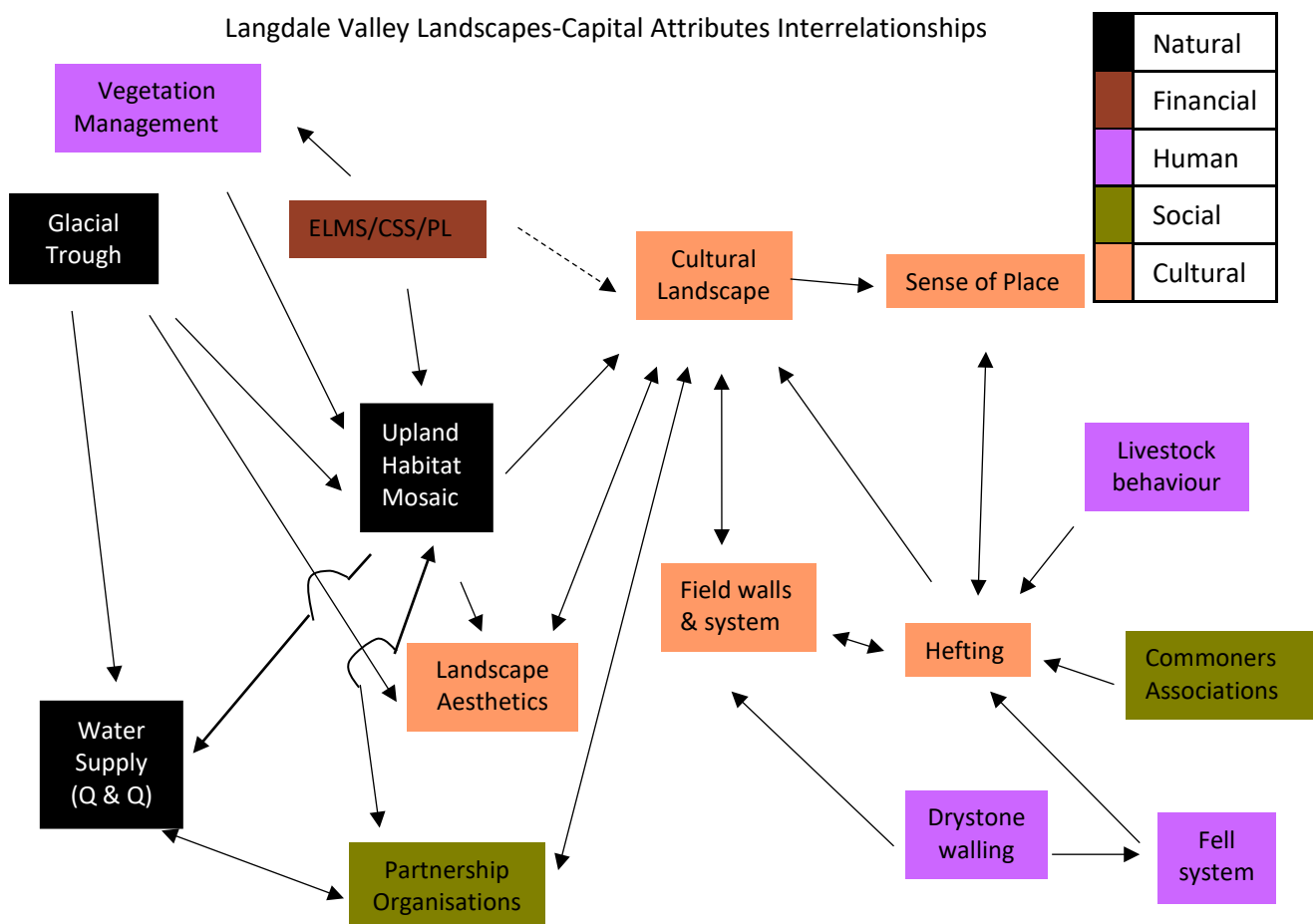
#### Recommendation 3 – Use capital dimensions to identify ‘real’ attributes

These conceptual dimensions were then translated into real structures and processes operating in the Langdale landscape case study, which we have referred to as *attributes*:

## Langdale Valley & Attributes of Capital



From this exercise we built a systems diagram to allow us to understand the inter-relationships between the various capitals' dimensions:



We have used arrows on this diagram in line with systems theory, whereby a line between two items shows they are interrelated. Sometimes we can use a solid line to denote a strong link or a dotted line to record a weaker link (or an indirect one). An arrow is then added to suggest A effects B, with the arrow point nearest to B. A double ended arrow means that A effects B, and B also effects A. Ideally lines/arrows should not cross, but on occasion diagram complexity forces this to occur, at these times a bridge symbol should be used (one tries to avoid this by re-organising the boxes, which can on occasion be impossible).

#### Recommendation 4 – Monitoring Landscape Change

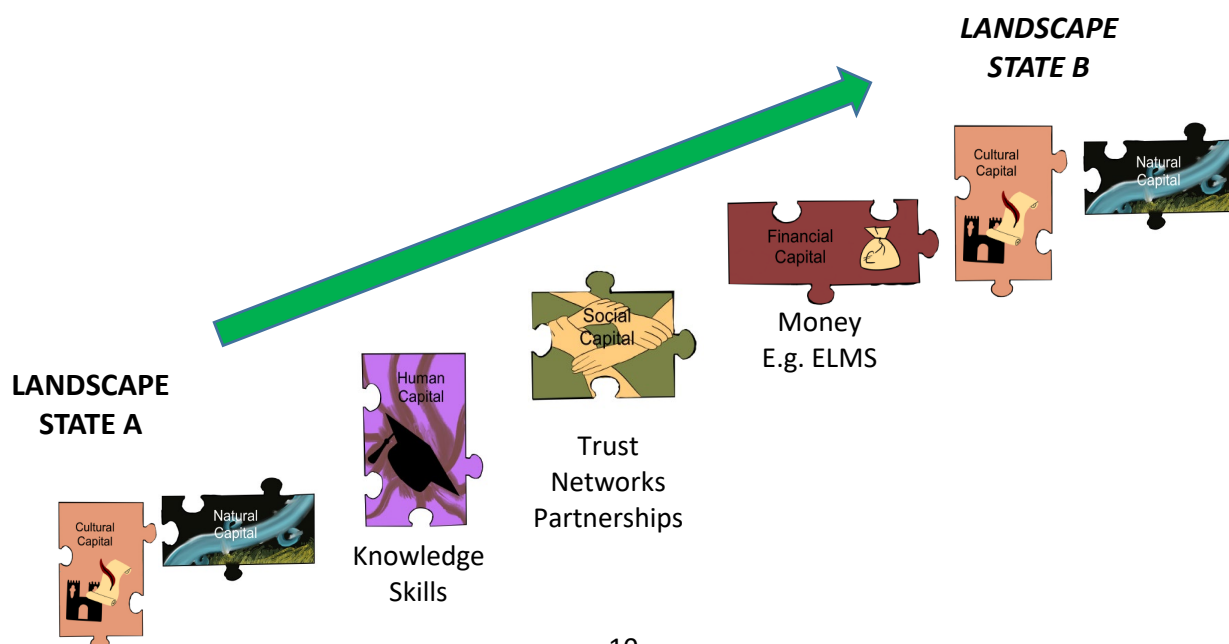
The second application of this landscape-capitals conceptual framework was to apply it to temporal change in landscapes. This provides:

- an understanding the dynamic nature of landscapes which are constantly in flux
- creating a structure to monitor landscape change
- a tool to implement landscape change
- helps in terms of understanding the intricacies of landscape resilience and/or sensitivity to an intervention (good or bad).

The figure below shows the application of temporal development building on the ideas of spiralling upwards advocated by the Community Capitals Framework. The underlying concept here is to suggest how a landscape derived from the nature-culture entanglement can change to a new, more desired state. The ordering of human, then social and then financial has been determined through previous research outlined in this report, its sisters for this consultancy and its application on a landscape scale, where many stakeholders have vested interests.

Arguably there is much thought needed to agree what ‘State B’ should look like (which may emerge from the developing Local Nature Recovery Strategies). Nevertheless, as long as the character of ‘State B’ is understood the application of a landscape-capitals approach can be applied at any geographical or administrative unit scale be that an urban nature reserve, a farm or a catchment. Nevertheless, scaling up brings with it greater complexity and the need for knowledgeable and experienced staff on the ground, or a method (and facilitation ability!) to elicit the information from a range of stakeholders.




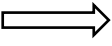


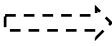

Applying a Landscape-Capitals Framework for Landscape Change



Finally, we considered how we could combine the dimensions (sub-themes of the capitals) and their attributes (a dimension's expression of reality on the ground) and temporal change in a landscape. We suggested THREE ways of expressing temporal change in capital attributes in a landscape, with appropriate symbols:




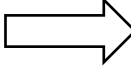

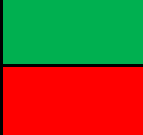
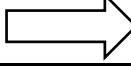

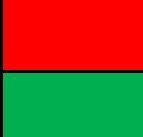
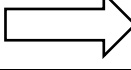

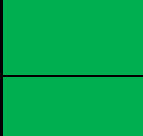
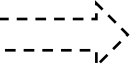

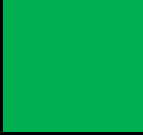



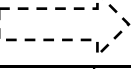

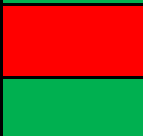


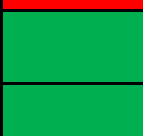


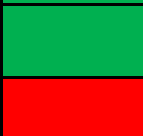
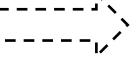





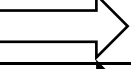

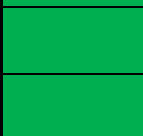





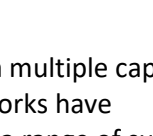
- *Strength* of attribute – the relative importance of the attribute in this landscape
- *Direction* of attribute – whether it is improving, declining or there is no change
- Whether the attribute is *enabling or blocking* the management of the landscape

Expressing temporal Change in Capital Attributes in a Landscape

Strength & Direction of Capital				Enabling or Blocking	
Strength		Direction			
Strong		Improving		Enabling	
Medium		No change		Blocking	
Weak		Decline			

This methodology was then applied to our case study of the Langdale Valley, the results of which are shown over:

# Langdale Valley Landscape: Temporal Change in Capital Attributes

Capital	Dimension	Attribute	Strength	Direction	Enabling or blocking
Natural	Geology/ Topography	Glacial trough			
		Supply Quality			
	Water	Supply Quantity			
		Biodiversity			
Financial		ELMS/CSS			
		Protected Landscapes			
Human	Knowledge	Fell system			
		Livestock behaviour			
	Skills	Vegetation management			
		Drystone walling			
Social	Trust/ Communication/ networks	Commoners associations			
		Partnership working			
Cultural	Tangible	Field walls & systems			
		Cultural landscape			
	Intangible	Hefting			
		Sense of place			
		Landscape Aesthetics			

## Concluding remarks

This paper has critically reviewed a range of conceptual frameworks which employ a multiple capitals approach in relation to the concept of landscape. It is evident that different frameworks have employed different combinations of capitals, defined them differently and included a range of sub-themes (*dimensions*). Thus in this paper, we have attempted to devise a set of **standard definitions** for each capital as well as **confirm their dimensions** (subthemes) in relation to landscape per se.

Drawing on a list of recommendations from the critical review of these multiple capital frameworks and a number of more focused conceptual works, a **macroscale conceptual framework** has been proposed, demonstrating how capitals interlink to create landscape.

Using a real case study, this overarching framework has then been unpacked to focus in on the **dimensions of the various capitals found in a landscape**. These conceptual dimensions were then translated into real structures and processes operating in this landscape, which we have referred to as **attributes**.

We demonstrate how the attributes are interlinked to each other through the **application of a systems approach**. Consequently, showing how one part of a capital if it changes can create a ripple effect across the entire landscape. Drawing from the literature we believe:

- **Landscape Structures** physically manifest themselves through natural and cultural capital
- **Landscape change** occurs through the application of human, then social and finally financial capital consecutively.

We do recognise that these two neat boxes are not as mutually exclusive as it sounds, structures are products of process, and change creates new structures. It is more an entanglement of multiple capitals operating, but in order to manage landscape change, disentanglement is needed to appreciate what are the drivers, causes, symptoms and solutions. Further work is also needed to deepen our understanding specifically of human and social capital as these **drivers**, to bring it into line with our knowledge of natural capital (Natural England's work) and cultural capital (DCMS' work).

The final part of the proposed conceptual framework focused on the temporal nature of landscape, that change is part of its character. In this respect we first considered how employing different types of capital in a logical way crates the conditions to move a landscape from State A to State B. Related to this is the condition of capital attributes in terms of *strength* (importance in a landscape) *direction* of change and whether attributes *block or enable* change. in order to understand a baseline to focus where resource need is required the most. We demonstrated how this can be applied for the case study landscape through local expert knowledge or participative facilitated stakeholder engagement.

Following, Tveit *et al's* (2006) conceptual stages, we can see how the production of a capital's attributes list can then act as the definitive list to devise an appropriate **capitals monitoring indicators** for effective active landscape management.

Lois Mansfield on behalf of the Consultancy consortium, 12/05/2021

# DEVELOPING A LANDSCAPE CAPITALS CONCEPTUAL FRAMEWORK

Prepared by: Lois Mansfield

## 1. Introduction

This (paper) has three aims;

- to review conceptual frameworks related to the five capitals approach
- to recommend a five capitals model appropriate for landscape change
- to suggest a structure to monitor landscape using multiple capitals to relate to the NCEA

The paper will start by briefly explaining what the idea of a conceptual framework and its components. It will then move on to review overarching macroscale frameworks which use the five capitals approach, followed by microscale examples which focus on fewer capitals with regard to landscape. This latter exploration is designed to demonstrate the depth to which individual capitals need or be explored in order to develop a rounded multiple-capitals approach for landscape. It is important to recognise there are very few which explore capitals beyond natural, through the lens of landscape. The final section of this paper will draw on the published literature to recommend a macro/micro-scale capitals conceptual framework for landscape monitoring.

### What is a Conceptual Framework?

Conceptual frameworks, or conceptual models, are designed to summarise the main findings of a literature review, philosophical thought and/or intense research into an organised structure. They can be used either test new ideas in the real world or, act as a culmination of many years of research. Either way they identify the range of variables, which explain or influence the operation of a phenomenon. The 'list' included is not however fool proof and phenomena can be missed, hence the need for an effective literature review to understand the current pool of knowledge about the topic before embarking on the construction of a conceptual framework. Pragmatically, with respect to geographical or ecological thought, conceptual frameworks can be the culmination of many years of work to understand something to answer a particular challenge, such as monitoring landscape change.

Conceptual frameworks generally have the following components:

- Structures – these are themes, concepts or topics, which have tangible physical manifestations in reality, eg. a coppice wood
- Processes – themes, concepts or topics which are intangible attributes of the topic which we cannot touch but we know exist eg the coppicing skill
- Relationships – the interactions, which occur between structures and processes eg the effect of the coppicing on the wood.

Being able to identify and clarify these three components is the heart of a conceptual framework as this will generate the list of 'things' we could to measure. Therefore, as Keane (2016) states:

*'A good framework is considered to be a useful, simplified representation of a system that captures important elements of reality in a way that helps to improve understanding. Implicit in this definition is the idea that multiple 'good' frameworks can co-exist, corresponding to different human conceptualisations of a system.'*

How we examine the 'list of things to measure' is a methodological challenge, which we will return to later at the end of this paper, once we have identified what we believe to be the character of five capitals in landscapes & their dimensions, and devised our conceptual framework.

## **2. Conceptual Frameworks implementing the Five Capitals**

Having understood the broad principles of a conceptual framework and its functions, we will review in this section those designed to explore the five capitals concept. As Flora *et al.* (2004) explain; when resources or assets are invested to create new resources, they become capital.

We learnt in the literature review (paper) that there are various types of capital, which include:

**Natural** - The aspects of the natural environment that provide benefits to people. England's varied natural environment, its ecosystems, geodiversity and landscapes, provides people with a wide range of benefits, upon which human wellbeing depends. These include food, clean water and air, the regulation of climate and hazards such as flooding, thriving wildlife and cultural and spiritual enrichment. (*Natural Capital Atlases, Natural England, 2020*)

**Intellectual** - The value of all the knowledge and ideas of the people in an organization, a society, etc the intangible assets that contribute to a company's bottom line.

**Human** - The knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being. (*OECD 2001*) #

**Social** - The networks of relationships among people who live and work in a particular society, enabling that society to function effectively. Networks together with shared norms, values and understanding that facilitate cooperation within and among groups (*OECD 2001, Capitals coalition*).

**Cultural** - The many and diverse ways people - in a specific geographical and socio-economic context – deal with and influence nature and natural resources. Cultural capital is made up of tangible (building, structures and locations) and intangible (ideas, practices, beliefs, traditions and values) assets.

**Physical/manufactured** - The manufactured physical objects (as distinct from natural physical objects) that are available for use in the production of goods or the provision of services, including: – Buildings – Equipment – Infrastructure (such as roads, ports, bridges, and waste and water treatment plants) Ardisa (2016).

**Financial** - Assets that exist in a form of currency that can be owned or traded, including (but not limited to) shares, bonds and banknotes. (*Forum for the future*)

Whilst these seem clear, it is evident from the literature review and this review below that different researchers and organisations interpret the capitals slightly differently from each other. For example, Selman & Knight (2006) compared to Flora *et al.* (2004). This discrepancy is discussed below in context of the work.



**Key point:** we will need to devise and use a standard set of accepted definitions to help with our chosen methodological approach

Within each of these capitals are various dimensions or attributes (Table 1). There is no consensus regarding these as we have found in the literature review and below in this conceptual framework critique.



**Key point:** we will need to devise and use a standard set of accepted attributes/ dimensions for each of our chosen capitals

The Natural Capital Ecosystem Assessment (NCEA) (2014) in its findings has nested capitals together recognised their importance as an integrated, inter-connected system. Nevertheless, it does this as a series of black boxes (Figure 1). We could place ‘landscape’ in the orange triangle on this diagram, but we could also place other ‘assets’ there such as the National Health Service or a National Park; it all depends on the combination and proportions of capital and how they physically manifest themselves.

**Table 1 – Capitals & their Dimensions**

<b>Capital</b>	<b>Dimensions</b>
Natural	<ul style="list-style-type: none"> <li>• ecosystems</li> <li>• species</li> <li>• freshwater</li> <li>• land</li> <li>• minerals</li> <li>• air</li> <li>• oceans</li> <li>• natural functions and processes</li> <li>• geodiversity</li> <li>• landscapes</li> </ul>
Human	<ul style="list-style-type: none"> <li>• knowledge</li> <li>• skills</li> <li>• tradition</li> <li>• practices</li> <li>• motivations</li> <li>• empathy</li> </ul>
Intellectual	<ul style="list-style-type: none"> <li>• education</li> <li>• life experiences</li> <li>• work experience</li> <li>• relationships</li> <li>• core belief system</li> </ul>
Social	<p>Relations of trust – values and trust</p> <p>Reciprocity and exchange - communication channels</p> <p>Common rules and norms - social norms</p> <p>Connectedness, networks and groups:</p> <ul style="list-style-type: none"> <li>• Bonding – within in communities of interest locally</li> <li>• Bridging – between communities of interest locally</li> <li>• Linking – between communities of interest local to external</li> </ul>
Cultural	<p>Tangible structures</p> <ul style="list-style-type: none"> <li>• buildings,</li> <li>• boundaries and</li> <li>• historic monuments;</li> <li>• contemporary built environment</li> </ul> <p>Intangible activities</p> <ul style="list-style-type: none"> <li>• practices and processes</li> <li>• sense of place/way of life</li> <li>• perception - sight, sound, smell, touch</li> </ul>
Physical/built	<p>Buildings</p> <p>Equipment</p> <p>Infrastructure (such as roads, ports, bridges, and waste and water treatment plants)</p>
Financial	<p>Currency - Shares, bonds, banknotes</p> <p>Carbon trading, natural capital accounting</p>

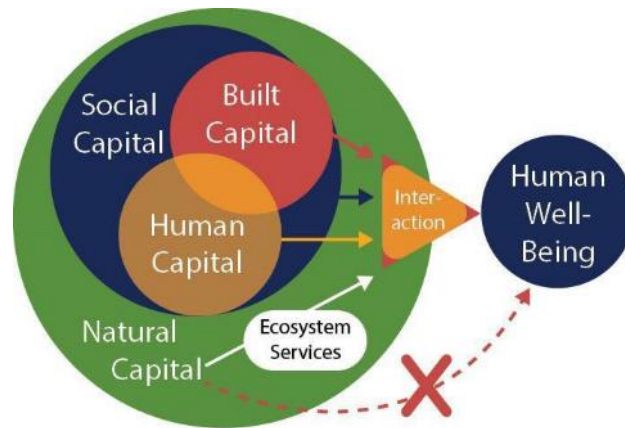
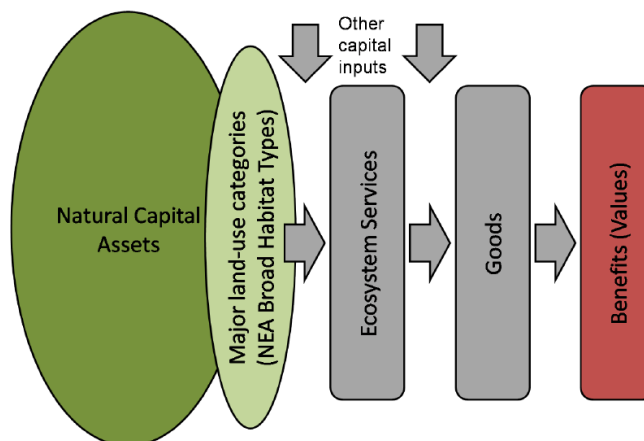


Figure 1 – Natural Capital Ecosystem Assessment conceptual modelling for capital relationships

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This is also true for the Natural Capital Committee’s (2014:7) report, which gave cursory consideration to other forms of capital with regard to the production of ecosystem services (Figure 2).



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Figure 2 – Relationship between Natural Capital, Other capitals and Ecosystem Services

Whilst this has raised the importance and profile of a multiple capitals approach, it does not provide a sound platform for us to unpack and fully understand the interrelationships between these capitals in terms of landscape character, development and change. Nor does it provide for the total measurement, assessment and valuation of landscape. The issue is that Figure 2 lacks any depth or detail, it offers a simply black box solution without unpacking what’s really going on with regard to multiple capitals. It suggests the authors are acknowledging there are others but as not the core of the work this diagram is designed to

address, ie the relationship between natural capital and ecosystem services. This is, in fact, the purpose of what we are presenting here, to unpack the detail.

A further key model is that proposed by Swanwick (2002) which explores the component characteristics of landscape, which is well accepted and embedded into many areas of professional and academic practice. Having said this, we can see from Figure 3 (see over) that Swanwick's model does not include the full spectrum of capitals listed in Table 1 apart from various Natural and Cultural sub themes (called 'dimensions') when we cross reference the two. This is most likely because Swanwick was looking at actual landscape characteristics rather than capitals, which were very much in their infancy conceptually at the time (first mentioned 1999 in a completely different discipline) she developed her ideas.

The task of this paper is to unpack these 'black boxes', to review options and to recommend an appropriate framework for landscape character assessment and monitoring alongside natural capital. We would expect that such a conceptual framework will be able to demonstrate:

- A structure for inventorying multiple capitals
- A process to explore and record relationships (actions and interactions) between capitals (this is addressed below)
- A mechanism to identify weaknesses in the landscape network and thus help focus attention to areas needing of support
- A monitoring and evaluation tool



**Key point:** Swanwick's landscape wheel does not include all capitals and the deficiencies need addressing.

Figure 3 – The Landscape Wheel & its relationship with the key five capitals



		CAPITALS				
	VARIABLES	Natural	Human	Social	Cultural	Financial
Natural	Geology					
	Landform					
	Air & climate					
	Soils					
	Flora & Fauna					
Cultural & Social	Land use					
	Settlement					
	Enclosure					
Perceptual & Aesthetics	Memories					
	Associations					
	References					
	Touch/feel					
	Smells					
	Sounds					
	Sight					

As shown from the range of attributes/dimensions shown in Table 1, the complexity of individual capitals has led to much research and conceptualisation being limited to either one or two types a time. Consequently, there are few studies which conceptualise all five (or more) simultaneously. Often the research or case study combines different combinations of capitals into the work. Financial capital is often left out, although that in itself poses a challenge, for without cash other capitals cannot flourish E.g. Environmental Land Management (ELM) injects money into the system to support public goods, some of which are capitals as well. This does not mean that these single or dual capital conceptual frameworks have no value here, indeed the complexity of capitals shows that deep knowledge of each is needed in order to ensure that all attributes/dimensions of each are measured, monitored and evaluated effectively over time.

Given that this 'proof of concept' contract is focused on the application of the five capitals approach; the review section below focuses on examples that cover at least four in relation to any aspects of the environment that relate directly or indirectly to landscape. One or two-capital frameworks will allow us to delve deeper to validate the various attributes or dimensions to include going forward into the methodology. In other words, building our conceptual framework for landscape for the NCEA will be a two-phased approach:

- Phase 1- Overarching macro level model construction (ie which capitals to include)
- Phase 2 - Micro level analysis of the attributes/dimensions to include

### **3. Critical Review of Conceptual Frameworks Addressing Five Capitals**

Conceptual frameworks, which allude to multiple capitals and landscape, can be drawn from a number of different academic discipline areas and is a strength, as it can provide added understanding to the work. Interestingly, the development of research in the 'five capitals' has occurred simultaneously across these disciplines with different groups of researchers exploring the ideas concurrently. Thus there is no real golden thread of 'ideas development', more a number of parallel tracks to follow and bring together to help us develop our 'capitals-landscape' conceptual framework.

We will begin by reviewing the roots of the capitals conceptual framework by considering the work of Bebbington (1999). Two frameworks have evolved from his work; the *Sustainable Livelihoods Framework* and the subsequent *Community Capitals Framework*. Both of these, as well as Bebbington's work, focus on alleviating rural poverty through natural resource management.

In contrast, conceptual framework research using a Socio-ecological Systems approach developed in parallel from a resource manager's perspective. This has focused on the relationship between ecological systems and people who interact with them at a practical level. The classic manifestation of SES are cultural landscapes, defined by UNESCO (World Heritage Centre) as 'Combined works of nature and humankind, they express a long and intimate relationship between peoples and their natural environment.' They can take three forms internationally;

- defined - designed and created deliberately by 'man'
- evolved - combinations of social, economic, administrative and/or religious factors
- associative - response to religious, artistic or cultural associations.

If we were to apply these forms to the English landscape, the majority are classified as *evolved* cultural landscapes. For example, the English Lake District is an evolved landscape, whereas Stonehenge has a more *associative* form, but still sits within an evolved cultural landscape.

### 3.1 Five Capitals of Bebbington

Bebbington (1999) is credited with introducing a five capitals conceptual framework into the literature where he explored how to overcome rural poverty through its relationship to natural resource management. Bebbington's (*sic.*) underpinning view was that alleviating rural poverty took more than relying on natural resource (natural capital) management;

*'..in a context where peoples livelihoods shift from being directly based on natural resources, to livelihoods based on a range of assets, income sources and product and labor markets. This leads me to consider livelihoods in terms of access to five types of "capital" asset produced, human, natural, social and cultural capital' (p2022).*

His work focused on natural, human, social, produced and cultural capital; in this instance produced capital is defined as 'human made', although he is not really forthcoming about what he means by this. The closest probability is material goods and infrastructure that contribute to the production process but are not part of the output (determined from Tinch *et al.*, 2015). He portrayed his capitals as the points of a five pointed star (Figure 4), which over time has evolved into a pentagon, sometimes referred to as an *assets pentagon* (see Sustainable Livelihoods Framework below, Figure 6). Figure 4 is interesting as it shows Bebbington never intended for the capitals element to be studied in isolation, but to form a wider tool to actively alleviate rural poverty.

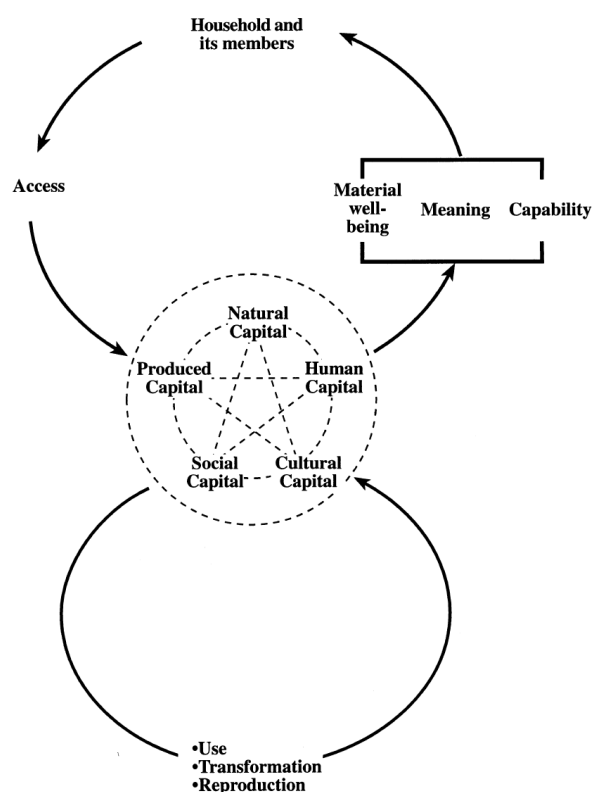


Figure 4 – Bebbington’s Original Conceptual Framework (taken from Bebbington, 1999:2029, Figure 1)



**Key point :** the five capitals framework is an active tool to create change

Bebbington (*sic.*) went on to recognise that conceptual frameworks exploring this relationship need to consider that people’s perceptions of well-being and their life choices & strategies relate to their *ability or capacity to address issues*, in his case poverty. His work explores the character of each of the five capitals using the peasant economy of the Andean region e.g. Chile, Bolivia, Ecuador. Other important ideas he brings to our attention is that first, assets (or capitals) are not just material resources available but the *capability of people to act*. Second, that *access to a range of resources* is crucial, and finally, the economic, political and social structures will impinge upon how a household *relates to other actors* there to help resolve the challenge.



**Key point :** Intangible phenomena are capitals too, such as capability for people to act, access to a range of resources and working in with other actors needs consideration.

The five capitals framework has been used in a number of circumstances as a standalone concept to understand the functioning of various contexts. An example is that of the role community groups for urban conservation in Perth, Australia, as described by Dhakal *et al.*, (2011). They considered financial, physical, social, human and natural capitals of these groups with an eye to working out where the strengths and weaknesses lay in with respect to each capital. From this they hoped it would help in policy development to secure the future of these groups, and thus their role in urban conservation. The research showed financial, human and physical capital were lacking, meaning few conservation goals could be achieved, without considerable inventiveness by the community groups. Another study, conducted by Maack & Davidsdottir (2015) used the same five capitals to see if they could broaden the effectiveness of Cost-Benefit Analysis for renewable energy schemes in Iceland.

Moran *et al.*, (2013) used the five capitals framework to connect measurement indicators at the regional scale to the cumulative impact of mining and pastoralism in the Murray Darling Basin (study area was 256,182 km<sup>2</sup> – twice the size of England). Their capitals included: natural capital divided into non-renewable and renewable; manufactured (engineered); human and social. They looked at each capital as a ‘store’ in turn, in effect an inventory of what was there, and then explored how they changed over time (‘fluxes’). The idea was to try and see if the data available at a regional scale allowed measurement of capital stores and fluxes. [Do not forget their view of regional scale is not the same as ours in the UK!]

Dunford *et al.* (2015) explored the capitals framework to see if could help measure the adaptive capacity of people to climate change. Their modelling focused on FOUR capitals: human; social; manufactured and financial. They created a quantitative index of ‘coping capacity’, which was transformed to a common scale of 0 to 1. They selected two variables to measure for each capital based on the following set of criteria (Dunford *et al.*, 2015):

- Appropriateness – clear conceptual link between variable and capital
- Open access - data were within the public domain
- Statistic independence – low correlation with the other variables selected
- Local scale – relevant to individual not nations
- Fixed assets – stocks not flows or rates
- Detailed resolution – as finer a spatial resolution as could be found

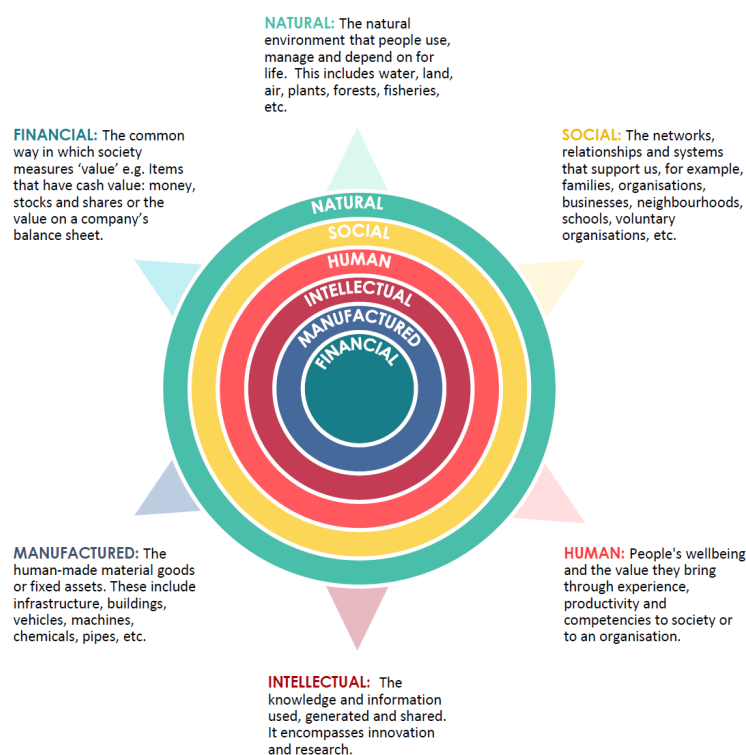
The capital attributes selected were as follows:

1. Human – life expectancy and Tertiary education
2. Social – income inequality and help when threatened

3. Manufactured – transport and produced capital
4. Financial – household income and net household savings rate

Our final example here, is the work of Yorkshire Water (2020), which we have explored as a case study in the literature review, but here we can consider briefly the structure of the framework they have employed for the Land Strategy. Figure 5 shows their application SIX capitals to the priority management of water supply and demand, water attenuation and carbon sequestration; and their secondary goals of a range of public goods and strengthening their brand (p13).

Figure 5 – Yorkshire Water’s Six *Capitals* Framework in their Land Strategy 2020

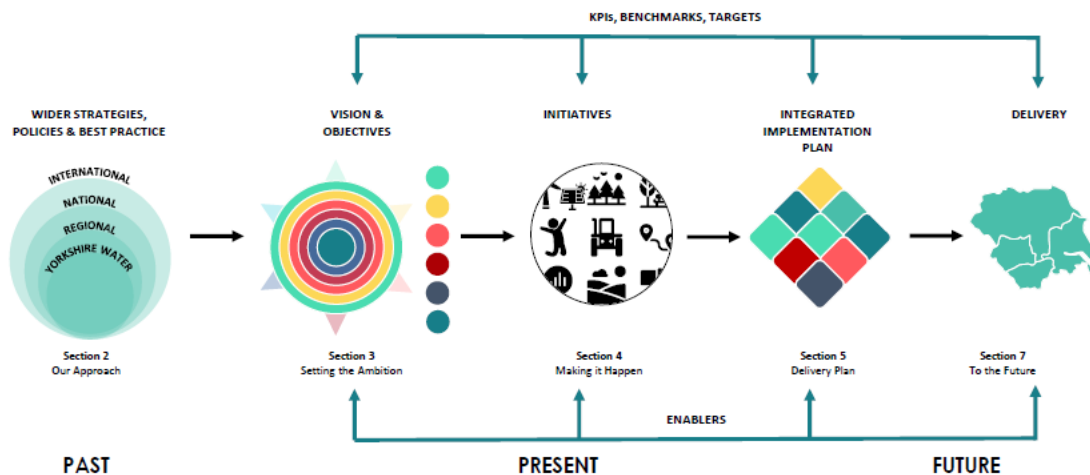


They illustrate it as series of concentric rings recognising some of the capitals as enablers to achieve other capitals, for example, intellectual and human capital. As their Land Strategy outlines, the model is designed to drive the management of their assets in a sustainable way within the limits of the natural environment. They are using the six capitals to:

- Shape their objectives
- Identify ‘high impact’ initiatives
- The ‘enablers’ they need to allow the initiatives to happen eg leadership, money
- Monitor the effectiveness and impact of their work.

The relationship between the six capitals and delivery of their core business is illustrated below in Figure 6. As this model has only just been adopted it is difficult to evaluate its efficacy.

Figure 6 – Yorkshire Water’s Approach to the Future Management of their Business  
(Source: Yorkshire water, 2020:11)



We can see that a range of capitals was used in different environmental contexts and, as a result, different combinations of capitals were deemed appropriate to include in different situations. All of them applied the capitals framework to resolving some form of resource challenge, rather than just inventory in its own right. The work of Tinch *et al.* (2015) is particularly important as they demonstrated how to move from conceptual framework to operational system through a set of selection criteria involving pragmatism.



**Key point:** different environmental challenges need application of different capitals, there is no one solution



**Key point:** monitoring capitals has been used successfully in a range of environmental topics



**Key point:** when selecting capital attributes to create indicators to measure have a set of principles

### 3.2 Sustainable Livelihoods Framework

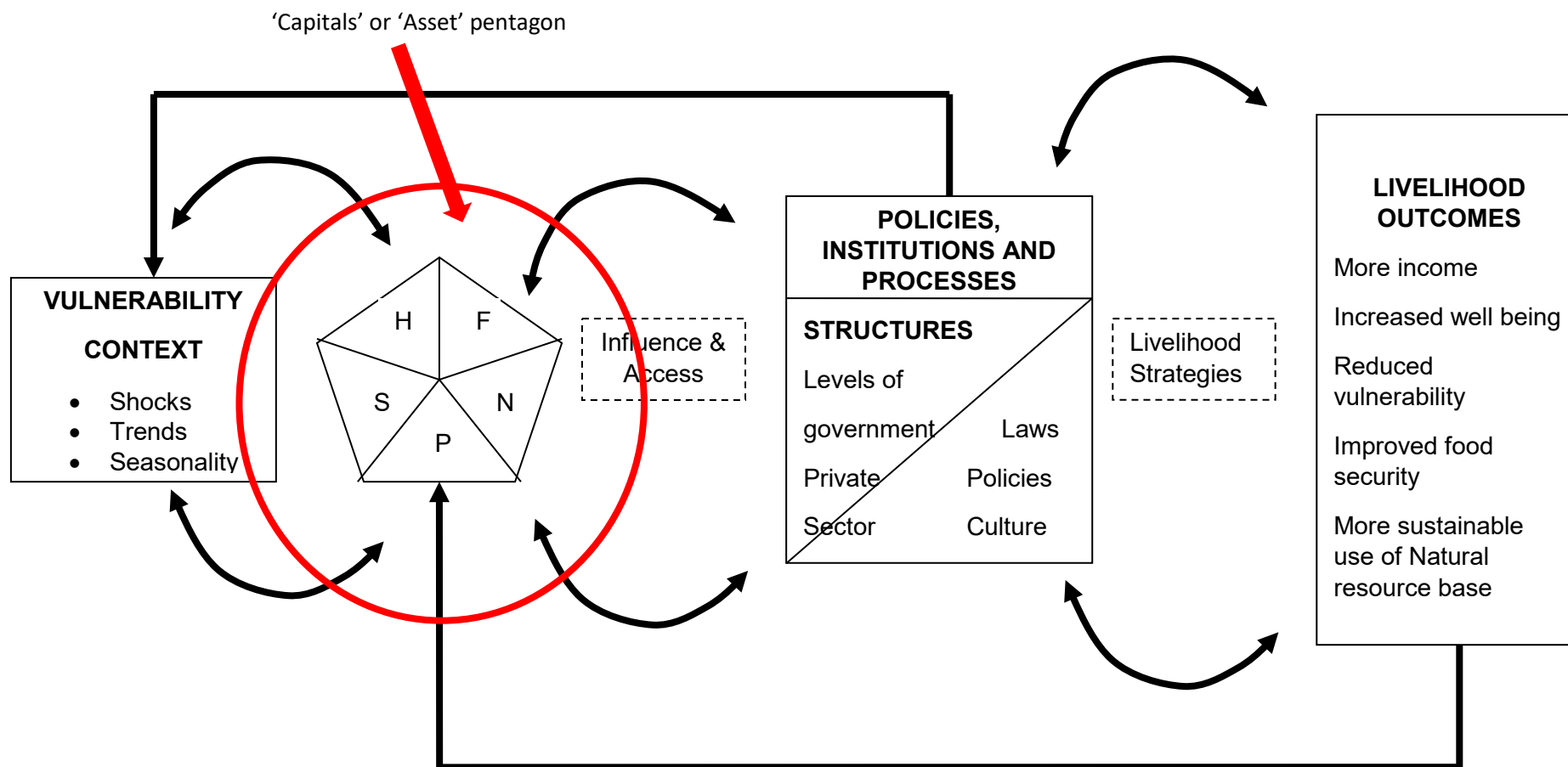
The *Sustainable Livelihoods Framework* (SLF) is probably the most well-known conceptual framework that brings together a range of capitals to resolve a resource challenge using what is referred to as the *Sustainable Livelihoods Approach* (DFID, 1999). Whilst it was designed originally to address the alleviation of rural poverty in the developing world, there are many aspects of the framework that can be applied to the developed world, indeed our earlier reviewed case studies refer to the Peak District (Ponder & Hindley, 2009; Ponder, 2018) and Teesdale (Rose Regeneration, 2012). The framework focuses on the family unit and how this collective can employ the unique combination of capital assets they have, to move away from poverty and make themselves more resilient to change. Capitals included in this model are: financial, human, natural, social and physical.

The underpinning SLA conceptual framework is divided into six areas as shown in Figure 7.

1. **Vulnerabilities:** a mechanism to identify the limiting factors operating. Although every situation will be different, there are general vulnerabilities (external to the phenomenon of study) and constraints (internal to the phenomenon) which limit activity flourishing.
2. **Five capitals :** an analysis of all available capital in relation to the phenomenon. What we are creating here is an *assets pentagon* beyond the traditional views of land, labour and capital extolled by land economists. We are seeking positives here, not negatives.
3. **Influence & Access:** here we are interested in how families can control their own destiny
4. **Power & influence:** constituting policies, institution, processes and structures which
5. **Livelihood strategies:** a range of options farm families find themselves in; ie. accumulating, adapting, coping or surviving. The idea is to move up this list to accumulating.
6. **Livelihood outcomes:** these are specific to the family and are generated through realising different combinations of assets (capitals). The family works to break down the problems, understand their causes and develop solutions.

As we can see, there are several steps to the development of a SLF and consequently there are a number of tools and techniques we can employ at different stages to help manage the process. Good examples that are easy to administer are provided by Oxfam Wales (see <http://policy-practice.oxfam.org.uk/publications/the-sustainable-livelihoods-approach-toolkit-for-wales-297233>; Accessed: 23/03/16).

Figure 7 – Sustainable Livelihoods Approach in relation to Rural Poverty



Adapted from: DFID, 2002. Reproduced under the UK Government Open Licence Agreement v3.

The application of the SLA in the developed world is unusual, but arguably by no means less needed where rural poverty exists as we have shown for the Ponder & Hindley (2009) and Rose Regeneration (2012) case studies earlier. Focusing on just the assets (capitals) pentagon second from the left in Figure 7, we can see from Figure 8 how the *Farming Lives* project in the Peak District helped farming families (Ponder & Hindley, 2009) generate a plethora of assets under each of the different capitals. This is a key component of SLA in that it uses participative action research methods to help draw out the dimensions of the various capitals by working with relevant stakeholders. We will return this later in this paper towards the end when we consider moving from theoretical construct to practical application.



**Key point:** use PAR with stakeholders to shape the dimensions of capital operating in a landscape

Another landscape example comes from the work of Mikulcak *et al.* (2015:255) who considered its use for rural poverty in Central Romania, a hilly area known as Transylvania. They concluded that

*‘financial capital .... cannot be a sufficient instrument for rural development if other systemic barriers are not also over-come. Given the complexity of development barriers and their interactions .... rural development endeavours should take a holistic approach, and aim to foster all capital stocks as well as local capacity.’*

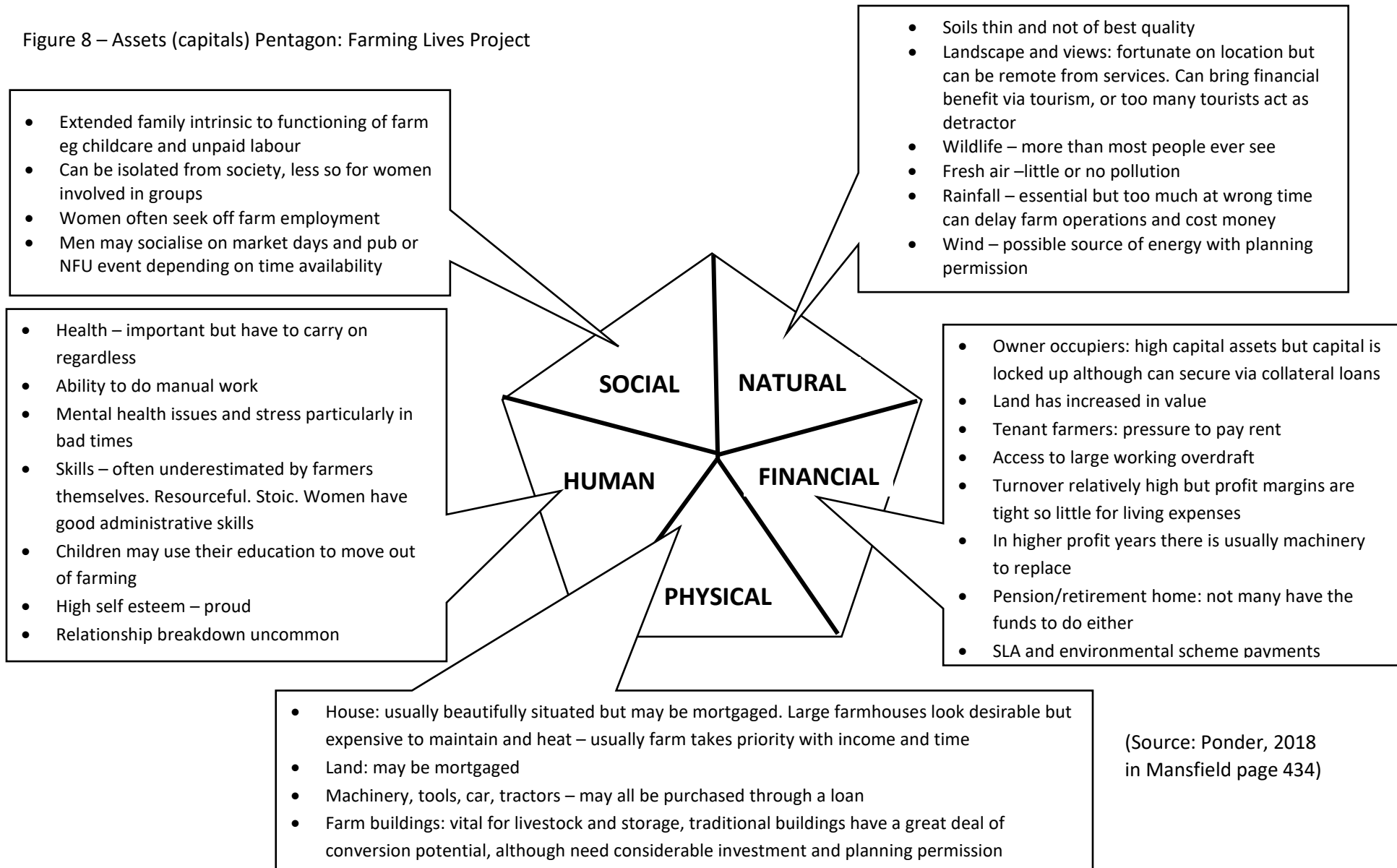
There are few studies considering the SLF relationship with landscape and natural resources directly. Kemkes (2015) explored government-led rural development of ski-tourism zone and commercial forestry in Upper Sveneti (Republic of Georgia) where the local population rely heavily on common pool resources<sup>1</sup> (CPRs) for their livelihoods. The CPRs are generated from the natural capital of the region producing a unique cultural landscape. They found that new government-supported initiatives (economic capital) threaten to cut off people’s access to these CPRs. If this happens, the work showed that it would undermine the population’s interrelationship with landscape and threaten to undermine high cultural capital.

Mansfield (2011, 2018) employed the SLF to conceptualise the capitals and their dimensions operating in an upland/hill farming system. Figure 9 shows the main assets/ dimensions of the capitals operating in this system. Cultural capital was added through additional research demonstrating hill farming

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<sup>1</sup> Common pool resources – another name for common property resources – heavy reliance on social capital to avoid resources been over exploited

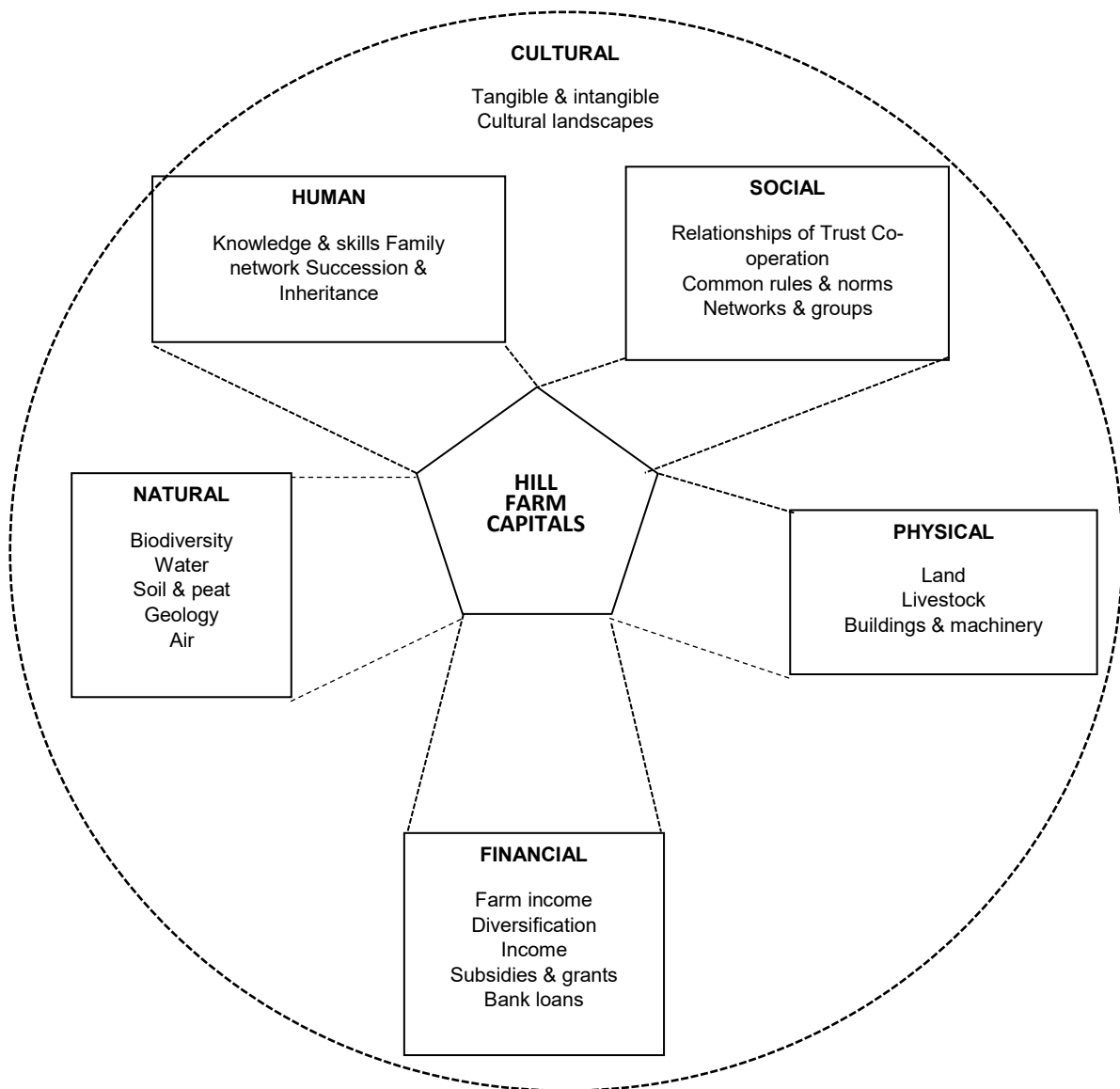
Figure 8 – Assets (capitals) Pentagon: Farming Lives Project



(Source: Ponder, 2018 in Mansfield page 434)

systems produce recognised cultural landscapes in the UK and Japan; moving the tally to six capitals (cultural, financial, human, natural, physical and social).

Figure 9 : The Hill Farm - An Example how Capitals interact with each other



(Source: Mansfield, 2019:22)

Whilst these case studies might seem ‘very’ applied and a step beyond where we are with our NCEA concerns here, they demonstrate that different combinations of capital operate in different locations. Mansfield’s (2011, 2018, 2019) work on hill farming shows all forms of capital are important if this type of landscape is to be perpetuated the same as Romania. For Georgia, financial, natural and cultural were important. In summary, it is the recognition that different combinations of capital are important in different landscape contexts, and it should be the function of natural resource management

therefore, to identify, appraise and provide support to develop the appropriate combinations and proportions in a landscape.



**Key point:** Different combinations and proportions of capital could operate in different landscapes.



**Key point:** there are few conceptual frameworks using SLA to explore landscapes

### 3.3 Communities Capital Framework

The Communities Capital Framework (CCF) is a development from the Sustainable Livelihoods Framework designed by Flora, Flora & Fey (2004). It is an alternative method using a systems approach to reduce poverty through combining it with natural resource management and social equity.

Gutierrez-Montes *et al.*, (2009a) argue that the main differences between the CCF and the SLF are:

- the framework increases the number of capitals analysed to SEVEN
- it focuses on communities as a whole, not just a single family
- It recognises capitals form an upward spiral of prosperity building one on another
- It provides a tool to analyse impacts on systems

We will look at each of these in turn to see what they have to offer to a capitals-landscapes conceptual framework.

The framework uses as its starting point the exploration of what communities have, rather than what they lack, immediately creating positive empowerment rather than a perception of failure. It employs a capitals approach because it helps people see the practical application rather than just an academic exercise in the inventory of resources. In this framework, the resources in a community are divided into three types initially:

- Those to be consumed – used and depleted eg. Crops for food
- Those which can be stored and preserved – no one can use them due to our inability to access them at the current time eg a mineral reserve out of technological reach
- Those that can be invested to create new or more resources – ***these are the capitals.***

Flora *et al.* (2004) see the SEVEN capitals in different ways to other researchers. First, they acknowledge that ‘*natural, cultural and human forms of capital are the basic resources that can be transformed into social, political and financial/ built capital*’ (Flora *et al.*, 2004: 8).

The framework divides the SEVEN capitals into two core groups, which they refer to as FACTORS:

1. Human (intangible) – cultural, human, political and social
2. Material (tangible) – built, financial and natural

Each of the capitals have a series of assets or dimensions accredited to them (Table 2), some of which are of value to the development of a capitals- landscape conceptual framework, and some of which are not. We will discuss this below.

Table 2 – Assets/ Dimensions of Communities Capital Framework

FACTORS	CAPITAL	Assets/Dimensions
<b>HUMAN (intangible)</b>	Cultural	The legacy people pass on in terms of values, symbols, art, language, customs, stories, rituals, world view
	Human	Education, training, medical care, skills, labour force, interpersonal skills, leadership capacities, types of job, health & poverty.
	Political	Government agencies State institutions Laws, by laws and regulations
	Social	How people interact with each other Bonding: individual & groups of same background Bridging: connecting diverse groups
<b>MATERIAL (tangible)</b>	Built	Physical structures: private goods eg building toll goods ie pay to use eg Broadband common-pool goods eg land providing habitat collective goods eg Public RoW
	Financial	Organisations providing money Personal income and wealth
	Natural	Land, water, biodiversity

(Taken from: Flora & Flora, 2006)

Thus, the CCF has a two dimensional matrix feel to it (Figure 10 – see over).

We would like to note at this point, that Flora’s view of financial and built being the same is not the best way of portraying this, particularly in relation to cultural capital. Instead, we (the consultancy team) see cultural capital as a combination of intangible processes and tangible structures (built), as explored Fluck & Hovoak (2007).

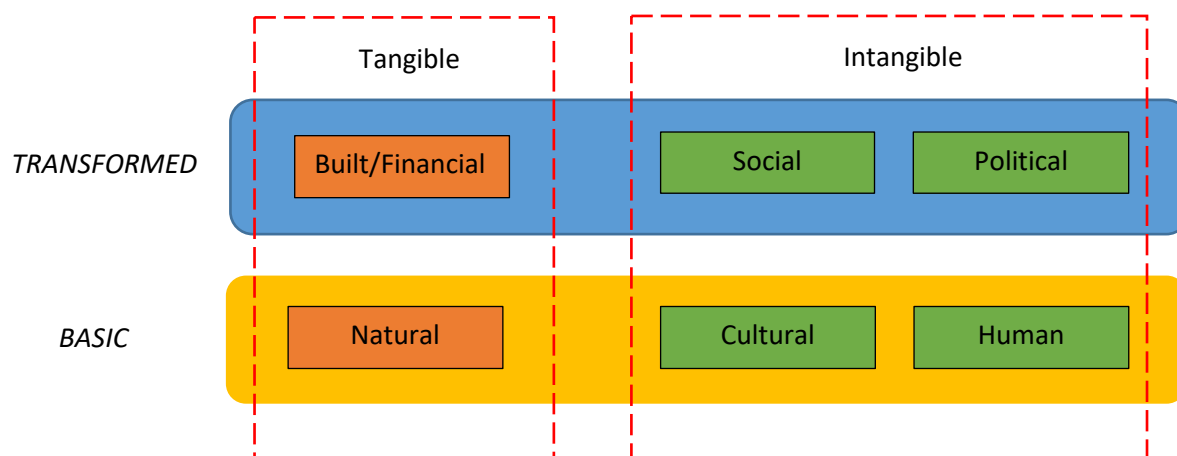


Figure 10 – A conceptualisation of Flora *et al.*'s (2004) Community Capitals Framework

After all, cultural landscapes are a palimpsest construct of many generations determined by the opportunities natural capital in the environment presents to them and conversely through people being responsible for shaping the natural capital through their activities (Meinig, 1979; Norgaard, 1987).



**Key point:** Cultural capital characterisation should contain tangible and intangible components



**Key point:** Tangible cultural capital dimensions should include: private goods, common-pool goods, collective goods, toll goods



**Key point:** Human capital component should include: skills, training (formal and informal), types of job

The second variation of the CCF from the SLF is its focus on communities, not individual families. This immediately places us into a landscape-level context as communities operate over wide geographical areas. Indeed, Flora *et al.* (2004) used many and varied rural US communities to develop their ideas, particularly the Catskill and Delaware water catchments as natural capital examples.

Gutierrez-Montes *et al.* (2009b) later applied the CCF tool to landscape management in Panama. They were interested to understand if CCF could be used for what we in the UK would call 'territorial landscape management' through a participative approach between the stakeholders of a multifunctional area managed by a plethora of different managers and landowners with different

combinations of property rights<sup>2</sup>. It is, in point of fact, the classic UK-wide land management conundrum we face here continuously. They were applying a co-management mechanism between those in control of the property rights (landowners and managers) and those who were external to managing those rights (ie. NGOs, Government Agencies, credit organisations and banks, technical assistance bodies and so on), and facilitate or control developments. These are examples of linking (the former) and bridging (the latter) social capitals. These sorts of developments are considered in the work of Dhakal *et al.*, (2011) when they considered urban conservation community groups, so is applicable in both rural and urban contexts.



**Key point:** collecting linking and bridging social capital information is important

The third variation between CCF and SLA is its upwards spiralling of prosperity as capitals build. Flora & Flora (2006) show this diagrammatically as in Figure 11. *Spiralling up* creates a staged development of different forms of capital one building on the next. In other words, without investment in social capital at the start, there is little hope of improving other capitals. This is mirrored by the work of Emery & Flora (2006), who showed how loss of capital creates a spiralling down effect that as jobs were lost in their case study area (Nebraska, US), population dwindled and that resulted in no transfer of knowledge and skills into the next generation. Another way of looking at this is through the *theory of cumulative causation*; Myrdal (1957) explains this effectively as ‘*the place that loses assets, for whatever reason, will continue to lose them through system effects*’. Thus interdependence, interaction and synergy operating between capitals, can lead to better or worse outcomes (Emery & Flora, 2006). Consequently, spiralling is, in effect, a form of resilience building (see more below on this, with regard to SES).

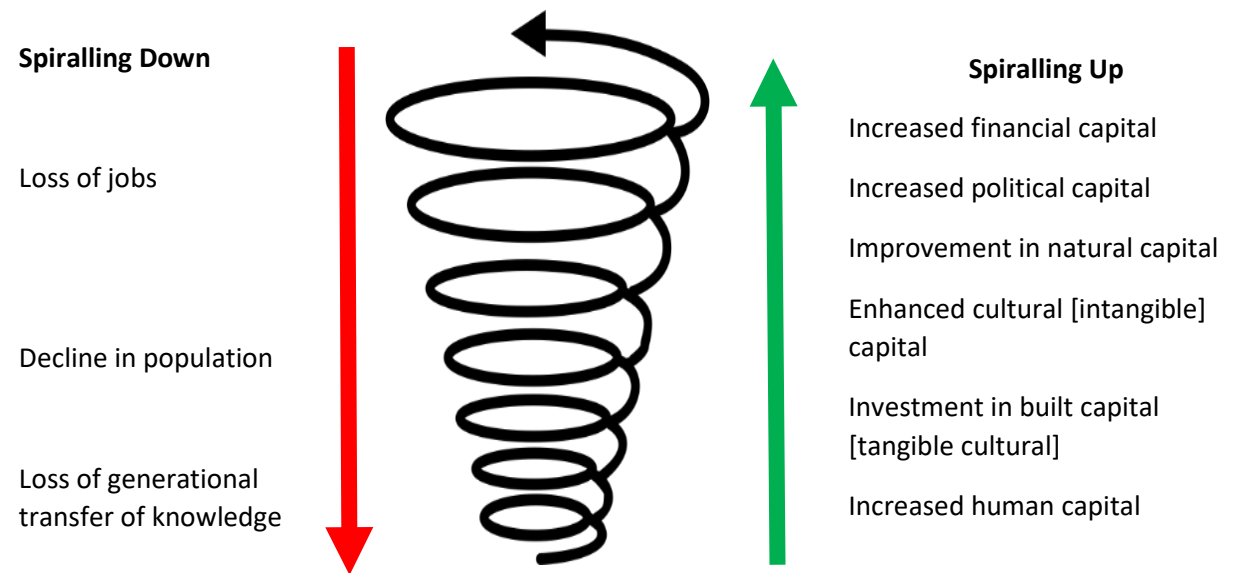
This conceptual model has also been used effectively by Urquijo *et al.* (2020) near Bogota in Colombia, where the team worked with a community to help improve their situation. They were able to demonstrate how ultimately natural capital in the area benefited from being underpinned by other forms of capital supported one after another (Figure 12; Urquijo *et al.*, sic: 37). We could adjust this

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<sup>2</sup> Property Rights – ‘authorised actions pertaining to a resource’ created by *de jure* (the law) or *de facto* (what actually happens in practice due to cultural norms); rights can include: access, withdrawal, management, exclusion or alienation (Schlager & Ostrom, 1992; Quinn *et al.*, 2010).

concept to fit with landscape resilience, so that upwards spiralling represents increased resilience and downwards spiralling, decreasing resilience (see section 4).

Figure 11 –Spiralling: Investment & Disinvestment in community capitals



(Adapted from Flora & Flora 2013:383 and Emery & Flora, 2006:22)

Figure 12 – Upwards Spiralling in Sumapaz, Bogota, Colombia.



Translation LHS (Source: google translate):

#### Community Capital Spiral

In this case, **social capital** is the starting point of the search for autonomy for the Sumapacean peasant families, expressed by solidarity, collective work, reciprocal relations and fraternity, generating an upward spiral with other capitals.

Social capital strengthens and promotes participation in political parties and in second and third level organizations for social mobilization and political advocacy (**political capital**). It also increases **human capital**, rescuing, generating and sharing new knowledge, strengthening capacities, transforming leadership and linking the participation of women and young people.

This has led to the preservation of identity through organizations such as Sumapaceña youth or dance groups, but also, the rescue of ancestral practices through the dialogue of knowledge (**cultural capital**). All this has helped to improve some aspects of the farms of the invitation that with individual work could not have been developed or cost a lot of time, in addition to acquiring machinery such as the motor-cultivator (**physical capital**).

The sale of collective crops, participation in the formulation and execution of projects, savings in external labor costs, the sale of various surplus products from the farm and multiple activities, have generated improvements in financial capital. All of the above, to order the territory and conserve the Sumapaz páramo through the consolidation of ZRC (**natural capital**).

Source: Cortes Urquijo LM., Gutierrez Montes I., Imbach A., Ramirez F, Osorio AA. (2020) 'Alternativas de producción y comercialización desde la agricultura campesina, familiar y comunitaria en Sumapaz, localidad 20 de Bogotá' Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), Bogota, Colombia

['Alternatives for production and marketing from peasant, family and community agriculture in Sumapaz, town 20 of Bogotá. Tropical Agronomic Center for Research and Education]

We can extrapolate this idea of spiralling into an English landscapes context. The example we will use here is countryside estate skills<sup>3</sup> to maintain and enhance field boundary structures. These are learnt formally (an accredited course) or informally (volunteering or through on-the-job participation). In rural areas, high levels of *social capital* (i.e. a large farming & forestry population with the skills to share) needs to be maintained to perpetuate the skill base (*human capital*) over vast areas (equivalent to 39,000 ha; Haines-Young *et al.*, 2003: 270). The skills learnt enable the structures to be created and managed (hedge, wall, fence, coppiced tree line), this maintains or enhances the cultural landscape (*cultural capital*), which in turn provides boundary habitats as travel corridors across a network (*natural capital*). If skills are not passed on, given the enormity of the task, it is highly unlikely that professional biodiversity conservation organisations can keep up with demand, and thus natural capital will decline. For urban areas, the skills base is much more focused to specific geographical locations (Table 3) and either performed by contractors, local authority staff or by volunteer groups (eg. *The Conservation Volunteers*).

Table 3 – The Six Urban Environments with biodiversity value

Urban Environment	Definition
The built & street environment	Verges, urban trees, buildings, churchyards, cemeteries, squares
The domestic system	Household gardens and green spaces around residential areas
The urban servicing complex	Railway embankments, canals, allotments, sewage works, docklands, refuse tips,
Recreation grounds	Public spaces such as parks, sports fields, golf courses
Encapsulated countryside	Countryside surrounded by urban land use through urban expansion of any type
Vacant & Derelict land	Wasteland left over from development activity, spoil heaps, abandoned railway land, demolition sites, pits and quarries, redundant docklands

Source: unknown

Another landscape example of cumulative causation can be seen in relation to hill farming systems and grazing pressure (Figure 13). Mansfield (2014) demonstrates how the reduction of sheep is a pivot point in relation to hefting<sup>4</sup> through conceptual modelling. Either destocking can cause positive or negative effects on natural capital depending on how effective the resultant grazing regime and heft management is.

<sup>3</sup> Countryside estate skills – we include here for reference: hedgelaying, drystone walling, fencing, coppicing etc...

<sup>4</sup> Hefting – the process whereby behavioural instinct encourages sheep to remain on an unfenced area of open fell land. Farmers use this to maintain a flock adjacent to their neighbours on common land.

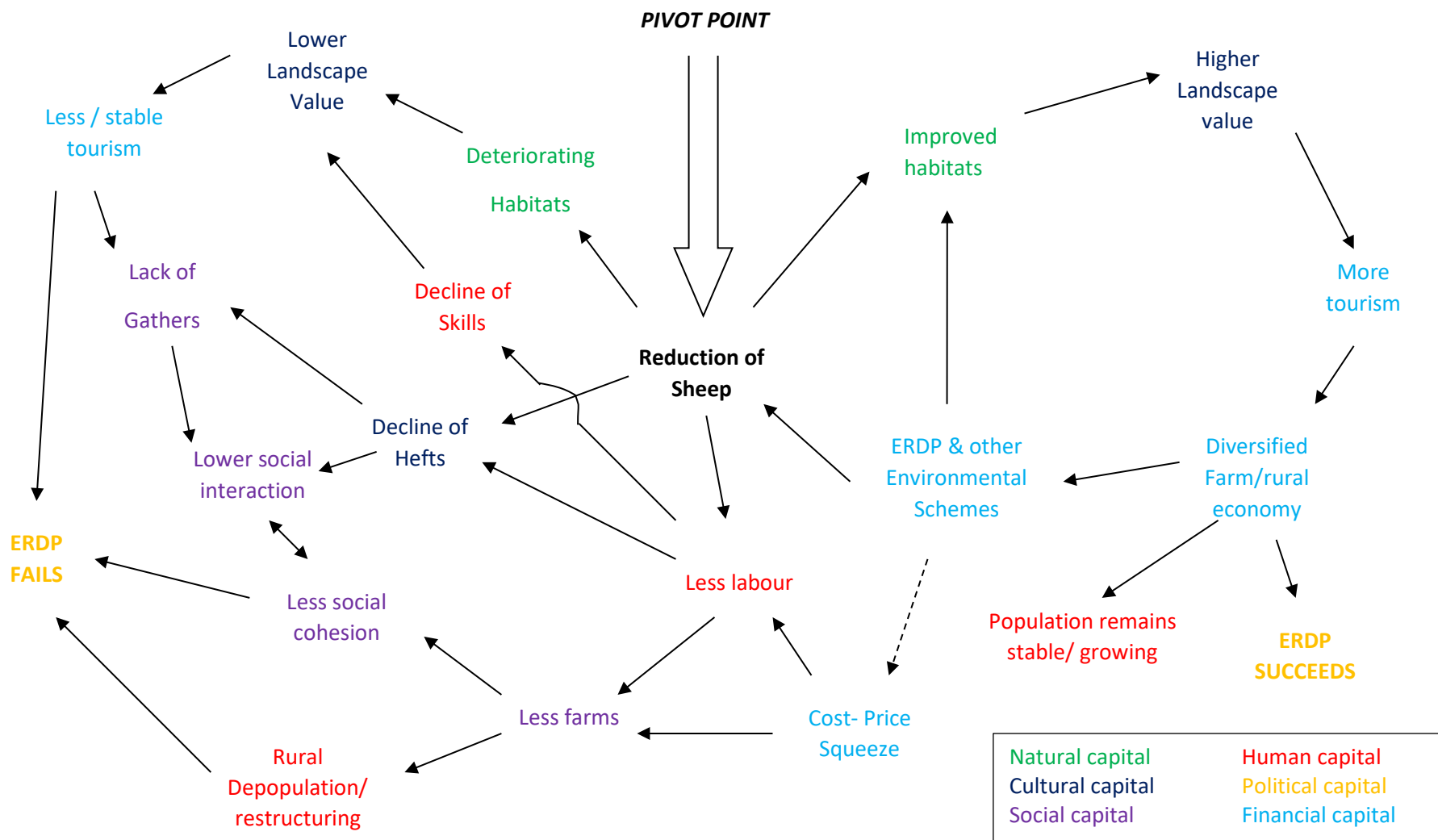


Figure 13 – The relationship between Capitals in Upland Farming Landscapes and ERDP (adapted from Mansfield, 2005; 2014)



**Key point:** employing upwards spiralling will enable us to flush out weaknesses in the production of multiple capitals in landscapes

The final variation between SLF and CCF, is that the latter provides a tool to analyse impacts on systems. Here the framework focuses on the impact from intervention within the different capitals to create tangible changes and second, the relevance of conversation between parties to support recovery (Gutierrez-Montes *et al.*, 2009a). In relation to the Panama case study, they employed a Participative Action Research approach to do this, which used shared ownership between different parties (here local communities and government/civil society officials). Using workshops, questionnaires and focus groups, they devised between the various stakeholders a data collection mechanism, which allowed for common understanding of the land management situation. A series of maps were produced recording land use for the area along with summary tables of various aspects of the capitals. With respect to the last point, SEVEN capitals data were collected by identifying the attributes within each capital, the type of capital invested, the interaction among the capitals and resulting impacts across the capitals (Emery & Flora, 2006).

A similar study conducted in Costa Rica by Bautista-Solis *et al.*, (2012) specifically investigated biological corridors between two protected areas and how they strengthen biodiversity conservation through high levels of social engagement. The case study focused on the Tenorio-Miravelles one of five major corridor initiatives in the country linking Tenorio Volcano National Park with Miravelles Protective Zone. The corridor area constitutes forests and pastureland about 12,500ha with a range of settlements of different sizes. Semi-structured interviews were used with community members to collect capitals data, which was then analysed to tease out the various interactions and interdependencies occurring. Other site-specific data were collected by the interviewers; examples for financial capital being the existence of telephones, health centre, meeting rooms, internet connection and so on. The study found that investing in the SEVEN capitals improved the effectiveness of the biological corridor and its management plan, more specifically investment in human capital. Bautista-Solis *et al.*, concluded (2012: 43):

*‘The sustainable livelihoods approach, complemented by the community capital framework, appears to be an approach with much potential for monitoring and evaluation of biological corridor initiatives in Costa Rica. Its strength is that the analysis framework is holistic, integrated and facilitates the identification of strengths and weaknesses in the resource base that can be used to carry out management adaptive management of a biological corridor.’*



**Key point:** collect information on interdependence, interaction and synergy operating between capitals in landscapes.

### 3.4 Socio-Ecological Systems conceptual frameworks

SES is based on the view that social, economic and biophysical components of system should be studied together if we are to better understand how the environment at large functions (Berkes *et al.*, 2003; Olsson *et al.*, 2004; Folke 2006). It was devised to understand and improve the management of common-pool resources (Ostrom, 2007, 2009). Pivotal to SES is that they are seen as systems with inputs, outputs, stores and throughflows, consequently, SES include resource systems, goods and services to extract, governance systems and users.

A simple way of displaying this as a diagram is given in Figure 14a below (Resilience Alliance, 2007:8 cited in: Wu & Tsai; 2014: 61/62). Fundamentally, it shows the interrelationship between human systems and ecological systems operating through actions and interventions by people, which then derive ecosystem goods and services in return. The research literature relating to SES is vast, but surprisingly there is little addressing the relationship between SES and capitals, or how landscape relates to SES and capitals together (see below).

Taking a stepwise approach, The Resilience Alliance (cited in Wu & Tsai, 2014) conceptualised capitals within SES. They showed that within the human sub-system exists a combination of human, social and physical capital, and natural capital within the ecological system (Figure 14b). Wu & Tsai (sic.) explored this two-layered conceptual framework using coastal and marine environments of the Penghu Archipelago lying off the west coast of Taiwan. They considered Penghu's historical evolution between 1900 and 2010 in relation to coastal fishing, as well as how the two sub -systems of SES adapted and transformed in response to each other. The process worked by charting the evolution of each capital separately, how it responded to the other capitals, and its impact upon them.

Figure 14a – Conceptual Diagram of SES

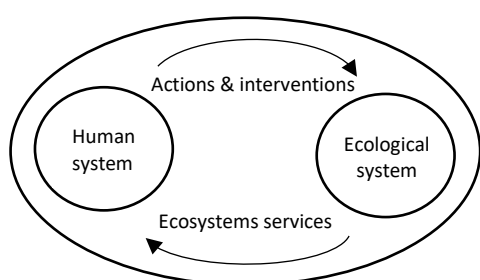
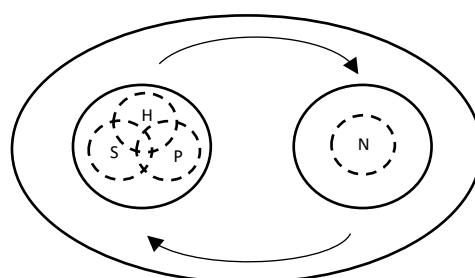


Figure 14b – Addition of capitals into SES



(Adapted from Wu & Tsai, 2014:61/62)

Muhar *et al.*, (2018) added detail to the operation of the interface between the two systems within the general SES conceptual framework. They considered the following were also important:

1. People's world views (as noted already above)
2. Individual and collective views of SES
3. Peoples' personal constructs of nature notably in terms of human-nature relationships, connectedness, place attachment and environmental world views
4. Situational factors – the character of people involved, both individuals and groups, governance arrangements and thematic focus of their activities.

Their corollary was that these four factors came together to influence collective decision-making for natural resource management. Whilst their reference to capitals was implicit, it is evident, based on our earlier literature review that their four key features are aspects of human (1 & 2), social (2 & 4) and cultural capital (3).



**Key point:** Socio-ecological Systems recognise the importance of different capitals.

With respect to landscape, Matthews & Selman (2006) explore another aspect of SES by unpicking the sub-systems within. First they posit that as 'open systems' where material, energy and information flow in and out of them, landscapes are rarely at equilibrium implying that their social, economic and biophysical features are linked through these flows. Furthermore, we, as people, are part of this system just as much as other biodiversity and as a consequence, any management must involve us. They also consider that landscapes cycle through four states like all SES, as suggested by Gunderson & Holling (2001);

Exploitation ( $r$ )	>>>	conservation ( $K$ )	>>>	creative destruction ( $\Omega$ )	>>>	reorganisation ( $\alpha$ )
capital increases		capital accumulates		capital is released		capital available for next cycle

; and then back round again as a type of Mobius loop (Figure 15). The *stored capital* axis represents the potential or size of the system; whereas the *connectedness*, the degree of interdependence between system components.

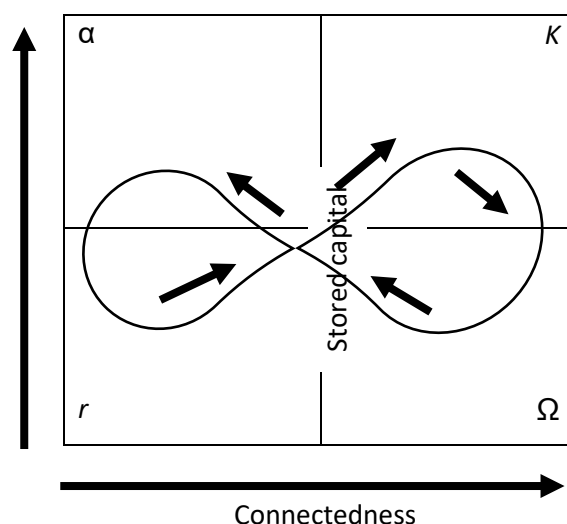


Figure 15 – The Adaptive Cycle as part of Social Ecological Systems  
(adapted from: Matthews & Selman, 2006:202)

Consequently, sub-landscapes, which are parts of a whole landscape, could well be operating at different points in the cycle, which exacerbate conflict. A further complication is that these sub-systems can go through catastrophic or incremental changes, which could disrupt the entire landscape and undermine Natural Capital (Leys, 1997; Gordon *et al.*, 2001). For example, upland peat erosion can impact on biodiversity, lakes systems through sedimentation and cause challenges for potable water supplies; but the landscape can either respond in a sensitive way. Understanding the causes of the peat erosion therefore becomes paramount, not just the natural ones, but those related to human activity, and thus the human and social capital in operation at that location. This then leads us on to consider the ideas of resilience and adaptability in SES.

*Resilience* in a Socio ecological system refers to the ability of the landscape to resist any of these changes; whereas the degree to which the internal components can influence that change, is known as *adaptability*. These two concepts can exist in positive or negative states, the latter enabling desired change and the former blocking desired change. With respect to Natural England, the definition of resilient landscapes and seas are those:

‘capable of absorbing, resisting or recovering from disturbances and damage caused by natural perturbations and human activities, while continuing to meet overall objectives of supporting biodiversity, landscape character, geodiversity and benefits for people. This depends on functioning natural processes and society’s support for sustainable management of the natural environment and cultural heritage. There are situations where the best environmental outcome may be to promote or accept change: our overall commitment to resilience is not intended to preclude this.’ Pasley (section 2:2, 2020)



**Key point:** capitals in sub-landscapes could be at different stages of the adaptive cycle



**Key point:** capital dimensions will enable or block change at a sub-landscape level

Running concurrently to Matthews & Selman (2006) through related RELU work, Selman & Knight (2006: 297) discussed how there is an increasing acceptance that

*‘if we are to produce sustainable landscapes, we need to pursue inter – or trans-disciplinary approaches (Tress & Tress, 2001) that re-connect social and economic entrepreneurship with environmental processes and patterns. In this regard, the multi-faceted phenomenon of ‘landscape’ can be seen as an amalgam of ‘capitals’.*

In this work, Selman and Knight (2006:297) defined the capitals in cultural landscapes as:

- *natural capital*—physical environmental and ecological functions, assets and capacities
- *cultural capital*—the human patina, both physical and associative, on the physical environment;
- *social capital*—networks and organizations that link individuals and groups in reciprocal relations of trading and trust
- *economic capital*—investment that yields products and services, thereby creating wealth and employment.

Furthermore, and more importantly here, they suggested that these cultural landscapes could be undergoing virtuous (accumulating) circles as well as vicious (diminishing) circles of capitals, which reflects the concerns of Emery & Flora (2006) and their upwards/downwards spiralling in the Community Capitals Framework.

Matthews & Selman (2006) expanded the SES relationship with capitals, by expanding the range and considering more dimensions for each:

- *ecological/natural capital* – such as the ‘life support systems’ underlying biodiversity and natural resources
- *built/cultural capital* – such as the structures and land uses that give relative degrees of character to parts of the countryside, and the cultures and traditions associated with particular areas;

- *social/human capital* – such as the networks and institutions that underlie trust and civiness, the potential for social learning within familiar and tangible settings, and levels of education and skills;
- *economic capital* – such as opportunities for the generation of wealth, jobs, business confidence and investment that are associated at least partly with natural and cultural landscape assets.

They identified hypothetical links between these capitals and attempted to show how the links *might* work in reality for a cultural landscape (see Figure 16; adapted from Selman & Knight by Matthews & Selman, 2006).

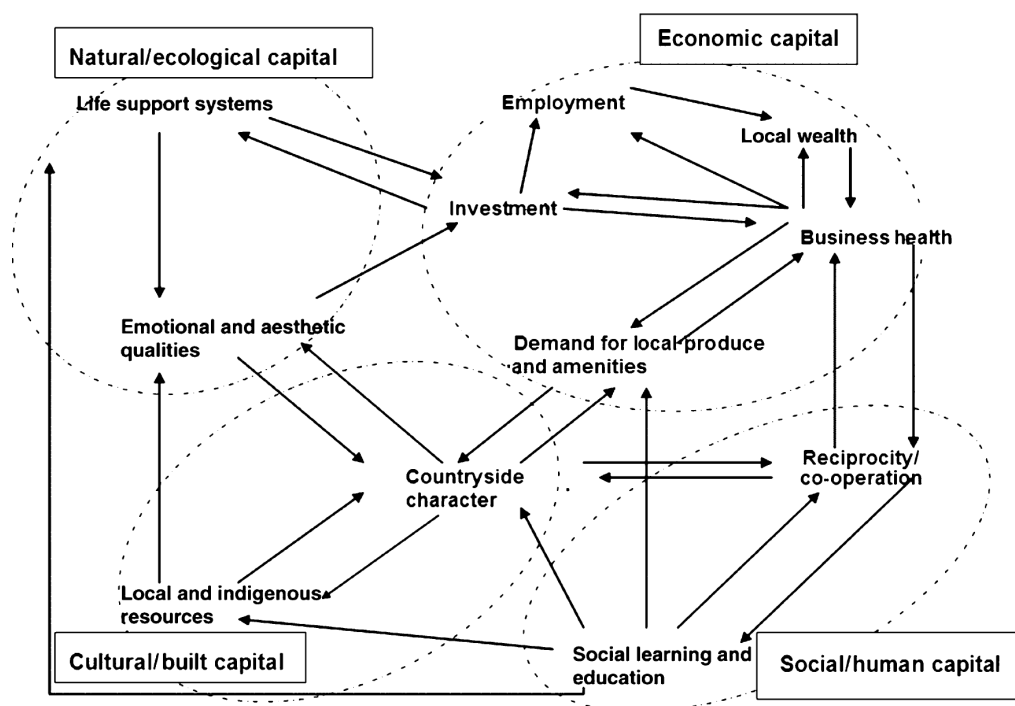


Figure 13 – Selman & Knight's conceptual framework adapted by Matthews & Selman (2006: 205)

Matthews & Selman (2006) work is interesting as it emphasises the role of the many capitals in the production of countryside character (cf. landscape), but furthermore in that they acknowledge the need to be taken into account to measure the nature, strength and direction of these links.



**Key point:** Design measures that clearly show nature, strength and direction of capitals linkages.

Matthews & Selmans' (2006) work added to the dimensions of human/ social capital important for landscape maintenance. These included: individual variations in people; social influences from others; formal (rules, laws constitutions); informal (norms of behaviour, conventions, self-imposed codes of conduct); enforcement of these formal and informal features, and social networks. [Although actually these are all social capital dimensions, NOT human!]. They further demonstrated that access to and use of economic capital would be shaped by all of these features, meaning that it was highly unlikely that a land manager/owner would make the most rationally-economic decision for the use of a piece of land. This is a well-understood and investigated concept by economic and rural geographers since the 1950s and 60s and pivotal in the adoption of agri-environment schemes for many UK farmers (See Mansfield, 2011, chapter 7 for a summary).

### 3.5 Summary of Key Points

The following box summarises the key points we have learnt from this review of macroscale conceptual framework in relation to multiple capitals and landscape. They can be divided into two main blocks, those which aid in our development of a conceptual framework and those we can take forward to help with moving theory into practice (ie conceptual framework to field data collection options).

- Devise and use a standard set of accepted definitions to help with our chosen methodological approach
- Devise and use a standard set of accepted attributes/dimensions for each of our chosen capitals
- Provide a capitals framework that includes resource appraisal as well as resource development in line with the standard resource management process.
- The five capitals framework is an active tool to create change
- Intangible phenomena are capitals too, such as capability for people to act, access to a range of resources and working in with other actors needs consideration.
- Different environmental challenges need application of different capitals, there is no one solution
- Monitoring capitals has been used successfully in a range of environmental topics
- When selecting capital attributes to create indicators to measure have a set of principles
- Use PAR with stakeholders to shape the dimensions of capital operating in a landscape
- Different combinations and proportions of capital could operate in different landscapes
- There are few conceptual frameworks using SLA only to explore landscapes
- Cultural capital characterisation should contain tangible and intangible components
- Tangible cultural capital dimensions should include: private goods, common-pool goods, collective goods, tool goods
- Human capital component should include: skills, training (formal and informal), types of job
- Collecting linking and bridging social capital information is important
- Employing upwards spiralling will enable us to flush out weaknesses in the production of natural capital in landscapes
- Collect information about interdependence, interaction and synergy operating between capitals in landscapes.
- Socio-ecological systems recognise the importance of different capitals.
- Capitals in sub-landscapes could be at different stages of the adaptive cycle
- Capital dimensions will enable or block change at a sub-landscape level
- Design measures that clearly show nature, strength and direction of capitals linkages.

The latter will be picked up towards the end of this paper when we outline how we believe we can move from theory to practice. In this section we will summarise the key elements we need to adopt in a 'multi-capitals landscape' conceptual framework.

### 3.6 Critical Review Summary – Macroscale Capitals Conceptual framework

There are three overarching conclusions we can draw from the review above:

- There are no frameworks to draw upon directly with respect to landscape, but those critiqued here have aspects of value for landscape character monitoring and latterly NCEA.
- Landscape is a product of multiple capitals
- Capitals support the development of each other

Key features to consider during construction of our capitals-landscape conceptual framework are: definitions and dimensions of capitals; the function of the conceptual framework and the value of upwards spiralling; the components to include in such a framework, and the relationships between capitals in landscapes and their sub-components.

#### ***Definitions and dimensions of capitals***

We recommend that we devise and use standard set of accepted definitions of each of the capitals, we have addressed this in the Literature Review paper. Second, within each capital are a number of components which we will refer to that attributes. Building on those attributes listed in the Literature Review (Table 1), we can add from our conceptual framework review the following as important for landscape (Table 4) :

- *Social* – bridging, linking and bonding, networks, organisations, membership
- *Human* - skills, training (formal and informal), types of job, social learning
- *Cultural* – tangible structures (private goods, common-pool goods, collective goods, tool goods) and intangible processes

These inclusions lead us to recommend, ***intellectual and human are merged*** as both relate to the development of an individual's capacity to learn.

#### ***Function of Conceptual Framework***

Our conceptual framework should be a tool to elicit change, *not just to measure and monitor change*. In other words, we recommend that the conceptual framework should address both components of resource management ie appraisal and development. It should be constructed in such a way as to employ upwards spiralling, showing how investing in different capitals can increase the value of the target; in this case better quality landscape and all its multi-functional benefits and related ecosystem services. This moves the concept of virtuous circles proposed by Selman & Knight (2006) into the accumulation of capitals in a particular order which should most effectively deliver what we want

depending on resource allocation. For landscape, this allows us to contemplate the building of resilience.

Table 4 – Updated capitals dimensions from conceptual framework review

Capital	Dimensions
Natural	<ul style="list-style-type: none"> <li>• ecosystems</li> <li>• species</li> <li>• freshwater</li> <li>• land</li> <li>• minerals</li> <li>• air</li> <li>• oceans</li> <li>• natural functions and processes</li> <li>• geodiversity</li> <li>• landscapes</li> </ul>
Human	<ul style="list-style-type: none"> <li>• education (formal and informal)</li> <li>• knowledge, skills &amp; work experience</li> <li>• tradition &amp; core belief systems</li> <li>• practices</li> <li>• motivations</li> <li>• empathy</li> <li>• life experiences</li> <li>• relationships &amp; social learning</li> </ul>
Social	<p>Relations of trust – values and trust, <b>organisations</b></p> <p>Reciprocity and exchange - communication channels, <b>membership</b></p> <p>Common rules and norms - social norms</p> <p>Connectedness, networks and groups:</p> <ul style="list-style-type: none"> <li>• Bonding – within in communities of interest locally</li> <li>• Bridging – between communities of interest locally</li> <li>• Linking – between communities of interest local to external</li> </ul>
Cultural	<p>Tangible structures</p> <ul style="list-style-type: none"> <li>• <b>private goods</b></li> <li>• <b>common-pool goods</b></li> <li>• <b>collective goods</b></li> <li>• <b>tool goods</b></li> <li>• buildings,</li> <li>• boundaries and</li> <li>• historic monuments;</li> <li>• contemporary built environment</li> </ul> <p>Intangible activities</p> <ul style="list-style-type: none"> <li>• practices and processes</li> <li>• sense of place/way of life</li> <li>• perception - sight, sound, smell, touch</li> </ul>
<b>Contemporary</b> <b>Physical</b>	<p>Buildings</p> <p>Equipment</p> <p>Infrastructure (such as roads, ports, bridges, and waste and water treatment plants)</p>
Financial	<p>Currency - Shares, bonds, banknotes</p> <p>Carbon trading, natural capital accounting</p>

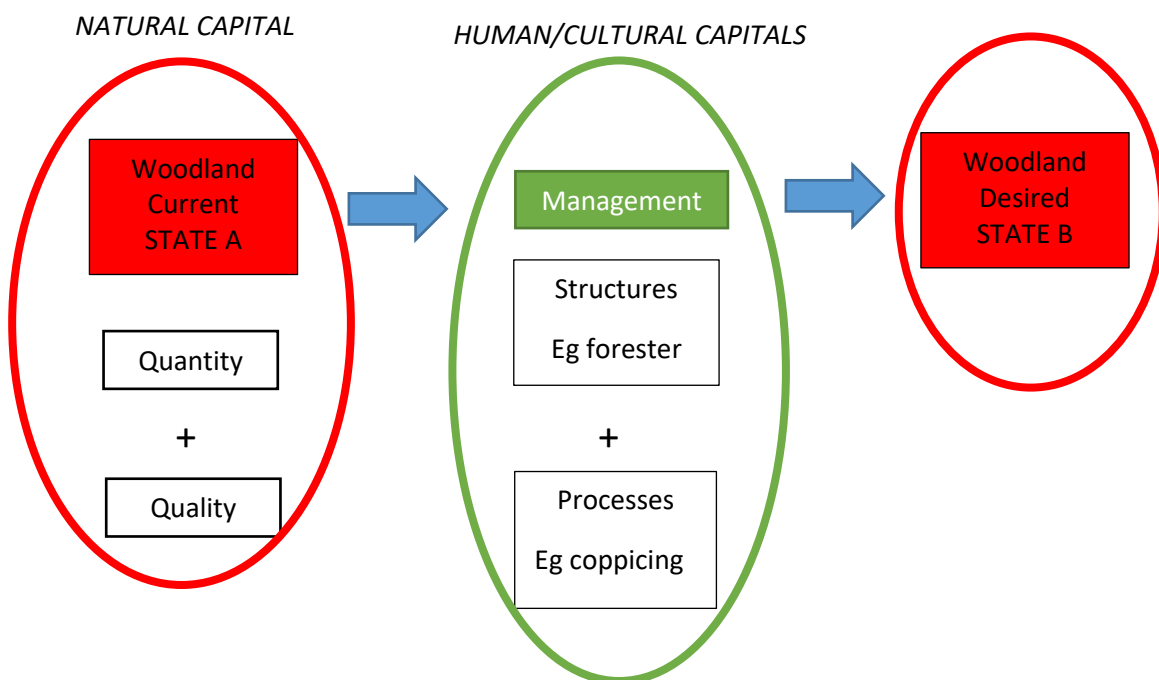
### Components of the Conceptual framework

As outlined at the beginning of this paper, a conceptual framework should include:

- Structures – these are themes, concepts or topics, which have tangible physical manifestations in reality, e.g. a coppice wood
- Processes – themes, concepts or topics which are intangible attributes of the topic which we cannot touch but we know exist e.g. the coppicing skill
- Relationships – the interactions, which occur between structures and processes e.g. the effect of the coppicing on the wood.

We have considered our structures and processes in the previous point in terms of the capitals and dimensions of these. The third element we need to explore is the ‘relational’ part. It is the element which moves the conceptual framework from being a descriptive, passive tool to one which is analytical and active, enabling change. For example, Figure 17 shows a woodland changing over time. The structural element would be the woodland (*NATURAL CAPITAL*) and typically we measure this via quantity and quality (STATE A). A relational element would be the management operating in the woodland which influences quantity and quality. That relational element is made up structures (tangible things such as a forester) and processes (practices and activities, e.g. coppicing) which lead to change (STATE B). The relational element, management, is a combination therefore, of *HUMAN CAPITAL* (person, knowledge & skill ability) with some *CULTURAL CAPITAL* (*traditional coppicing skills*).

Figure 17 – Changing the natural capital of a Woodland



We can then assess what is the nature, strength and direction our capitals are travelling in to determine whether what's happening will give us the end point we desire (Woodland STATE B). Is the human & cultural capital invested in the woodland's management going to get us to STATE B? For the three components our options could be :

- Nature - how the capital manifests itself in reality
- Strength – the importance of this capital in this landscape
- Direction – improving, no change, declining

The benefit of this assessment is that it will help us identify enabling or blocking change behaviour. Enabling behaviour, we would want to support and encourage more of that. Blocking behaviour, what is going wrong, and what can we do about it to turn into enabling behaviour by using the capitals we have at our disposal, or in fact need to inject into the situation. Identifying what is creating enabling behaviour allows us to replicate it to stop the blocking behaviour.

We could then move this down a scale into the dimensions of capitals operating to bring about the change in state of the woodland. Thus our second step would be to build in an understanding of the nature, strength & direction of the various dimensions of the capitals operating in our woodland. Such complexity whilst we can appreciate it superficially, needs a lot more critical thought for that landscape and is outside the scope of this report.

It could be argued, for both capitals and their dimensions, that such relational measurement is highly subjective. How do we know when social capital is eroding? What do we look for? When has it reached critical? And more importantly, how do we reverse its decline? Admittedly, for some capitals and their dimensions this is less likely to be in this situation where objective measurement exists. An example here would be the input of financial capital, even with regards to developing methodologies for natural capital accounting which at least are in development. Nevertheless, injecting money does not necessarily lead to desired output as has been demonstrated by the long history agri-environment payments.

### ***Relationships between capitals for landscapes & sub-landscapes***

Both the literature review and conceptual framework review suggest that combinations and proportions of capitals will vary from one landscape to another, and one sub-landscape to another. In other words, every landscape or sub-landscape is a unique product and if we want to improve it, we need to understand the capitals operating in that area. It may be there are common capitals operating across all landscapes e.g. the financial capitals input of ELM. [The proviso here is that we know that the amount can vary from place to place, and that amount may be the right amount, too much or too little

in the context of that landscape, which means we need to invest in different amounts]. For example, we already know this answer for elements of natural capital - how much money we need to restore a peat bog. Nevertheless, we don't know the investment need for other types of capital. For example, how much will it cost to train these farmers to do X in this valley to get Y outcome?

To complicate matters, the sub-landscapes within a larger territorial landscape unit such as a National Character Area (NCA) can all be at different points in the journey. Some will be in better condition than others, and also have different combinations of capital operating. This is where good quality human and social capital become central, the ability to spot the challenge, and apply the right management to rectify it without destabilising the other capitals operating in the sub-landscape.



**Key point:** A macroscale multiple-capitals landscape conceptual framework should include the following capitals:

- Natural, human, social, cultural and financial



**Key point:** the conceptual framework should include:

- Structures – tangible dimensions of capitals
- Processes – intangible dimensions of capitals
- Relationships – showing how processes and structures are interrelated and direction and strength of change

Whilst this sets us up to develop an overarching multi-capitals landscape conceptual framework, we do need to explore in some detail a few key examples which have explored some of the inner workings of these capitals in terms of their dimensions. The examples we have chosen do not contain all the capitals we think should be captured. There are three reasons for this;

- 1) No conceptual framework for landscape exists to cover everything we have discussed above
- 2) These studies are chosen to demonstrate the complexity that exists for some of the less well understood capitals and thus why researchers have not looked at more than one or two capitals
- 3) To give us a mechanism to move from theory to practice in terms of landscape change monitoring and management

### 3.7 Micro scale studies

This section explores five examples of the application of different combinations of capitals to various aspects of landscape. They are not all encompassing, as this does not exist, hence this initial short contract to explore 'proof of concept'. The examples investigate different aspects of a capitals approach for different reasons:

- conversion of theory to practice - not the visual content
- use of statistical modelling to measure capital
- measurement of human and social capital – this example uses agri-environment schemes, but one of the few studies to tackle human capital, despite the mis-labelling of a lot of it
- measurement of social capitals beyond networks – networks is the most researched aspect of social capital
- cultural capital dimensions & valuation – various examples

#### 3.7.1 Example 1 – *Conversion of theory into practice*

Tveit *et al.* (2006) were interested to investigate how visual landscape character could be analysed. They outlined how analysis of the visual aspects of landscape has over the years fallen into two main camps: those devised by 'experts' where landscape characterisation is seen as the object of scrutiny, and a 'subjectivist' style where the focus has been on the viewer's experience of landscape. They saw merit in both, citing three examples of which the Landscape Character Assessment (i.e. Swanwick, 2002) was one. The challenge is the reliance on fieldwork to collect the underlying data, which makes monitoring more difficult and costly, so they set out to devise a system, which used readily available data.

They conducted an extensive literature review (over 130 pieces of research & other literature), which created a list of nine visual concepts: stewardship, coherence, disturbance, historicity, visual scale, imageability, complexity, naturalness and ephemera (defined in Table 5). Each of these were considered important elements of landscapes, with visual quality being a combination of them all to differing degrees within each landscape. Whilst landscapes can be seen as constructs of structure, function and value, this study focused on the first of these only. Whilst therefore not complete for our needs, it does nevertheless provide a process to develop for the different capitals.

Table 5 – Definitions of visual concepts

Visual concept	Definition
Stewardship	Sense of order and care, contributing to a perceived 'ideal' situation. Human activity through active management.
Coherence	Unity of the scene through repetition of colour and texture
Disturbance	Lack of contextual fit with features deviating from the context.
Historicity	Historical continuity [from the landscape palimpsest <sup>5</sup> ] and richness relating to amount, condition and diversity of cultural elements
Visual scale	Visual quality through the idea of 'landscape rooms' and landscape preference.
Imageability	Qualities of the landscape present in totality or through elements, landmarks and special (natural & cultural) features which make landscapes distinguishable and memorable
Complexity	Diversity and richness of landscape elements and features.
Naturalness	Closeness to a perceived natural state
Ephemera	Elements and land cover types changing with season or weather

(Taken from: Tveit *et al.*, 2006: 238-246)

From their work they devised a four level framework which allowed them to move from overall concept through landscape attributes to visual indicators with suggestions as to how to map and quantify them (Figure 18). They referred to this as 'abstraction'. The details of these four levels are in Table 6 and an example of this abstraction process is as follows:

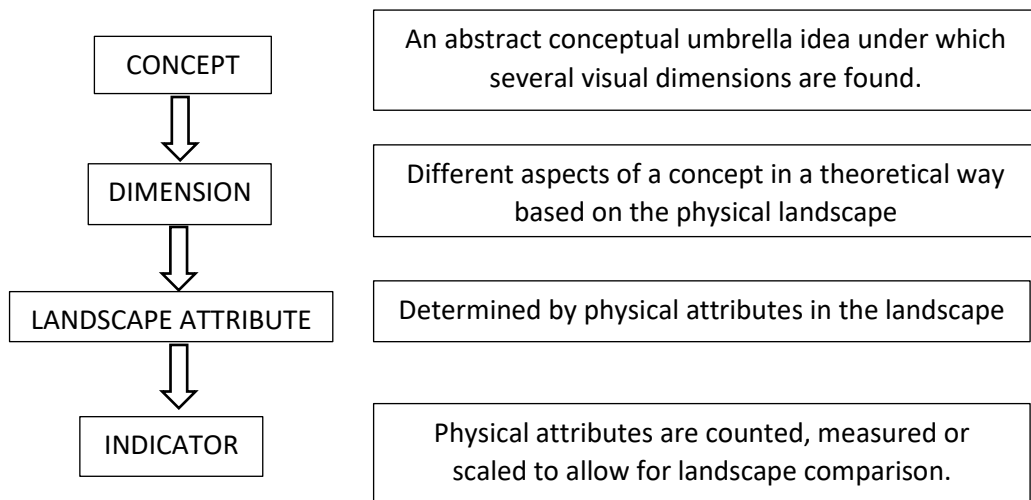
- *Concept* – Historicity – the definition of which was derived from their review of the literature examining this area
- *Dimension* – they then looked at Historicity and created a list of theoretical ideas which represented parts of historicity. In this case the literature suggested continuity (temporal layers) and richness (range of phenomena).
- *Landscape attribute* – they then took each dimension and worked out how it could be actually physically represented in the landscape. In this case, they found visible time layers [the landscape palimpsest], cultural elements and traditional agricultural structures.
- *Indicator* – the final stage was to explore how they could count and measure the different attributes and how what they found could be scaled up to cover an entire landscape unit.

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<sup>5</sup> Palimpsest – the cost of vellum in the medieval period was such that scholars scraped clean sheets they no longer needed removing the text and reused them. Frequently, the scraping was not complete and words from previous writing showed through. Landscapes are likened to this process whereby the structures of previous cultures still exist in our contemporary landscape eg stone circles, field lynchets, ridge and furrow, open field systems.

Figure 18 – Four levels of ‘abstraction’: concept to indicator

(Source: Tveit et al., 2006)



For a capitals-landscape framework, we could employ the same process. The literature review has allowed us to create the concepts (each capital’s definition) and dimensions (the parts of the capitals recognised by researchers). We could then convert the theory into practice to help us identify the physical elements in a landscape that represent the dimension and from that how we could measure it.

One area needing further consideration is that of intangible dimensions; particularly important for cultural, social and human capital. Recognising intangible processes in a landscape will require careful thought. There are instances where physical proxies have been used, which although helpful do not necessarily capture intangibles in their entirety and thus miss crucial aspects in need of monitoring. In other words, a process does not necessarily lead to one physical outcome, possibly a number, all equally valid with respect to the formation of landscape character.



**Key point:** use Tveit *et al*’s (2006) abstraction process to move capitals-landscape conceptual framework from theory to practice.

Table 6 – Tveit *et al.*'s (2006) Visual Landscape Character 'Abstraction' Process

Concept	Dimensions	Landscape Attributes	Potential Indicators
<b>Stewardship</b> (Sense of order and care, contributing to a perceived 'ideal' situation. Human activity through active management.)	Sense of order Sense of care Upkeep	Signs of use/non use Vegetation succession Buildings & linear features management detail Drainage Waste	% abandoned land and stage of succession Status of maintenance of buildings Management type and frequency Length & condition of linear features Presence of waste Wet areas in crop fields Presence of weeds
<b>Coherence</b> (unity of the scene through repetition of colour and texture)	Harmony Unity/holistic Land use suitability	Land use Water Pattern	% of land use matching natural conditions Water presence and its spatial location Repeating colours and patterns
<b>Disturbance</b> (Lack of contextual fit with features deviating from the context)	Lack of contextual fit Lack of coherence	Extraction Natural disturbance Constructions	Number of disturbing elements % area impacted by disturbance Visibility of disturbing elements
<b>Historicity</b> (Historical continuity as palimpsest and richness relating to amount, condition and diversity of cultural elements)	Continuity Richness	Visible time layers (palimpsest) Cultural elements eg grave mounds Traditional agricultural structures	Presence of cultural element Shape & type of linear features Age Number of time layers % area of historical continuity Presence of traditional land use and pattern
<b>Visual scale</b> (Visual quality through the idea of 'landscape rooms' and landscape preference)	Visibility Openness 'Grain' size	Topography Vegetation Man made obstacle	'Viewshed' size 'Viewshed' form Depth of view Degree of openness 'Grain' size Number of obstructing objects
<b>Imageability</b> (Qualities of the landscape present in totality or through	Spirit of place <i>Genius loci</i> Uniqueness	Spectacular elements Panorama Landmarks	Viewpoints Presence of spectacular/ iconic elements Presence of historical elements and patterns

elements, landmarks and special (natural & cultural) features which make landscapes distinguishable and memorable)	Distinctiveness vividness	Water Iconic elements	Presence of water bodies % area of moving water
<b>Complexity</b> (Diversity and richness of landscape elements and features.	Diversity Variation Complexity of pattern & shape	Linear features Point features Land cover Land form	Number of objects and types Evenness index Dominance index Diversity indices Shape diversity Size variation indices Heterogeneity indices Edge density Aggregation indices
<b>Naturalness</b> (Closeness to a perceived natural state)	Intactness Wilderness Natural Ecologically robust	Natural feature Structural integrity of vegetation Vegetation/ land cover type Water Management Patch shape Edge shape	Fractal dimension Vegetation intactness % area with permanent vegetation cover Presence of water % area water Presence natural feature Lack of management Management intensity (type and frequency) Naturalism index Degree of wilderness
<b>Ephemera</b> (Elements and land cover types changing with season or weather)	Seasonal change (human or natural) Weather related change	Land cover/vegetation Animals Land use (activity) Water (colour reflections & waves) Weather	% of land cover with seasonal change Presence of animals Presence of cyclical farming practices % area of water Projected and reflected images Presence of weather characteristics

(taken from Tveit *et al.*, 2006: 238 to 246)



**Key point:** devise a mechanism to properly identify and measure for intangible dimensions of capitals which do not overlook key elements.

### 3.7.2 Example 2 – Social capital and statistical modelling

McGehee *et al.* (2009) investigated the relationship between rural tourism social capital and other capitals to aid in the development of tourism in the River Valley Region of Virginia, US. They use Flora's (2004) CCF as the basis for their work, stating that not all communities need an equal balance of the seven capitals and some need more of one than another. They particularly stressed this in terms of rural tourism agreeing with Jones, 2005:205 (cited in Macghee *et al.* 2010:487):

*'Trust and reciprocity lubricate co-operation through reducing transaction costs, as people no longer have to invest in monitoring the behaviour of others, thus building confidence to invest in collective or other group activities.'*

They also ascribe to Flora's (2004) view that when trust, reciprocity and cooperation are strong in a community, that community are more likely to be able to take advantage of economic community based activities as a result. The key features of this situation being: information sharing, co-ordination of activities and collective decision-making. In England, we can see such a system at work in relation to the 'Right of Common' and commoning in our uplands; indeed, it suggests good social capital will enable better engagement with territorial landscape management and the forthcoming 'Landscape Recovery scheme' of ELM.

They interviewed a mix of different stakeholders (tourism business owner, tourism users and destination management organisations) using a long list of capital dimensions/attributes applied in previous studies. For each statement asked the respondent was asked to rank them using Likert scale responses (ie. 1= strongly disagree, 5 = strongly agree). The study by McGehee *et al.* (2009) is of interest here because they attempt to move from the arena of qualitative measurement of social capitals into quantitative measurement through the application of a range of statistics (e.g. Pearsons Product moment for correlation) and a tool known as Structural Equation Modelling. SEM is a form of cluster analysis, where each capital is correlated against all others. It allows the researcher to identify which capitals are most important for the subject group objectively (semi- objectively really, as the use of Likert has many well-acknowledged flaws).

Reflecting on the process, whilst Likert scales are a well-established tool to gauge strength of people's views, SEM itself is complex and not a well-known technique nor taught as standard in many British

Universities. Field operatives will struggle to understand the process, creating unnecessary additional cost and inviting error.



**Key point:** advise against overly complex statistical modelling to value different capitals one over another, instead employ recognised methods.

### 3.7.3 Example 3 – Human and Social capital indicators for Agri-environment Schemes

Mills *et al* (2019) conducted a comprehensive literature review to identify a set of social indicators to use to assess the social outcomes of Agri-Environment Scheme agreements and their linkages to environmental outcomes. They identified two sets of indicators, *engagement factors* and *social outcomes* (Table 7); those highlighted in yellow donate to this current piece of work in terms of the role of social capital, green, human capital and blue, cultural capital. It is of note how many concepts listed are capitals (15 out of 29). We will look briefly at each of these three in relation to this piece of research.

Table 7 – Social Indicators generated from Mills *et al.*'s (2019) report

Engagement factors	Willingness to engage	Interest & awareness of the environment Engagement in advice & training Self-identity Level of AES experience Interest in experimentation
	Capacity to engage	Farmer age Succession Life cycle stage Financial stability Farmer education Farming system and farm type Farm size Farm tenure Resilience Agency (capacity to act)
	Farmer engagement with others	Bonding social capital Bridging social capital Linking social capital Cultural (symbolic) capital
Social Outcome	Awareness of and Interest in the Environment	
	Knowledge & Skills	
	Connectedness (with others)	
	Social capital (trust, collaborative working and social/cultural norms)	
	Change in Cultural capital (respect)	
	Public image	
	Agency	
	Resilience (security of business)	
	Labour availability	
	Mental health and subjective well-being	

- *Social capital* – Mills et al (2019) captured the four key dimensions of this concept and the various facets of networks (ie. bonding, bridging and linking) albeit spread across their two main themes. With respect to bonding social capital, it was a bit of a ‘curates egg’ – good in places; the evidence was split between encouraging more environmental behaviour in contrast not being seen to do something not the norm amongst peers. Bridging capital in terms of belonging to non-agricultural networks and positive public acknowledgement where identified as helpful. For linking social capital, the relationship was poor between farmers and government institutions unless schemes were co-designed.
- *Human capital* – this work identifies the importance of knowledge, level of knowledge and the capacity to apply it. It was re-enforced by positive relationships with advisers and good engagement with training opportunities. If the author were to pick out one specific piece of cited literature within this report, it would be the work of Gorman *et al* (2001) and the many thousands of Irish farmers who engaged with the Irish AES training ‘fostering’ a culture of conservation’. We need to foster a culture of landscape through a multiple capitals approach. Other areas related to human capital includes previous AES experience; ‘*Experience is believed to increase the level of skill and knowledge of a particular practice which, in turn, increases the efficacy of the behaviour*’ (p17). Finally, level of formal education was identified as important, although there is little explicit research in this area.
- *Cultural capital* – is mentioned three times in this report, although *respect* is seen more as a form social rather than cultural capital, as it is a construct derived from the interaction with peers and others. They also identified the importance of historic buildings as cultural assets (in our case built or tangible cultural capital) as well as visual amenity, beauty and landscape character. Finally, cultural (symbol) capital was applied inappropriately as a term (p25).

The aim of the report was to create a list of indicators to measure for social outcomes. Whilst this is a useful exercise for ideas, many are specific to AES and do not relate to landscape *per se*. It is compounded by loose use of definitions of the different capitals and their dimensions. Of note for landscape are the following:

1. Knowledge & skills (ie. human capital) - change in confidence and abilities [author suggests something more fundamental than this for landscape change]
2. Connectedness (social capital) – learning capacity (although the author thinks they might mean social learning – ie learning together through problem solving)
3. Social capital- changes in levels of social trust, extent of collaborative working and information sharing, social & cultural norms

#### 4. Agency –change in control over land (owner occupiers have more ‘say’ than tenants)

A more interesting aspect was the work Mills *et al.*, (2019) completed to explore social sustainability as the third element of this study. Whilst the definition is not important in this context, they completed a review of social indicators and how to measure them. For knowledge and information they referred to the FLINT study by Herrera *et al.* (2016; cited in Mills *et al.*, 2019) which suggested amongst others a series of objective indicators:

- no. of total contacts to advisory services
- no. of providers of advisory services
- no. of types of advice
- types of technology used
- no. of persons participating in training events
- years of experience

Herrera *et al.* (2016 cited in Mills *et al.*, 2019) did consider subjective indicators too, but there has not been time to follow this line of enquiry in this study.

One final point of interest in this report is their exploration of a conceptual framework (Figure 19), which links AES to their groupings of engagement factors and social outcomes. Furthermore, they employed an analytical framework for the literature review, which again emphasised many dimensions of different capitals (Figure 20). The same colour coding has been used on this diagram as above. Both frameworks demonstrate the inherent importance of multiple capitals in positive environmental outcomes.)

Figure 19 – Conceptual Framework proposed by Mills *et al.*, (2019) for AES outcomes

& social phenomena

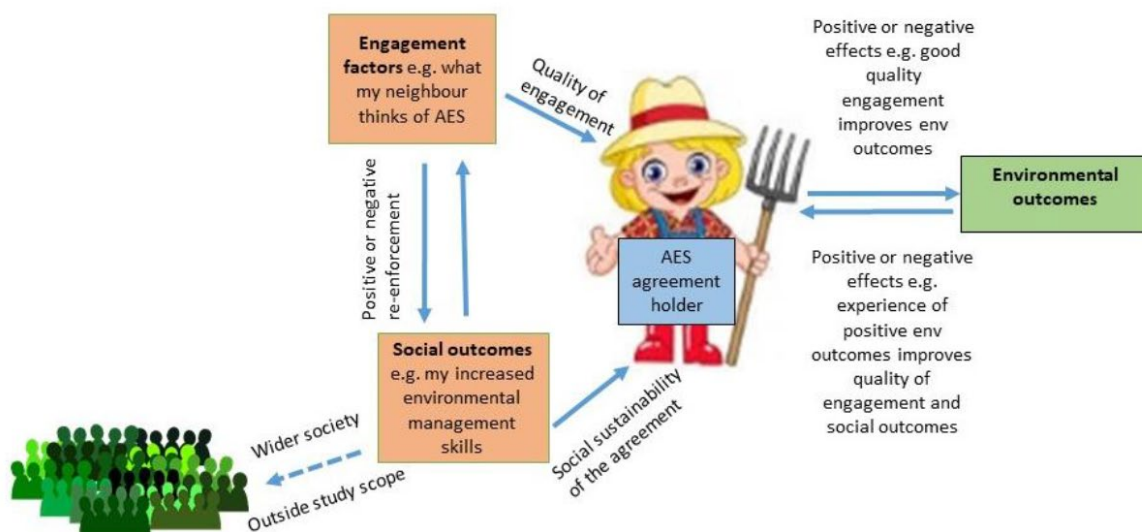
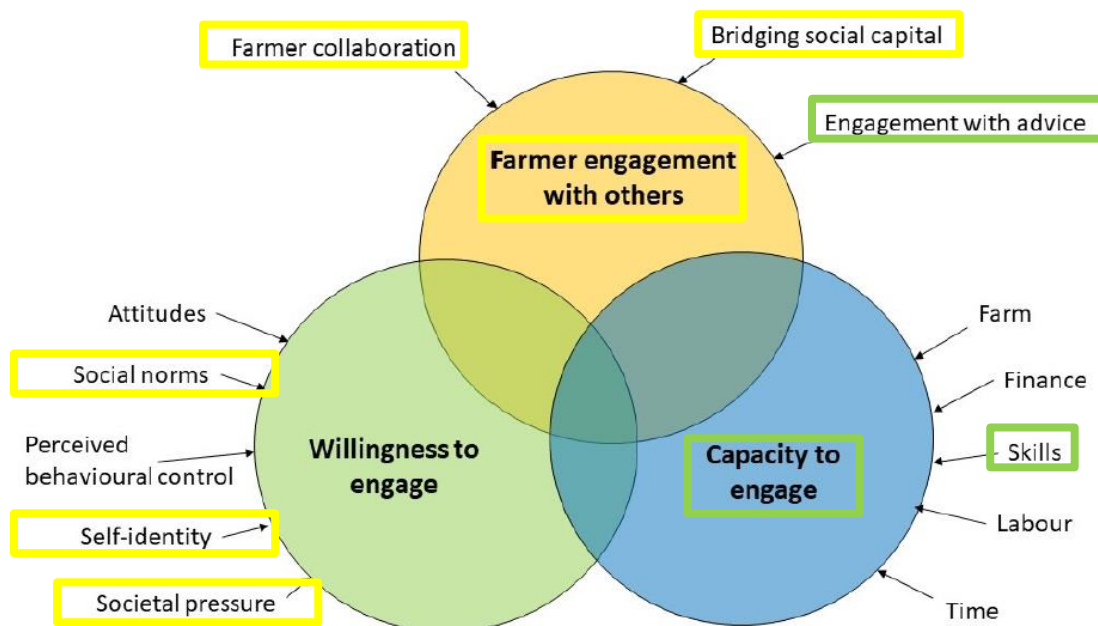


Figure 20 – Analytical framework employed by Mills *et al.* (2019)

Yellow –social capital, Green – human capital, Blue – cultural capital



**Key point:** this literature review acknowledges the importance of social, human and cultural capitals (mainly the former two) for environmental outcomes.



**Key point:** importance of agreeing formal definitions of capitals and their dimensions



**Key point:** lack of research into measureable human and social capital indicators

#### **3.7.4 Example 4 - Social Capital and Landscape**

Kizos *et al* (2018) explored how different stakeholder groups perceive the dynamics of local processes of landscape change in five European landscapes (Lesvos Island, Greece; SW Devon: Rhone-Alpes area, France; Kodavere, Estonia; and in the Madrid region, Spain). They used social capital concepts to explore this, focusing on decision-making processes, tradition, and engagement regarding national and local planning issues.

Conceptually they considered social capital to constitute : social trust; institutional trust; compliance with social norms' and participation in social networks; the latter of which is expanded to include bonding, bridging and linking networks (ie. within, between and beyond communities). They saw the role of social capital particularly important for landscape conceptualisation, values and governance options for stakeholder groups. Areas they considered important in this respect were:

- Contradicting ideas and values between 'experts' and 'locals' with regard to what is acceptable to not acceptable for landscape appearance and function
- How experts 'teach' locals what is acceptable
- How experts research about local knowledge systems and traditional ecological knowledge
- That people have multiple roles which influence success or failure of policy instruments or management
- The overarching views of experts seeing landscape issues needing solving whereas locals see it as a need to engage and discuss how local knowledge supplements good practice.

They used a *deliberative approach* to derive stakeholder perspectives of landscape change and participant values in a series of workshops. They opted to use this method because it allowed 'landscape values to be process and context-dependant without claiming objectivity' (p5). They set out to identify different sets of landscape values (eg productive, ecological, aesthetic, historical, symbolic) and to discuss and present to participants, ideas and practices to manage these values. They were also

interested in *the interactions between participants* to understand the social capital in the area, and how it affected landscape change.

For the SW Devon component of the study the key issue for the participants was landscape pressure created by new housing, the high demand for property and the influx of ‘amenity migrants’. The researchers found an absence of bridging social capital between newcomers and older residents, with the locals complaining about the lack of engagement of newcomers with local issues, social groups and land use/scape planning. Participants recognised the importance of the farming community in producing and maintaining the landscape, noting the decline of hedgerow and farmland management. Local people felt responsible to support the local farming community by buying local food and going to farmers’ markets. Nevertheless, for future landscape goals they were unsure and reverted to ideas of subsidies and regulation to help direct landscape change.

Threats to cultural landscape from new developments was common to all landscapes investigated. Historic and archaeological heritage were considered part of these landscapes, but were deteriorating. Intangible assets such as sense of community, identity and local knowledge were identified and loss of these were seen as impacting on the loss of cultural heritage, and in turn, landscape.

The researchers also found that during the second set of meetings a number of people did not turn up, and when they explored this, it was often cited that there were little trust between the various stakeholders. Such a situation is not uncommon in social capital research, and as Pretty & Smith (2004: 633, cited in Kivos *et al.*, p9) state ‘relations of trust lubricate cooperation’, but that trust takes time to build. The concept of trust also influenced the view of many local participants that their traditional ecological knowledge was being replaced by ‘expert’ knowledge, creating a position of power over local management activities. Furthermore, changes in societal demands had rendered some local practices obsolete.

The conclusions of the research recognised that strong bonding capitals existed within groups with common objectives, but where bridging capitals was weakest, this impacted negatively on environmental protection and landscape stewardship. The more rural landscapes had greater bonding capital in contrast to the urban fringe areas in the study, the latter of which were better at bridging capital. They also found institutional social capital was weak particularly between different levels of regional administration and that there needed to be a recognition that landscapes are a mix of cross-sector as well as cross-scale activities both of which are needed to address landscape management issues. Another key finding was the importance of valuing local knowledge for landscape stewardship especially with regard to:

*'designing and implementing landscape-related bottom-up approaches - respecting and highlighting such practices and knowledge and combining them in such a meaningful way with 'expert', scientific knowledge will work better than relying on scientific knowledge solely.'*



**Key point:** Expert and local knowledge is important when conceptualising landscape



**Key point:** Both bonding and bridging social capital needed with regard to landscape change. We need to create bridging social capital particularly where it is lacking.



**Key point:** building trust is important to create co-operation in landscape change

### **3.7.5 Example 5 – Cultural capital frameworks & valuation**

Cochrane (2006) explored how to develop a framework to analyse the role and impact of cultural capital on the management of natural resources for sustainable development. It is important at the outset to understand that Cochrane's (*sic.*) definition of cultural capital is very much focused on the intangible aspects of cultural (i.e. values, belief and views and how they manifest themselves through recognised common behaviour). She recognises the interface exists in three key areas:

- *Management objectives for natural capital* – influenced by cultural beliefs concerning the value and importance of various activities. The types of areas affected include: equity of resource use; social well-being of local people and/or less powerful groups; adoption of the stewardship ethic, and the commitment to reinvest capital. This challenge becomes more complex where there is cognitive conflict<sup>6</sup> between stakeholders in partnerships.
- *Efficiency in the use of natural capital* – focused on the behaviour of groups involved in managing and designing the desired outputs. Where natural capital has multifunctional end use, different groups of stakeholders can be involved leading to complex management systems compromising use.

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<sup>6</sup> Cognitive conflict- different groups of individuals or organisations have different goals and objectives which may conflict dramatically with those of others

- *Demand* – what the consumer wants will affect management and use. Furthermore, consumers can control the choice management approaches employed through what is acceptable or not to them.

Cochrane's (*sic.*) conceptual framework cross references these three situations with the four dimensions of natural capital (which he defines as: provision of raw materials for production, sinks for waste and pollution, environmental services and amenity services) and the three pillars of sustainability. As an example, the output for environmental services is summarised below (Table 8).

Table 8: Outputs from Environmental Services (Cochrane, 2006)

Aspects of Sustainability	Management Objectives	Efficiency of Process	Demand
Economic	Beliefs regarding the value of or charging for ES*	Belief in the value of ES and assimilation of practices which facilitate a charging or compensation mechanism	Beliefs regarding expectation of free versus payment
Environmental	Value given to ES	Ecological knowledge and use of best practice	Demand for ES
Social	Values related to the importance of localised benefits of ES and long term environmental stability	Values related to the importance of localised benefits of ES and long term environmental stability	Demand for local ES and retention for future generation needs

\*- ES environmental services e.g. climate mitigation, biodiversity etc...

Whilst Table 8 does not add much to our developing framework here, it does raise the importance of being able to *value* aspects of cultural capital. Valuing cultural capital is an area we will need to consider in the methodology and we suggest here to draw on the various tools considered for cultural ecosystem services. Many of these revolve around non-market goods concepts such as the family of tools known as *stated preference techniques* such as *Willingness to Pay* and *Choice Experiment* (Mansfield, 2018:345); the former of which is recognised by the UK Government's Green Book. These techniques rely on interviewing individuals, which would be costly although not prohibitive, for the proposed 1km<sup>2</sup> sampling regime proposed for the NCEA landscape capital monitoring. It all depends on the objectives.

Perhaps a more useful approach is that suggested by Norton *et al.* (2012), who proposed a method to quantify cultural ecosystem services at a national scale, which could be deconstructed down to a NCA level. They aimed to suggest methods that combined quantitative data garnered from the 1km<sup>2</sup> sample squares for the Countryside Survey (e.g. Firbank *et al.*, 2003) with qualitative data. The eight cultural

services were considered as part of the latter social survey (150 people over 8 NCAs); these included: sense of place, cultural heritage, inspiration, escapism, relaxation, spiritual, learning and recreation. Respondents also were asked to comment on 20 landscape features and how they perceived the two groups of variables. Each cultural service was given a score of zero to High (=3) along with scores for four CS Broad Habitat types (woodlands, water, altitude & coast). By combining the scores for both elements the map below was created (Figure 21).

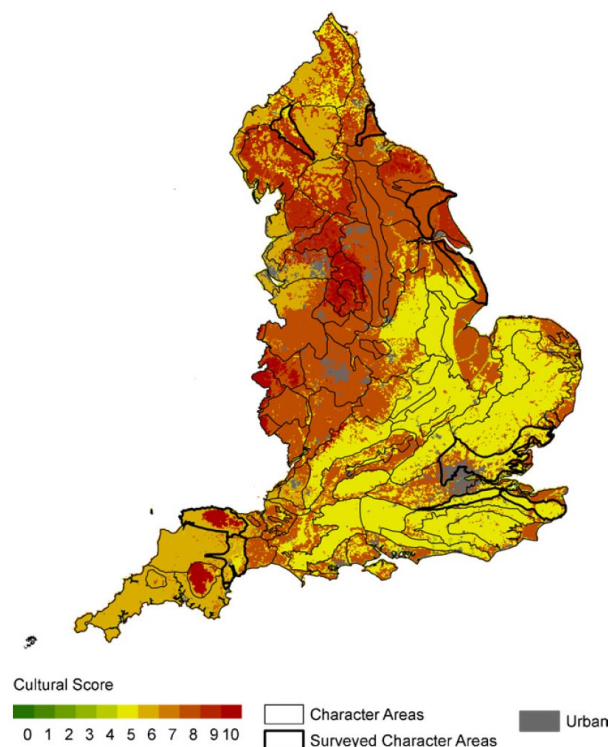


**Key Point:** consider the use of stated preference techniques through survey or a simpler perceptions survey.



**Key Point:** Possible cultural capital dimensions to measure: sense of place, cultural heritage, inspiration, escapism, relaxation, spiritual, learning and recreation.

Figure 21 – Cultural Service scores for woodlands, water, altitude & coast



Source: Norton et al.,2012:451

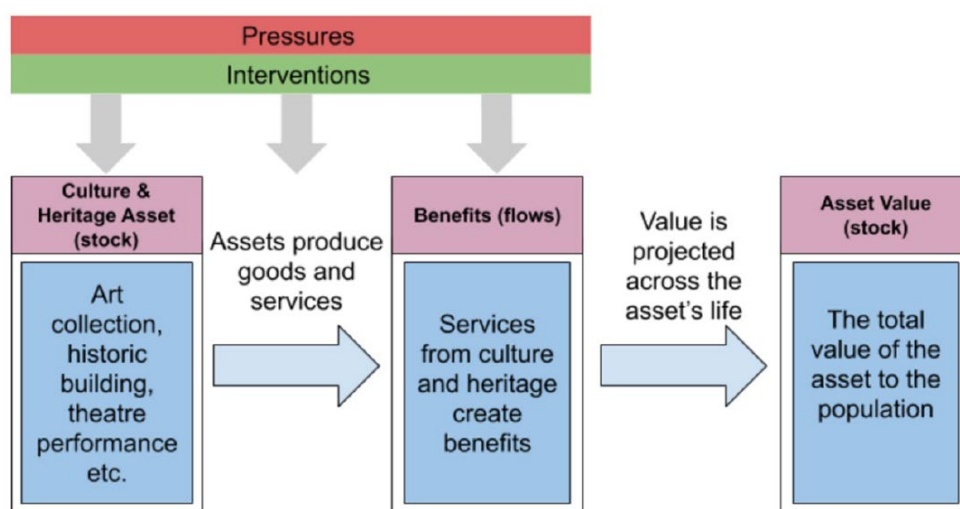
A third way to consider cultural capital has recently been published by Sagger *et al.* (2021) who were asked by DCMS to develop a formal approach to valuing cultural and heritage assets to aid in decision making. The paper is a ‘thought piece’ setting out the need to develop a valuation method which

marries with the Social Cost Benefit analysis recognised by HM Treasury’s Green Book and how they will go about developing the system. It forms part of DCMS’s ‘*Culture & Heritage Capitals Programme*’. The report starts by agreeing terms of reference, why it’s important to measure cultural & heritage capital (CHC) and when it is proper to do so. They see CHC developing a similar approach to that devised for natural capital. Their focus is on tangible CHCs but they do acknowledge that intangibles are important. They do, nevertheless, seem to ‘hope’ that measuring tangible assets will partially rectify this;

**‘Intangible assets.** Intangible assets are nonphysical such as folklore, customs, beliefs and traditions. As set out above these types of assets will not be part of the initial scope of the Culture and Heritage Capital Programme. *However, physical assets will provide services that enable these traditions and knowledge to continue and therefore their value will be partially evident within the estimates provided by the Culture and Heritage Capital Programme.*’  
[Sagger *et al.*, 2021:11, *italics*: this authors’ emphasis]

Another aspect of the paper is to suggest a CHC framework (Figure 22) and our main focus here. The framework focuses on demonstrating how CHC contribute to outcomes sought by DCMS for people and society at large. They further seek to show how these outcomes can be seen as *stocks* (tangible items) and *flows* (the derived benefits).

Figure 22 – The Culture and Heritage Capital Framework



(Source: Sagger *et al.*, 2021:12; Reproduced under the UK Government Open Licence Agreement v3.)

Once both stock and flow value are calculated then the assets entire value is known.

The paper acknowledges little is understood as to how to value either of these and is an area in need of development. The rest of the work is spent outlining the various ways in which assets are valued using the concept of Total Economic Value and its constituent parts. (This paper's explanation of the various types of *use value* is one of the clearest this author has seen and is recommended). The paper also exploring the techniques available to measure non market values for CHC assets. These are the same techniques used to place economic value on landscapes and habitats and now formally recognised by the Green Book and used in '*DCMS Rapid Evidence Assessment: Culture & Heritage Valuation Studies*'. There is overlap here with how we could measure intangible social and cultural assets with respect to landscape.

A final point of note, is Sagger *et al.*'s (2021) consideration of how CHC overlaps with natural capital (p21);

*'There are many examples where natural capital and culture and heritage capital come into close proximity and are difficult to separate; parks with monuments, historic houses with gardens and canals with industrial heritage to name a few. It is important that the value from the culture or heritage asset and natural asset can be valued distinct from each other so that the natural capital and culture and heritage capital avoid double counting across the capital accounts. Case study examples will be used to attempt to disentangle the benefits of natural capital and culture and heritage capital.'*

They are right, the two do need disentangling to avoid double accounting depending on the objective of the exercise. There is nevertheless, scope to link to the two conceptual frameworks to support each other using the capitals-landscapes as a bridging interface to share data in more efficient ways.



**Key point:** The capitals-landscape framework should include DCMS CHC framework as a bridging interface into the natural capital one.

### 3.7.6 Summary of microscale studies.

The following table outlines the key points we have derived from this short exploration of more focused capitals-landscape research:

- Use Tveit *et al.*'s (2006) abstraction process to move capitals-landscape conceptual framework from theory to practice.
- Devise a mechanism to properly identify and measure for intangible dimensions of capitals which do not overlook key elements.
- Advise against overly complex statistical modelling to value different capitals one over another, instead employ recognised methods.
- Mills *et al.*, (2019) this literature review acknowledges the importance of social, human and cultural capitals (mainly the former two) for environmental outcomes.
- Importance of agreeing formal definitions of capitals and their dimensions
- Lack of research into measureable human and social capital indicators
- Expert and local knowledge is important when conceptualising landscape
- Both bonding and bridging social capital needed with regard to landscape change
- We need to create bridging social capital particularly where it is lacking.
- Building trust is important to create co-operation in landscape change
- Consider the use of stated preference techniques through survey or a simpler perceptions survey.
- Possible cultural capital dimensions to measure: sense of place, cultural heritage, inspiration, escapism, relaxation, spiritual, learning and recreation.
- The capitals-landscape framework should include DCMS CHC framework as a bridging interface into the natural capital one.

These key points can be summarised into four main groups, those that: provide additional insights in the construction of the conceptual framework, re-enforce the role of multiple capitals in landscape; those helping us transition from theory to practice, and future work.

- *Additional insight for Conceptual framework construction* – the need to have a set of standardised definitions for capitals and their dimensions; integrate the DCMS CHC framework into the overarching concept; cultural capital dimensions to include (if not already) sense of place, cultural heritage, inspiration, escapism, relaxation, spiritual, learning and recreation;
- *Re-enforce the role of multiple capitals* – the importance of social and human capital for landscapes; bonding and bridging social capital is important;
- *Transition from theory to practice* – employ Tveit *et al.*'s (2006) tool (concept > dimension > landscape attribute > indicator); avoid use of statistical tools; expert & local knowledge is important here; the ability to build bridging social capital needs to exist; build trust;
- *Future work* – tools to measure intangibles are needed; there is weak knowledge on social and human capital apart from networks; employ stated preference techniques where appropriate.

#### **4. Devising a Five Capitals conceptual Framework for Landscape**

From this critical review of conceptual frameworks at macro and micro scale the following steps will be applied to develop a multi-capital landscapes framework:

- 1) Choice of capitals and their dimensions
- 2) An overarching fundamental diagram with explanation for wide spread dissemination
- 3) The relationship with NCEA black box diagrams
- 4) Application of the conceptual framework with regard to landscape as a spatial concept – a form of descriptive inventory
- 5) Application of the conceptual framework with regards to landscape as temporal concept – an ability to consider condition for landscape improvement
- 6) The relationship to other high level conceptual frameworks to feed into evidence collection
- 7) The Gaps in our knowledge base – human, social (and financial)

##### **4.1 Choice of Capitals**

The following table overleaf lists the capitals and dimensions we will use in this conceptual framework Table 9), We recommend the inclusion of:

- Natural
- Cultural
- Social
- Human
- Financial

The dimensions (sub themes) of each of these are listed in Table 9. As our first part alluded to, there are many combinations of dimensions proposed by different researchers. We have attempted here to indicate which we believe to be the most relevant to the concept of landscape. This is merely our considered recommendation.

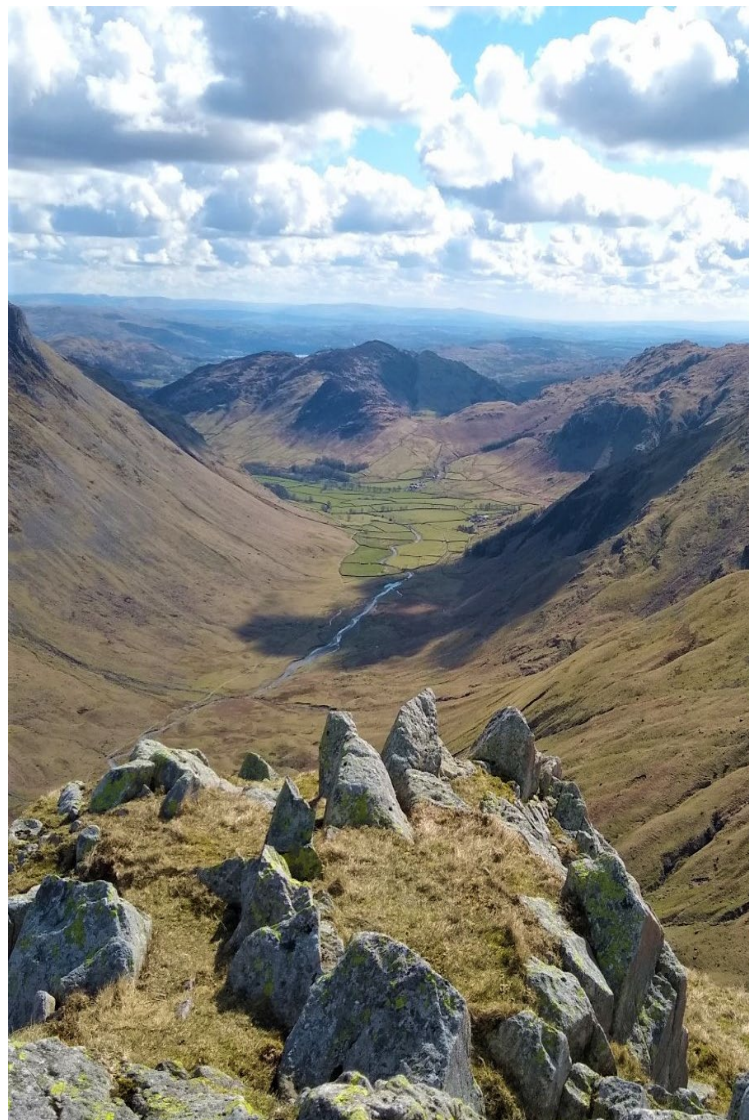
Table 9: Choice of Capitals for Landscape Conceptual Framework

Capital	Dimensions
Natural	<ul style="list-style-type: none"> <li>• ecosystems</li> <li>• species</li> <li>• freshwater</li> <li>• land</li> <li>• minerals</li> <li>• air</li> <li>• oceans</li> <li>• natural functions and processes</li> <li>• geodiversity</li> <li>• landscapes</li> </ul>
Human	<ul style="list-style-type: none"> <li>• education (formal and informal)</li> <li>• knowledge, skills &amp; work experience</li> <li>• traditional practices &amp; core belief systems</li> <li>• practices</li> <li>• motivations</li> <li>• empathy</li> <li>• life experiences</li> <li>• relationships &amp; social learning</li> </ul>
Social	<p>Relations of trust – values and trust, organisations</p> <p>Reciprocity and exchange - communication channels, membership</p> <p>Common rules and norms - social norms</p> <p>Connectedness, networks and groups:</p> <ul style="list-style-type: none"> <li>• Bonding – within in communities of interest locally</li> <li>• Bridging – between communities of interest locally</li> <li>• Linking – between communities of interest local to external</li> </ul>
Cultural	<p>Tangible structures</p> <ul style="list-style-type: none"> <li>• private goods ?</li> <li>• common-pool goods ?</li> <li>• collective goods ?</li> <li>• tool goods ?</li> <li>• buildings,</li> <li>• boundaries and</li> <li>• historic monuments;</li> <li>• contemporary built environment</li> </ul> <p>Intangible activities</p> <ul style="list-style-type: none"> <li>• practices and processes, recreation</li> <li>• sense of place, way of life</li> <li>• perception - sight, sound, smell, touch</li> <li>• inspiration, escapism, relaxation, spiritual</li> </ul> <p>Contemporary capitals</p> <ul style="list-style-type: none"> <li>• Buildings</li> <li>• Equipment</li> <li>• Infrastructure (such as roads, ports, bridges, and waste and water treatment plants)</li> </ul>
Financial	<p>Currency - Shares, bonds, banknotes</p> <p>Crypto currency - Carbon trading, natural capital accounting</p>

## 4.2 Fundamental Conceptual Framework

In this section we will explore the fundamental components of our suggested conceptual framework for a landscape-capitals approach from the recommendations gathered in the main part of this report. We will consider the framework in two main ways; spatially (derived from the independent work of Matthews & Selman (2006) and Mansfield (2005/2014), and temporally (employing the lessons of spiralling upwards from the CCF model and the work of Tveit *et al.*, 2006). We will use a simplified case study to illustrate application - the Langdale valley in the central Lake District (Figure 23).

Figure 23 – the Langdale Valley, Central Lake District



Spatially, a landscape-capitals framework provides us with:

- An overall diagrammatic illustration which shows how at the macroscale the different capitals combine to create a landscape

- How we can use the dimensions of each capital to appreciate the sub-components extant in a landscape
- How the dimensions of each capital inter-relate to each other in a landscape.

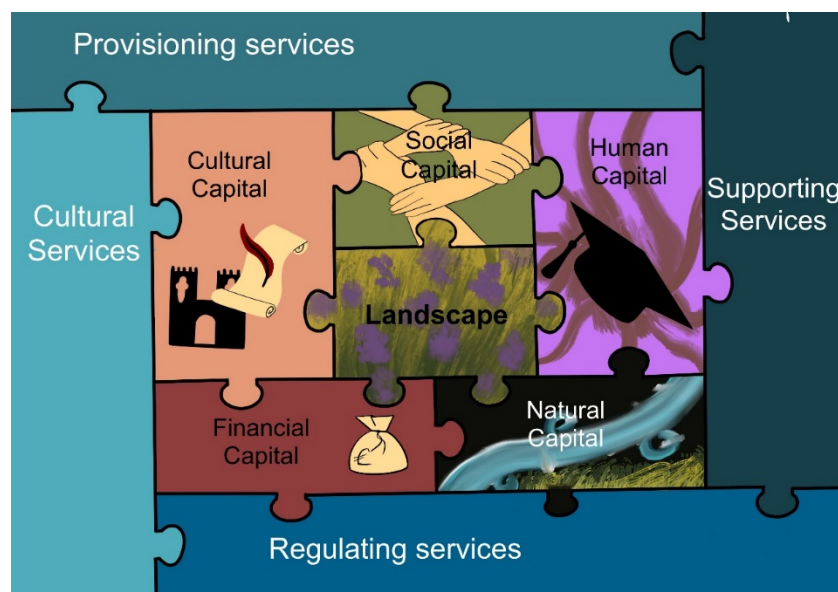
Temporally, a landscape-capitals framework provides:

- A management tool to appreciate how to move a landscape from State A to State B
- A mechanism to evaluate trends in capitals in order to identify dimensions in need of improvement through appropriate management

#### 4.2.1 Spatial application

Our macro-model employs a jigsaw concept to demonstrate how landscape is made from the interconnection of different capitals operating together through the analogy of interlocking jigsaw pieces (Figure 24). This is a first iteration to allow people to understand the broad role of varied capitals in a landscape.

Figure 24: A Landscape- Capitals Conceptual Framework



We also believe it is important to show how these capitals further relate to ecosystem services to allow greater clarity of the black box portrayed in the NCEA Framework in Figures 1 and 2, and this too is shown on Figure 24.

The next step is to de-construct a landscape into the constituent dimensions of each capital at the microscale. We suggest in Figure 25 the main dimensions of direct relevance to the idea of landscape. These are abstract concepts at this point and thus we have used the Langdale case study to exemplify how these could be translated into 'real' structures and processes 'on the ground' (Figure 26).

Figure 25: Dimensions of capitals in a landscape (micro-scale)

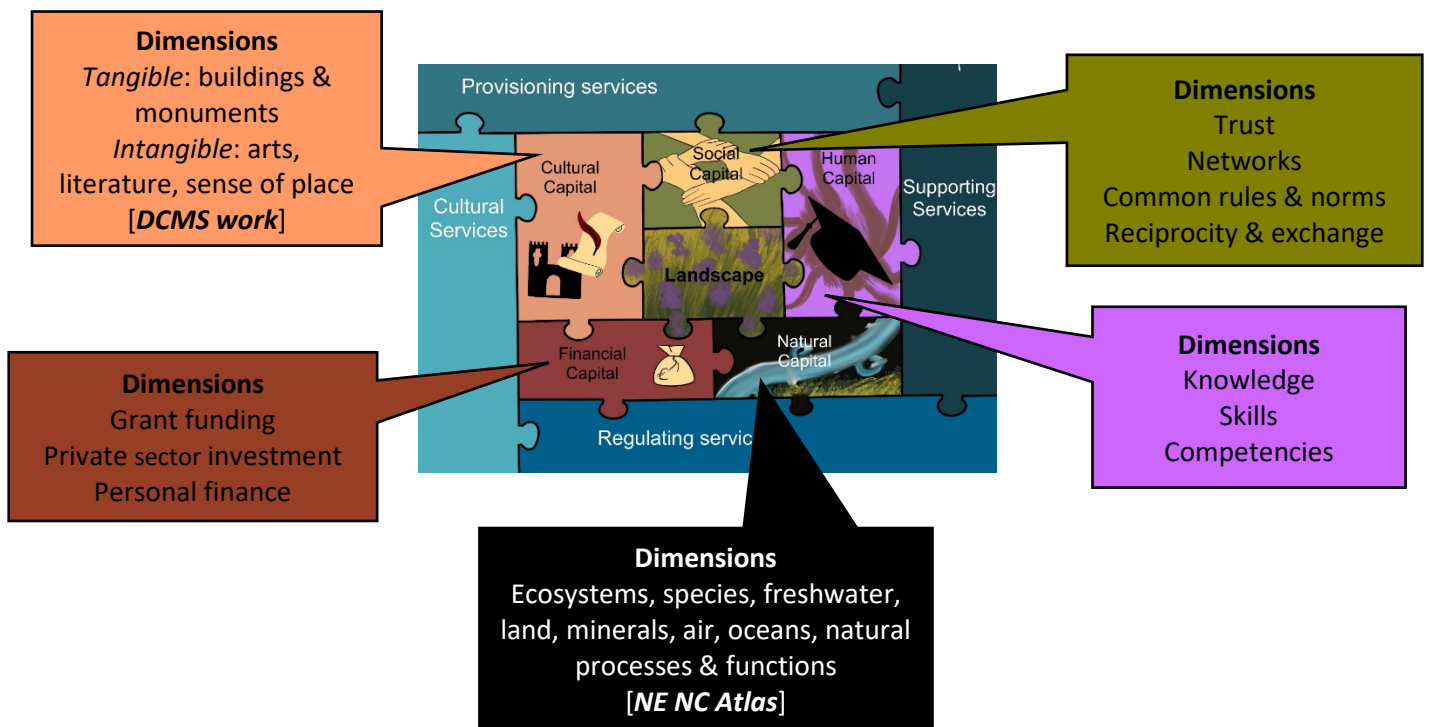
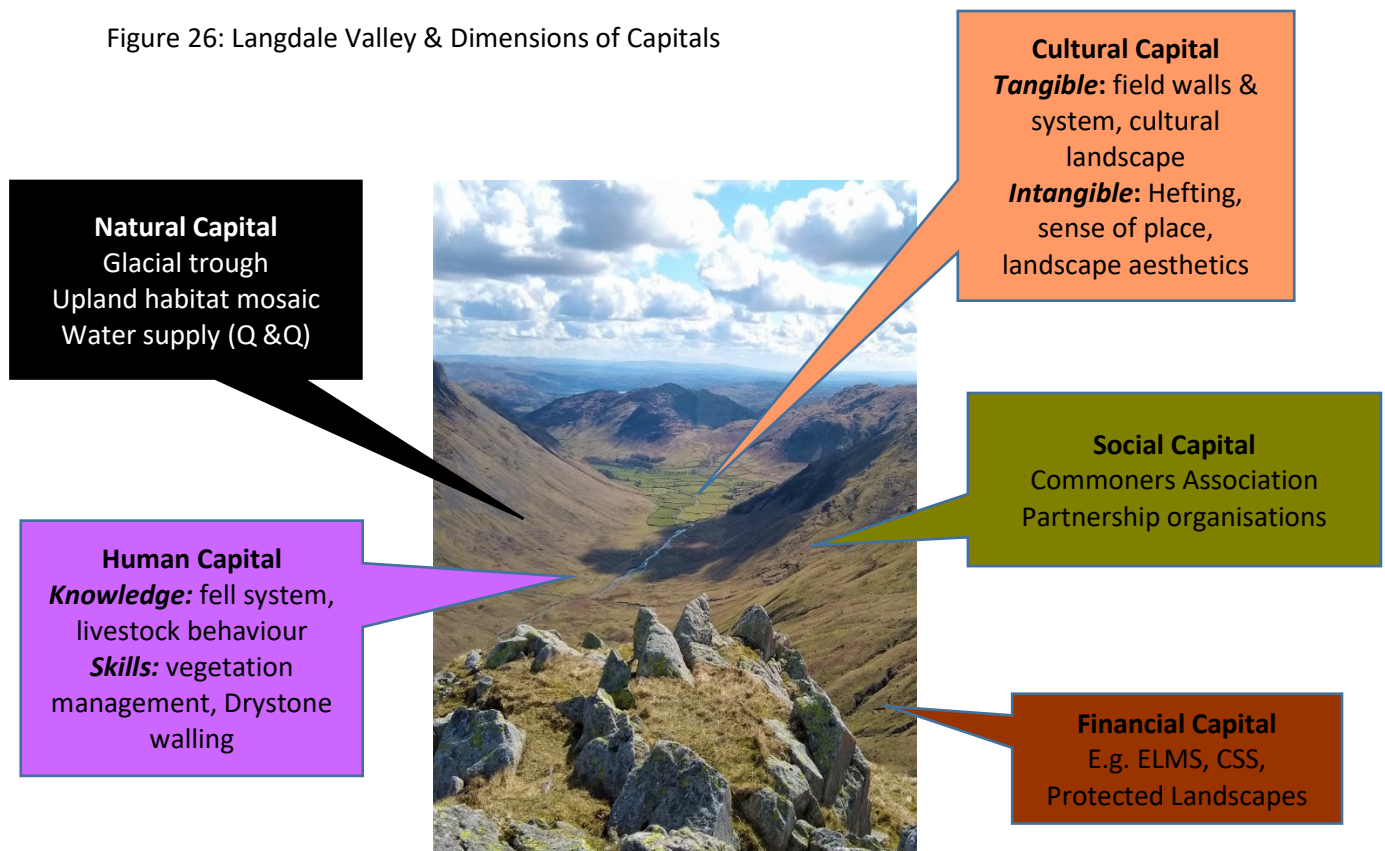


Figure 26: Langdale Valley & Dimensions of Capitals

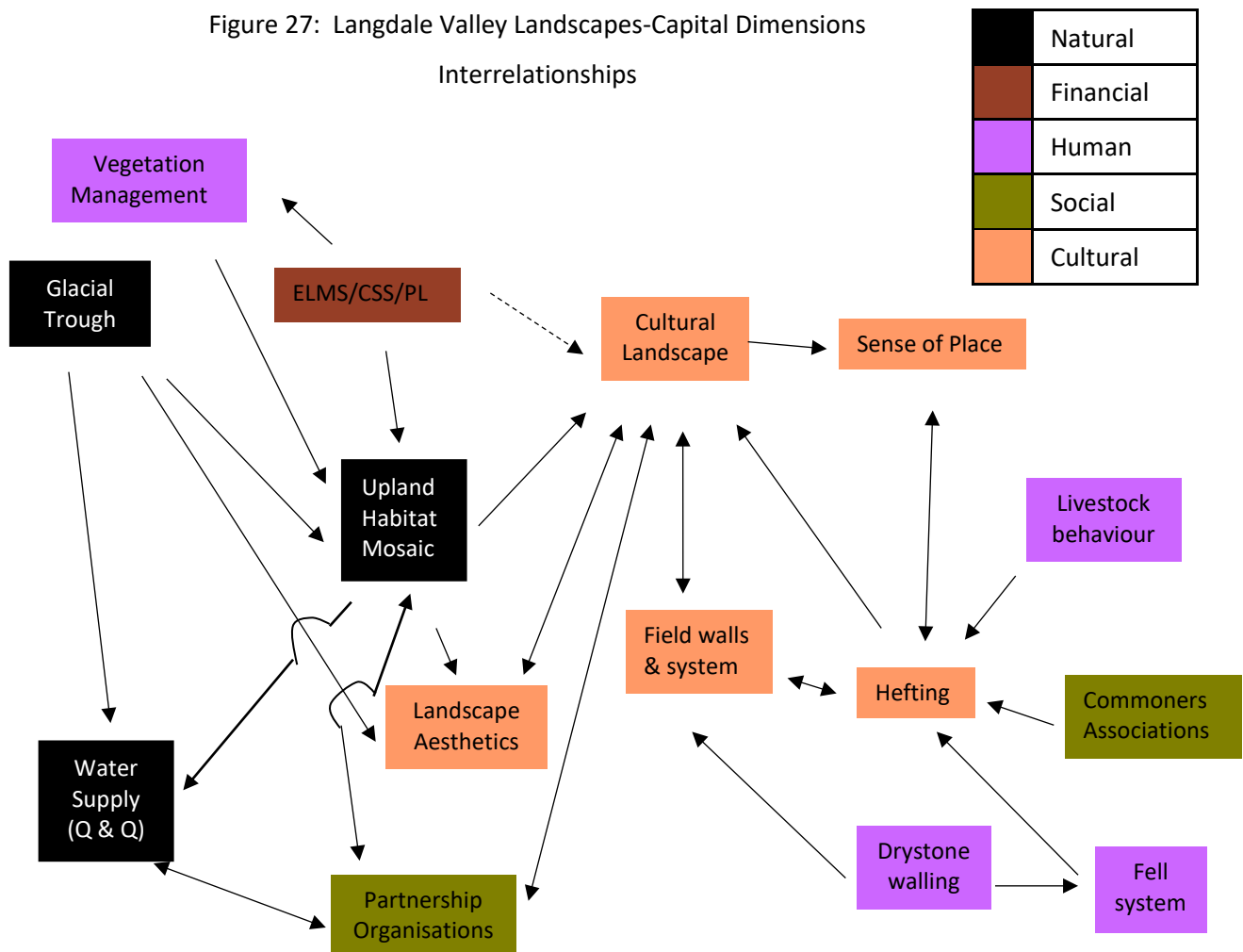


From this exercise we can then begin to build a systems diagram to allow us to understand the inter-relationships between the various capitals' dimensions (Figure 27). We have used arrows on this

diagram in line with systems theory, whereby a line between two items shows they are interrelated. Sometimes we can use a solid line to denote a strong link or a dotted line to record a weaker link (or an indirect one). An arrow is then added to suggest A effects B, with the arrow point nearest to B. A double ended arrow means that A effects B and B also affects A. Ideally lines/arrows should not cross, but on occasion diagram complexity forces this to occur, at these times a bridge symbol should be used (one tries to avoid this by re-organising the boxes, which can on occasion be impossible).

Figure 27: Langdale Valley Landscapes-Capital Dimensions

Interrelationships



Now we have converted a series of abstract dimensions into actual structures and processes it might be worth considering changing the box content names to *attributes*, as suggested by the work of Tveit *et al.* (2006). Of further note is to recognise that these diagrams related to the dimensions of capitals operating in Langdale are **a simplification of what is really going on** in order to develop the conceptual approach in general.

Some discussion was also had with the project steering group as to whether this level of analysis is more appropriate to National Character Area application initially, in order to embed the concept with Natural England teams. We will return to the value of this below.

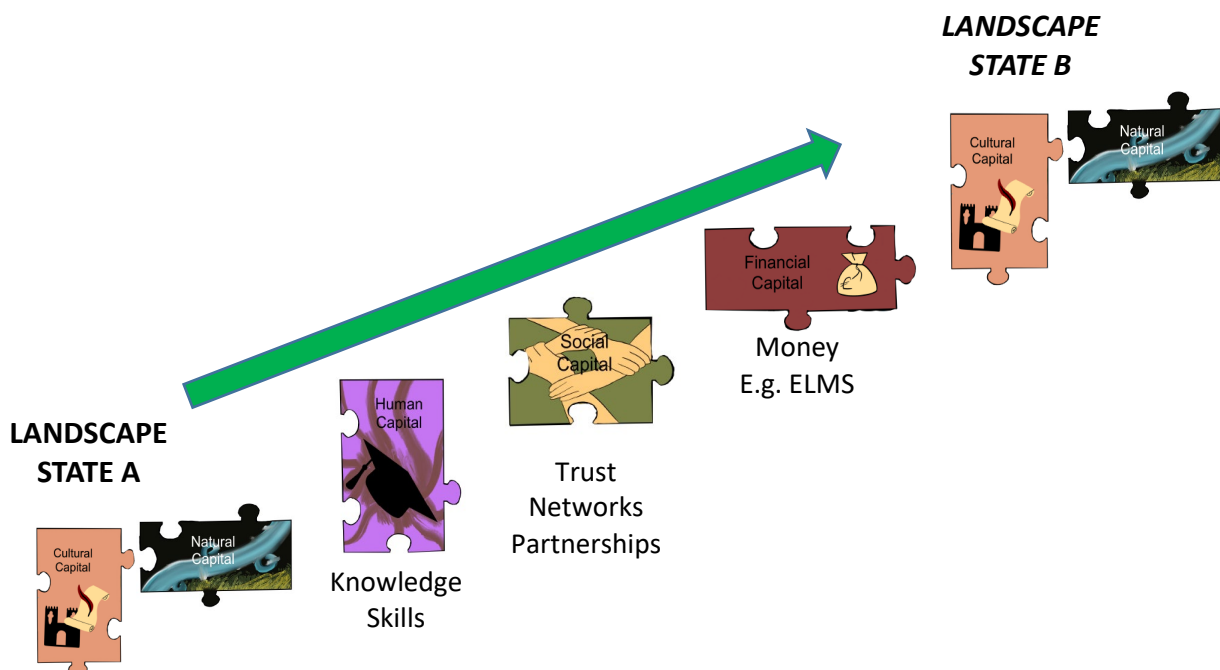
#### 4.2.2 Temporal Application

The second application of this landscape-capitals conceptual framework is to apply it to temporal change in landscapes. This provides:

- an understanding the dynamic nature of landscapes which are constantly in flux
- creating a structure to monitor landscape change
- a tool to implement landscape change
- helps in terms of understanding the intricacies of landscape resilience and/or sensitivity to an intervention (good or bad).

Figure 28 shows the application of temporal development building on the ideas of spiralling upwards advocated by the Community Capitals Framework (see Section 3.3). The underlying concept here is to suggest how a landscape derived from the nature-culture entanglement can change to a new, more desired state. Arguably there is much thought needed to agree what 'State B' should look like.

Figure 28: Applying a Landscape-Capitals Framework for Landscape Change



Having said this, NCA profiles include *Statements of Environmental Opportunity* which provide possible landscape outcomes and ecosystem service provision. Furthermore, the recent introduction of a process to develop Local Nature Recovery strategies and the wider driver of territorial landscape level management through the forthcoming ELM scheme should provide greater clarity on desired end points.




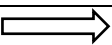


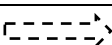

We argue here, that as long as the character of ‘state B’ is understood the application of a landscape-capitals approach can be applied at any geographical or administrative unit scale be that an urban nature reserve, a farm or a catchment. Nevertheless, scaling up brings with it greater complexity and the need for knowledgeable and experienced staff on the ground, or a method (and facilitation ability!) to elicit the information from a range of stakeholders.

Figure 28 uses a stepwise application of different capitals to help achieve State B drawing on this conceptual framework literature review and the practical application of the CCF tool in other countries. The ordering of human, then social and then financial has been determined through previous research outlined in this report, its sisters for this consultancy and its application on a landscape scale, where many stakeholders have vested interests.

We have next considered how we can combine the dimensions (sub themes of the capitals) and their attributes (a dimension’s expression of reality on the ground) and temporal change in a landscape. Drawing on the critical literature review earlier in this report, we identify THREE ways of expressing temporal change in capital attributes in a landscape, with appropriate symbols (Table 10):

- *Strength* of attribute – the relative importance of the attribute in this landscape
- *Direction* of attribute – whether it is improving, declining or there is no change
- Whether the attribute is *enabling* or *blocking* the management of the landscape




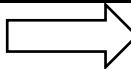


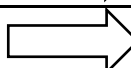


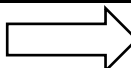


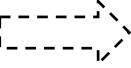





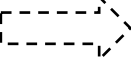








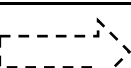




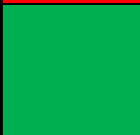









Table 10: Expressing temporal Change in Capital Attributes in a Landscape

Strength & Direction of Capital				Enabling or Blocking	
Strength		Direction			
Strong		Improving		Enabling	
Medium		No change		Blocking	
Weak		Decline			

The final step is to employ this methodology to our case study of the Langdale Valley, the results of which are shown in Table 11. At this point local knowledge is crucial to ensure the ‘landscape’ in

question is portrayed accurately. Some form of facilitated PAR approach would be an ideal tool to apply here to elicit consensus.

Table 11: Langdale Valley Landscape: Temporal Change in Capital Attributes

Capital	Dimension	Attribute	Strength	Direction	Enabling or blocking
Natural	Geology/ Topography	Glacial trough			
	Water	Supply Quality			
		Supply Quantity			
	Biodiversity	Upland habitat mosaic			
Financial		ELMS/CSS Protected Landscapes			
Human	Knowledge	Fell system			
		Livestock behaviour			
	Skills	Vegetation management			
		Drystone walling			
Social	Trust/ Communication/ networks	Commoners associations			
		Partnership working			
Cultural	Tangible	Field walls & systems			
		Cultural landscape			
	Intangible	Hefting			
		Sense of place			
		Landscape Aesthetics			

#### 4.3 The relationship to other high level conceptual frameworks

We have aimed to design this conceptual framework bearing in mind the current Natural Capital work by Natural England as well as the developing activity by DCMS to explore the character, dimensions and value of cultural capital. There is obvious synergy between these projects when a multiple capitals approach is taken to explore landscapes as a concept, through policy development and its implementation into operational management. The corollary is that a home is yet to be created to develop human and social capitals knowledge with regards to landscape in a similar way to complete the picture to provide an integrated landscape perspective.

## 5. Conclusions & Recommendations

This paper has critically reviewed a range of conceptual frameworks which employ a multiple capitals approach in relation to the concept of landscape. It is evident that different frameworks have employed different combinations of capitals, defined them differently and included a range of sub-themes (*dimensions*). Thus in this paper, we have attempted to devise a set of **standard definitions** for each capital as well as **confirm their dimensions** (subthemes) in relation to landscape per se.

Drawing on a list of recommendations from the critical review of these multiple capital frameworks and a number of more focused conceptual works, a **macroscale conceptual framework** has been proposed, demonstrating how capitals interlink to create landscape. This is shown below:



Using a real case study, this overarching framework has then been unpacked to focus in on the **dimensions of the various capitals found in a landscape**. These conceptual dimensions were then

translated into real structures and processes operating in this landscape, which we have referred to as *attributes*.

The next step was to demonstrate how the attributes are interlinked to each other through the **application of a systems approach**. Consequently, showing how one part of a capital if it changes can create a ripple effect across the entire landscape. Drawing from the literature we believe:

- **Landscape Structures** physically manifest themselves through natural and cultural capital
- **Landscape change** occurs through the application of human, then social and finally financial capital consecutively.

We do recognise that these two neat boxes are not as mutually exclusive as it sounds, structures are products of process, and change creates new structures. It is more an entanglement of multiple capitals operating, but in order to manage landscape change, disentanglement is needed in order to appreciate what are the drivers, causes, symptoms and solutions. Further work is also needed to deepen our understanding specifically of human and social capital as these **drivers**, to bring it into line with our knowledge of natural capital (Natural England's work) and cultural capital (DCMS' work).

The final part of the proposed conceptual framework focused on the temporal nature of landscape, that change is part of its character. In this respect we first considered how employing different types of capital in a logical way creates the conditions to move a landscape from State A to State B. Related to this is the condition of capital attributes in terms of *strength* (importance in a landscape) *direction* of change and whether attributes *block or enable* change. In order to understand a baseline to focus where resource need is required the most. We demonstrated how this can be applied for the case study landscape through local expert knowledge or participative facilitated stakeholder engagement.

Following, Tveit *et al*'s (2006) conceptual stages, we can see how the production of a capitals attributes list can then act as the definitive one to devise an appropriate **capitals monitoring regime** for effective active landscape management.

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