

Land Use Transformations Project

GLOSSARY

v1.0

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1 Introduction

This is the *Glossary v1* for the [Land Use Transformations](#) project (C3-JHI-1). The first version of the document was an output of the start-up process for the project, a series of project-level workshops building on off-line data collation tasks. The objective of the start-up process was to kick-start interdisciplinary working since the Project has ambitions to exploit closer integration, then team building, familiarisation with others' work and shared terminology is essential. It has been long recognised that a shared language is key part of interdisciplinary team building so creating a glossary was undertaken. A list of key terms (and acronyms) was generated from reviewing the project description and related documents, and definitions derived for the most significant, with the intent that the others will be completed over time and new terms added as they become significant. The intent is thus that the Glossary is a living document that will evolve over time with different versions serving to highlight how terminology and understandings has evolved over the course of the Project.

2 Glossary Format

For each item, the glossary records a working definition, links to citations and notes issues or points of difference. The notes also highlight where there is uncertainty in how the term is used (and by who).

3 Live Issues

As the first version of the Glossary was prepared a series of issues were highlighted – most of which have no easy answer but also most of which usefully highlight things to consider when making use of the terms or assessing how they are used by others.

Acronyms – are a prevalent feature of the science-for-policy domain and can be a barrier to interpretation. The Glossary thus includes specification of acronyms – but also tries to provide some insights on why the subject is significant to the Project.

Detail – can be overwhelming even for “simple” terms so the approach is pragmatic – so as much as is needed, expecting to add more if an item becomes a key focus of any deliberations with stakeholders.

Interaction between terms – dependencies, linkage between terms if it becomes a significant issue may mean the document needs to be presented in another way. For now the accessibility of the simple tabular format is a benefit.

Certainty – a gradient over the items, do those with more uncertainty need more attention and if so, does this reduce of just better understand the uncertainty. The Glossary is not intended to be definitive in the sense of eliminating uncertainty or imposing a single definition but rather acts to prompt reflexivity in framing analyses so that all participants are aware of working definitions.

Ambiguity – a particular form of uncertainty – can be a difference between official definition and lay use (social construction) – different perspectives matter and are informative – about understanding why we differ than finding one final definition. Are some terms deliberately left ambiguous, so that agreement can be made? (Quote on agreeing if not the same).

Tacit versus formal knowledge – it can be hard to find a ‘citation’ for some terms, especially those in common usage e.g., ‘estate’ or ‘land’

Contested – differences may reflect world views/values or may be an outcome of domains of expertise. Where apparent, these are noted in the Glossary text.

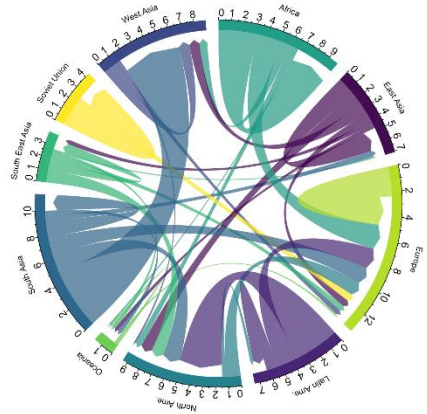
Audience – this is primarily an internal working document, but it may also have value for others. This does though raise questions of whether the Glossary becomes a boundary object in a deliberative process and if so how might differences or revisions be handled.

4 Glossary

Item	Explanation	Citation	Issues/Points of difference	Person
Actively farmed land	Land that is active in production for agricultural goods. Colloquial term used to describe a criteria for receipt of agricultural subsidies. Can be formalised as eligibility criteria. Potential policy term currently being defined in relation to direct payments subsidy access.		Potentially used in specific ways around subsidy in Scotland. May be disagreement over the extent to which this involves forestry/tree crops and energy crops	*
Adaptive co-management	Linked to adaptive management but highlights the importance of co-production/creation with the relevant stakeholders (More often termed adaptive co-governance)	https://www.ecologyandsociety.org/vol17/iss3/art11/ https://lawexplores.com/adaptive-co-management/	Major debates on whether you need to add 'co' to AM and AG as the philosophy of learning would highlight the need to involve multiple actors.	KB
Adaptation	Adjustment to environmental conditions In biology, the process by which a species becomes fitted to its environment; it is the result of natural selection's acting upon heritable variation over several generations. Refers to adjustments in ecological, social, or economic systems in response to actual or expected (external) stimuli and their effects or impacts	https://www.merriam-webster.com/dictionary/adaptation https://www.britannica.com/science/adaptation-biology-and-physiology https://unfccc.int/topics/adaptation-and-resilience/the-big-picture/what-do-adaptation-to-climate-change-and-climate-resilience-mean		MR
Adaptive management	An intentional approach to making decisions and adjustments in response to new information and changes in context	https://usaidthelearninglab.org/community/blog/what-adaptive-management#:~:text=Adaptive%20management%20is%20defined%20in,goals%20in%20response%20to%20changes.		AG
Ag Reform Plan – replaces CAP Replacement Programme	Within SG research and development forum for future agriculture policy.			*

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Anti-fragility	a property of systems in which they increase in capability to thrive as a result of stressors, shocks etc.	https://www.investopedia.com/terms/a/anti-fragility.asp		AG
APOLUS (Actor, Policy and Land Use Simulator) model	A model designed to simulate future land use change (cellular automata)	https://simlander.wordpress.com/apolus/ Hewitt, Richard J. (2020, April 2). APoLUS User guide version 2.0 (April 1st 2020). Zenodo. doi:10.5281/zenodo.3737708 Hewitt, R. J., Compagnucci, A. B., Castellazzi, M., Dunford, R. W., Harrison, P. A., Pedde, S., & Gimona, A. (2020). Impacts and trade-offs of future land use and land cover change in Scotland: spatial simulation modelling of shared socioeconomic pathways (SSPs) at regional scales. SocArXiv. doi:10.31235/osf.io/fc6he.		AG
App data processing pipeline and other infrastructure	Software and hardware which allows ingestion of raw data from disparate sources and its subsequent storage and analysis			MA
AquaCrop model	A crop growth model developed by FAO's Land and Water Division to address food security and assess the effect of the environment and management on crop production	https://www.fao.org/aquacrop/		EU
Benchmarking	Comparison against an agreed standard or starting point against a basket of comparable systems. This should include getting agreement on what comparable systems there are for your benchmarking exercise. The process of measuring a system's processes, identifying differences		Risk associated with benchmarking is that selective evidence can be used to prove a point ('the climate has always been changing'). Benchmarks also referred to as external referents – in societal metabolism working – judges the so what question.	*

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Bio(geo)sphere	Global sum of the living ecosystems (that would survive without human intervention) plus the rock and minerals (abiotic) parts of soils and land.	https://en.wikipedia.org/wiki/Biosphere https://scied.ucar.edu/learning-zone/earth-system/geosphere	Arose from discussion regarding conceptual framework and the use of 'bio (geo)sphere' in the processor in Societal Metabolism studies	*
Bioenergy systems	Methods of production of renewable energy from recently living organic materials known as biomass	https://www.energy.gov/eere/bioenergy/bioenergy-basics		SM
Biosphere	The biosphere is the part of the earth where living things exist. It encompasses all living things living in the lithosphere , atmosphere, and hydrosphere. The parts of Earth where life exists	https://www.biologyonline.com/dictionary/biosphere https://education.nationalgeographic.org/resource/biosphere		*
Bi-variate	Having data two variables	https://en.wikipedia.org/wiki/Bivariate_data		KM
Boundary objects	Entities that enhance the capacity of an idea, theory or practice to translate across culturally defined boundaries, for example, between communities of knowledge or practice.	https://journals.sagepub.com/doi/pdf/10.1177/0038038510387196		KM
Business (IACS)	A legal entity with a single beneficiary that has land "at its disposal" – can be a single holding or a multi-holding.	IACS	Note, in reality, businesses structures can be very much more complex with poor linkages to IACS businesses	*
Carbon credit	A generic term for any tradable certificate or permit representing the right to emit a set amount of carbon dioxide or the equivalent amount of a different greenhouse gas	https://en.wikipedia.org/wiki/Carbon_credit		MA
Carbon offsetting	A way to compensate for emissions by funding an equivalent carbon dioxide saving elsewhere	https://www.carbonfootprint.com/carbonoffset.html		MA
Catchment	In human geography, a catchment area is the area from which a location, such as a city, service or institution, attracts a population that uses its services and economic opportunities. In hydrology an area of land where all flowing surface water converges to a single point, such as	https://en.wikipedia.org/wiki/Catchment_area https://en.wikipedia.org/wiki/Drainage_basin	Also called drainage basin when referring to the movement of water	MC

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	a river mouth, or flows into another body of water, such as a lake or ocean			
CCS (Carbon capture and storage)	Capturing carbon dioxide (CO2) at emission sources, transporting and then storing or burying it in a suitable deep, underground location this removing it from the atmosphere	https://www.bgs.ac.uk/discovering-geology/climate-change/carbon-capture-and-storage/ https://www.nationalgrid.com/stories/energy-explained/what-is-ccs-how-does-it-work		MA
Chord diagram	A type of diagram which represents flows or connections between several entities (called nodes). Each entity is represented by a fragment on the outer part of the circular layout. Then, arcs are drawn between each of the entities. The size of the arc is proportional to the importance of the flow.			KM
Circular economy approach	A model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible	https://www.europarl.europa.eu/news/en/headlines/economy/20151201STO05603/circular-economy-definition-importance-and-benefits#:~:text=The%20circular%20economy%20is%20a,reducing%20waste%20to%20a%20minimum.		SM
Climate adaptation	Actions to adapt to climate impacts in the future. This is about both adaptation of the natural system and the humans depending on it. Implies nested scales – action on a farm or land parcel but influenced by national or global drivers.	SG Climate Adaptation programme Adaptation Scotland UN Definition UNFCC IPCC (2014) Glossary: The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities Annex II - Glossary (ipcc.ch) - useful secondary categories of adaptation also listed.	Ability of biophysical system to adapt or adaptation by people....it is not often clear. Beyond just responding to impacts but also the (indirect?) adaptation to climate mitigation Difficult to distinguish between mitigation for net Zero and adaptation (when often they are adapting to mitigation measures).	*

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			Associated stakeholder group – adaptation Scotland Adaptation Scotland Sniffer	
Climate Envelopes	The Abiotic environmental limits within which a living organism can potentially live.	https://onlinelibrary.wiley.com/doi/full/10.1111/j.1365-2486.2006.01256.x	Human Innovations/Technologies? Easier to define for other species other than humans.	AG
Climate mitigation	Actions to reduce GHG emissions and prevent as much future climate change as possible.		Seemed to be agreed on very easily. Suspiciously so. Did we miss something?	*
Co-construction	A distinctive approach where the emphasis is on collaborative or partnership working. The approach includes some more interactional processes such as cooperation and coordination	https://en.wikipedia.org/wiki/Co-construction_(learning)		KM
Complex systems - limits to prediction & control, co-evolution, self-organisation, emergence	Complex systems are systems made up of many interacting components, often with nonlinear relationships. These systems can exhibit emergent behaviour, meaning that the behaviour of the whole system is not predictable from the behaviour of individual components, because interactions are crucial. Emergent behaviour also limits the ability to make predictions and exercise control. Co-evolution and self-organization describe how the system, its components, and interactions change and adapt over time.	Complexity: A Guided Tour. Mitchell M., 2011. OUP Self –organisation in Complex Ecosystems. Bascompte and Soule', 2006. PUP		
Complexity (complex adaptive systems)	The interactions between ecological processes and people operating within a multitude of inter-dependent drivers including economy, culture, climate and use of foresight and historical knowledge.	<i>Holland, John H. (1999). Emergence: from chaos to order. Reading, Mass: Perseus Books. ISBN 0-7382-0142-1.</i> Gunderson, L. H., and Holling C. S. (2002) Panarchy: understanding transformations in human and natural systems. Island Press, Washington, D.C., USA. Wikipedia says A complex adaptive system is a system that is complex in that it is a dynamic network of interactions , but the behaviour of the ensemble may	Cross reference to socio-ecological systems – are these the same? Implications of using Complex Adaptive Systems – inductive working, can't predict, uncertainty, emergent outcomes – but we all tend to recognise complexity and need to be adaptive but then define	*

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		not be predictable according to the behaviour of the components. It is adaptive in that the individual and collective behavior mutate and self-organize corresponding to the change-initiating micro-event or collection of events - https://en.wikipedia.org/wiki/Complex_adaptive_system#Literature	the system we work with and reduce complexity that way. Linked to setting system boundaries and seeing interactions. Can feel a bit challenging to actually operationalise even if we all recognise it.	
Conditionality	The use of conditions attached to the provision of benefits such as a loan, debt relief or bilateral aid. These conditions are typically imposed by international financial institutions or regional organizations and are intended to improve economic conditions within the recipient country	https://en.wikipedia.org/wiki/Conditionality		KM
Contrasting use of landscape – e.g., landscape architects vs landscape ecology	The word “landscape” has a wide variety of interpretations, depending on the background or research topic. From all the visible features from a location (landscape architects), to any spatial area containing heterogeneity (landscape ecology), to whole countries (geographical spatial analyses), to just more than one field (for research topic normally focusing on a given area disregarding its spatial context).	https://en.wikipedia.org/wiki/Landscape Vicenzotti, V., Jorgensen, A., Qviström, M., Swaffield, S. (2016) Forty years of Landscape Research, Landscape Research, 41:4, 388-407, DOI: 10.1080/01426397.2016.1156070 Landscape ecology - The 'basics' of landscape ecology - Forest Research		MC
Convergence (internal and external)	Convergence is part of CAP reform language and refers specifically to payment rates. There are two difference types – internal and external. Internal convergence involves those countries who still make direct payments based on historical references. For these countries there is a need to reduce the differences between payment rates per hectare in a stepwise fashion across the period 2023-2027. The target is that all payment entitlements will have a value of at least 85% of the average payment entitlement value by	https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/new-cap-2023-27/key-reforms-new-cap_en		DM

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Scoring) scores	DAMS values can be calculated for a specific location directly or looked up from the DAMS scores for the whole of Britain			
Decoupling	Coupled support = The link between income support payments and production of specific goods. Decoupling is the removal of this link. (Partial) Recoupling is where funding is relined with production activity.	https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/income-support/additional-optional-schemes/voluntary-coupled-support_en	<p>Part of vocabulary of CAP payment types.</p> <p>Would be good to know what kind of flexibility might exist in the implementation of these terms – entrenched policies?</p> <p>Note that coupled payments are seen as a problem as they may increase intensity of production beyond the ability of environments to support them or beyond the needs of the market.</p> <p>Coupling (or conditionality) for environmental outcomes has less of this baggage but may be worth considering if “over supply” could ever be an issue.</p>	*
Degressivity	This is a term related to CAP payments which describes the reduction of payment rate above a certain threshold.	https://agriculture.ec.europa.eu/news/cap-measures-play-important-role-supporting-farm-income-2021-05-12_en		DM
DEM (Digital Elevation Model)	A representation of surface elevation data.	https://en.wikipedia.org/wiki/Digital_elevation_model	Often used interchangeably with DSM (Digital Surface Model) and DTM (Digital Terrain Model) although a DTM is specifically the height of the ground surface, while DEM/DSM can include overlaying objects such as buildings, vegetation cover etc	KM

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Demographics	The statistical characteristics of human populations	https://www.merriam-webster.com/dictionary/demographic		AG
Designed landscapes	<p>An area of land which has been modified by people for primarily aesthetic effect.</p> <p>Recorded within a spatial inventory by "Historic Environment" called "Inventory of Gardens and Designed Landscapes".</p> <p>"The most common type of site on the Inventory is the estate landscape – the policies associated with an important house or castle, developed by country landowners for both pleasure and productive purposes.</p> <p>Other types of site on the Inventory include: botanic garden collections, urban parks, horticulturalist's gardens, Cemeteries"</p>	<p>https://en.wikipedia.org/wiki/Designed_landscape</p> <p>https://www.historicenvironment.scot/advice-and-support/listing-scheduling-and-designations/gardens-and-designed-landscapes/what-is-the-inventory-of-gardens-and-designed-landscapes/</p>		AG
Desirability	To be judged as worth having or wanting	https://dictionary.cambridge.org/dictionary/english/desirability	Arose from discussion regarding conceptual framework and how to evaluate outcomes from the processor. Whilst feasibility can be derived from metrics about the state of the bio(geo)sphere and viability from the metrics on the state of the technosphere, desirability is about what these mean for the society, group or individual and whether they believe it is a positive outcome. Therefore, desirability is about deliberation, positionality and politics and is a normative judgement.	*

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DIPs, deliberate inclusive processes	Interactive processes (workshops, focus groups, and other events) with stakeholders, over time, that support deliberation (reasoned-based debate) on issues.	Dryzek, J., Deliberative democracy and beyond: liberals, critics, contestations , Oxford University Press, Oxford, 2000. Rauschmeyer, F. and Wittmer, H., Evaluating deliberative and analytical methods for the resolution of environmental conflicts , Land Use Policy 23(1), 108-122, 2006. https://doi.org/10.1016/j.landusepol.2004.08.011	Use as part of reviews of DSS in early 2000's and the transition towards Quantitative Story Telling. Matthews, K. B., Rivington, M., Blackstock, K. L., McCrum, G., Buchan, K., and Miller, D. G., Raising the bar? - The challenges of evaluating the outcomes of environmental modelling and software , Environmental Modelling and Software 26(3), 247-257, 2011.	
Dispersal theory	A theory describing an ecological process which involves the movement of an individual or multiple individuals away from the population in which they were born to another location, or population.	https://royalsocietypublishing.org/doi/10.1098/rsfs.2013.0028		AG
Driven Grouse Moor(s)	A moorland humanly managed to facilitate grouse shooting, this may include heather burning (muirburn), predator control, tick management, etc.	Wikipedia page - https://en.wikipedia.org/wiki/Driven_grouse_shooting	Thus, limits carbon-sequestering capacities of the land, and ecological, conservational, and wider wildlife point of view. Yes, a controversial practice. Fewer hares, raptors, thus, trade-offs, for example.	*
DSSAT (Decision-Support System for Agro-technology Transfer)	A set of computer programs for simulating agricultural crop growth	https://dssat.net		MR

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Ecological niche theory	A theory which states that an ecological community is made up of a limited number of niches, each occupied by a single species	https://www.frontiersin.org/articles/10.3389/fmicb.2020.01942/full		AG
Ecosystem	The complex of living organisms, their physical environment, and all their interrelationships in a particular unit of space. A system consisting of biotic and abiotic components that function together as a unit.	https://www.britannica.com/science/ecosystem https://www.biologyonline.com/dictionary/ecosystem		MC
Effects of scale and resolution	Results of models and statistical analysis often depend on the scale and resolution adopted because, many variables have non stationary means, and different gradients are more prominent when different windows of analysis are used.			AG
Efficiency, Jevons paradox	The Jevons Paradox states that, in the long term, an increase in efficiency in resource use will generate an increase in resource consumption rather than a decrease.	https://www.frontiersin.org/articles/10.3389/fenrg.2018.00026/full#:~:text=and%20behavioral%20adjustment,-,Introduction,consumption%20rather%20than%20a%20decrease		KM
Env and social deprivation	Absence of an environment that stimulates intellectual and behavioural development, such as educational, recreational, and social opportunities	https://dictionary.apa.org/environmental-deprivation		AG
Environmental condition	The state of the environment, including natural resources (e.g., flora and fauna), soil, surface water, ground water, any present or potential drinking water supply, subsurface strata or ambient air	https://www.lawinsider.com/dictionary/environmental-conditions		MA
Environmental impact	The effect of human activity on the environment			SM
Environmental Key Performance Indicators	Quantitative measures that put values on the environmental performance of a business or operation.			MA

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EO-based condition	Property or condition determined or estimated by using Earth Observation methods, i.e. using sensors mounted on satellites or airborne vehicles			AG
Epistemic objectivity	Methods of science which lead us to the objective truth about the objective world		A critical view of limitations and advantages	AG
ESCOM (Ecosystem Services Community Scotland)	An informal community of practice to foster academic collaboration around the emerging natural capital research and policy agendas	https://naturalcapitalscotland.com/article/escom-ndash-a-new-working-group-to-strengthen-collaboration-with-the-research-community/	Several other organisations with the same acronym!	KB
ESF (European Social Fund)	The European Union's main instrument for investing in people	https://ec.europa.eu/european-social-fund-plus/en		MR
Estate	'any large parcel of land under single ownership' often associated with uplands; often long-term ownership and promoted as having multiple objectives – mix of enterprises (agriculture, forestry, sporting, conservation)	SLE talks about country estates, which is defined as “A <i>property</i> in the countryside, typically with surrounding grounds and cultivated land to which one or more tenant farms are attached.” https://www.lexico.com/definition/country_estate Sustainable Estate project doesn't directly define estates but does define privately owned estate as “an estate owned by a private individual, family, charitable trust or commercial organisation” https://www.perth.uhi.ac.uk/t4-media/one-web/perth/news/images/Working-Together-for-Sustainable-Estate-Communities.pdf	Also consider housing estates – implies an area of land zoned for a specific use, although broken down into individually owned parcels. Not sure if the 'estate' as a whole has any legal meaning in this context, maybe just a legacy term?	*
Ethnography	A branch of anthropology and the systematic study of individual cultures which explores cultural phenomena from the point of view of the subject of the study. A qualitative research method predicated on the diversity of culture at home (wherever that may be) and abroad	https://en.wikipedia.org/wiki/Ethnography https://anthropology.princeton.edu/undergraduate/wh-at-ethnography		KB

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Extent and intensity metrics –	Societal metabolism analysis idea that when using metrics to define system performance there are two useful ways to proceed. Extent – how big elements are. Intensity – rate variables (x per y). Example being highlighting comparison between intensity per ha of N use, where NL is highest, contrast with extent where FR is by far the largest user of N (combined area and rates).	Deliverable 4.4: Report on the experience of applications of the Nexus Structuring Space in Quantitative Storytelling MAGIC-NEXUS Project	Links to funds and flows ideas – (£/ha or T/hour etc.) Preference for fund/flow ratios – not flow-flow ratios as can get same rate in different ways – Energy/GDP – low/low (Laos) and high/high (Germany)	KM
Externalisation	This refers to importing goods and services without accounting for their impact on the environment. Hence not calculating a global footprint. This can give the impression that growth is not reliant on material throughput, when this is simply shifted or leaked outside the accounting boundaries.		Links to “apparent dematerialisation”	KM
Externality	A cost or benefit caused by a producer that is not financially incurred or received by that producer	https://www.investopedia.com/terms/e/externality.asp#:~:text=Investopedia%20%2F%20Madelyn%20Goodnigt-What%20is%20an%20Externality?,of%20a%20good%20or%20service		SM
FADN/APHA (Farm accountancy data network)	A source for monitoring farm income and business activity which can be used to understand the impact of measures taken under the common agricultural policy	https://agriculture.ec.europa.eu/data-and-analysis/farm-structures-and-economics/fadn_en		KM
Farm systems	An approach to farming that exists in a particular geographic area, characterised by similar technological approaches, management, inputs outputs and markets e.g., the ‘beef barley system’ in Scotland	Definition of ‘agricultural system’ from the FAO: https://www.fao.org/3/w7365e/w7365e04.htm Typologies of farming systems: https://geography-revision.co.uk/gcse/agriculture/types-of-farming/	There is a large body of literature on ‘farming systems’ - more popular a few decades ago. There is an ‘international farming systems’ conference held biannually in Europe.	*
Farmyard area identification	Modelled areas of farm impervious surfaces (buildings and hard standings)	https://doi.org/10.3389/fenvs.2022.976933	Model is based on locations of farms provided in OS AddressBase and data on	MCC

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			surfaces from OS Mastermap, as the best available data on farm locations, although anecdotally this dataset has absences and incorrectly identified points	
Feasibility	The possibility that can be made, done, or achieved, or is reasonable. The capability of a task being done or carried out	https://dictionary.cambridge.org/dictionary/english/feasibility https://www.merriam-webster.com/dictionary/feasible		KM
Flows	Movement of things - money, goods, resources etc - between places	https://cla.umn.edu/geography/research/specialties/culture-place-and-flows		KM
Fluvial risk	The risk of flooding as a result of the water table rising			AG
Food security	"Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life". (World Food Summit, 1996)	FAO definition - (World Food Summit, 1996)	Does this really mean all people at all times? This leads us to ask, does or has food security ever existed? and if we include future and historical generations too? Seems to be a multi-layered/level concept, individual, household, nation, population.	*
Food system	The interconnected systems and processes that influence nutrition, food, health, community development, and agriculture	https://en.wikipedia.org/wiki/Food_system		MR
Forestry-based C offsets	Cancelling the impact of emissions by investing in forestry planting and preservation			AG
Fragmentation	The process of breaking into pieces or being divided into parts. In biology, a form of asexual reproduction wherein a parent organism breaks into fragments, each capable of growing independently into a new organism	https://dictionary.cambridge.org/dictionary/english/fragmentation https://www.biologyonline.com/dictionary/fragmentation		AG

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Funds	Pools of money set aside for a specific purpose			KM
Gamification	To adapt (a task) so that it takes on the form of a game	https://www.collinsdictionary.com/dictionary/english/gamify		MCC
Gardens	Recorded within a spatial inventory by "Historic Environment" called "Inventory of Gardens and Designed Landscapes". "The most common type of site on the Inventory is the estate landscape – the policies associated with an important house or castle, developed by country landowners for both pleasure and productive purposes. Other types of site on the Inventory include: botanic garden collections, urban parks, horticulturalist's gardens, Cemeteries"	https://www.historicenvironment.scot/advice-and-support/listing-scheduling-and-designations/gardens-and-designed-landscapes/what-is-the-inventory-of-gardens-and-designed-landscapes/		AG
Geochemical atlas	The concentration in soil of a range of chemical elements on a regular 20km grid across Scotland.	https://www.hutton.ac.uk/sites/default/files/files/soils/GeochemicalAtlas_web_aug11.pdf	Data determined by aqua regia extraction of prepared soil samples to give a 'total' elemental concentration in soil.	MCC
GHG flux	The amount of a greenhouse gas (CO ₂ , CH ₄ , N ₂ O) added to the atmosphere by emissions from various sources such as the combustion of fossil fuels or industrial processes. The net flux is what is left after these gases have been absorbed by sinks such as oceans and land biomass	https://climate.copernicus.eu/ESOTC/2019/greenhouse-gas-fluxes		TP
Granularity	The scale or level of detail in a set of data			MC
Green washing	Pejorative - Adding the word green to policies or objectives (growth, jobs, finance etc) without changing the substance of objectives, measures or implementation.		See Greening	*
Greening	Including environmental concerns into policy or other decisions		See Green Washing	*
Greening CAP	If part of CAP payments – then the part of BPS tied to additional conditionality e.g., perm grasslands, Ecological focus areas and formerly	https://agriculture.ec.europa.eu/common-agricultural-policy/income-support/greening_en	See green washing	*

Item	Explanation	Citation	Issues/Points of difference	Person
	also crop diversification (3-crop rule). Now linked to Enhanced Conditionality proposals in post 2026 payments.			
GROS (General Register Office for Scotland)	Former Scottish Government directorate that administered the registration of births, deaths, marriages, divorces and adoptions in Scotland from 1854 to 2011.		On 1 st April 2011 it was merged with the National Archives of Scotland to become the National Records of Scotland https://www.nrscotland.gov.uk	KM
HADRM3	A series of models designed to simulate the regional climate for Europe and the UK in the period 1950-2100 for various emissions scenarios	http://catalogue.ceda.ac.uk/uuid/f9c7d70b0e6d4c31c067e75ab67cb3cc		KM
Hobby Farmers	People who own land and manage it for productive purposes due to lifestyle motivations but where farming is not their main source of income. Separate from crofting as different identities.	https://en.wikipedia.org/wiki/Hobby_farm#United_Kingdom https://onlinelibrary.wiley.com/doi/10.1111/soru.12262	Better to use amenity farming, lifestyle farmers. Hobby seen pejoratively – why? What is different to new entrants to farming/crofting? Not-for profit-farming – can be for production but not (maximising) income. Slipper farmers are different (but important)	*
Holding (Agriculture)	Set of land parcels and associated resources – livestock, machinery and infrastructure identified by a person or other legal entity as conducting agriculture (or closely related activities such as livery stables). Colloquially a farm, but once large enough can be referred to as an estate. Can be part of a multi-holding business		Important to make distinction between different ‘types’ of Holding Field < holding < business	*
Horticulture in rural or urban areas (allotments)	Small land parcels (standard is 10 poles, an old area measurement equal to approx. 25 square metres). Allotment areas are normally coordinated through local authorities in the UK, and are used for domestic vegetable/flower production. Soils are commonly carbon and	https://www.allotment-garden.org/ https://www.gov.uk/apply-allotment	Allotments commonly have long waiting lists and are often subject to land rights/ownership disputes involving local authorities, developers and plot holders.	MA

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	nutrient rich due to high rate applications of compost and/or manure.			
Hotspot	A place which is either particularly rich in species not found elsewhere, or which is threatened due to loss of most of the original species	https://www.conservation.org/priorities/biodiversity-hotspots		KM
IACS (Integrated Administration and Control System)	A system for recording the permanent and seasonal activity on agricultural land parcels, and administering payments associated with them.	https://agriculture.ec.europa.eu/common-agricultural-policy/financing-cap/assurance-and-audit/managing-payments_en		KM
Identity	The qualities, beliefs etc that distinguish or identify a person or thing	https://www.dictionary.com/browse/identity		SM
Imaginaris				
Interpolation	A method of constructing new data points based on the range of a discrete set of known data points. Can be applied to spatial data.	https://en.wikipedia.org/wiki/Interpolation		MA
INVEST (Integrated Valuation of Ecosystem Services and Tradeoffs) model	A suite of models used to map and value the goods and services from nature that sustain and fulfil human life	https://naturalcapitalproject.stanford.edu/software/invest		AG
Just Transition	"The ILO's vision of just transition is broad and primarily positive. It is a bridge from where we are today to a future where all jobs are green and decent, poverty is eradicated, and communities are thriving and resilient. More precisely, it is a systemic and whole of economy approach to sustainability. It includes both measures to reduce the impact of job losses and industry phaseout on workers and communities, and measures to produce new, green and decent jobs, sectors and healthy communities. It aims to address	Just transition - Wikipedia Just Transition Commission - gov.scot (www.gov.scot) https://www.oecd.org/environment/cc/g20-climate/collapsecontents/Just-Transition-Centre-report-just-transition.pdf	<p>Moving towards a new socioeconomic system that is fair. e.g., for oil and gas in Aberdeen, a just transition would provide new employment that is equitable.</p> <p>It is interesting that justice of transition occasioned by societies need to rid itself of an industry that is inherently</p>	*

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	environmental, social and economic issues together. " (source , page 3)		polluting and could make large parts of the globe uninhabitable and has been hugely profitable yet now needs a specific just transition whereas elimination of other sectors has no such concerns when driven by the "invisible hand of the market" i.e. shipbuilding, cars, coal etc. Special case for fishing when faced by collapse of stocks?	
Land	For C3-1, land means the terrestrial surface of Scotland, with a particular focus on the non-urbanised areas.	In the Scottish Government statement on Land Rights and Responsibilities they note "The Land Reform (Scotland) Act 2016 does not define the meaning of "land" for the purposes of the Scottish Land Rights and Responsibilities Statement. Schedule 1 of the Interpretation and Legislative Reform (Scotland) Act 2010 applies: this provides that "land" includes buildings and other structures, land covered with water, and any right or interest in or over land	What is the meaning of Land? The prefix for land cover, use, rights, scape etc. Is land inclusive of urban and water? We tend to assume in C3-1 that is rural land. LUS separates into 7 landscape [types]: <ul style="list-style-type: none"> - Settlements - Enclosed farmland - Semi-natural land - Rivers and water bodies - Coastal - Islands - Marine We are probably focussed on the ones in bold.	*
Land capability	The ability of a piece of land to sustainably support a specific land use	https://www.hutton.ac.uk/learning/exploringscotland/land-capability-agriculture-scotland https://www.hutton.ac.uk/learning/natural-resource-datasets/landcover/land-capability-forestry	JHI have produced Land Capability for both Agriculture and Forestry in the past.	KM
Land Cover	The mix of vegetation and/or human made materials present in a land parcel – this may imply use and management but is not always the same. Depending on classification and granularity may be a single cover or an intimate mixture. More than one land cover	Definitions are purpose specific or may be the outcome of the method used to gather the data – e.g., ground survey vs. remote sensed. and may exist at differing levels of granularity, typically arranged as a hierarchy. Examples:	In our experience, land cover and land use can be used interchangeably, and they are not the same. Need to ensure that we clarify the difference between LC &	*

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	<p>(heather, grass, scrub trees) can define a habitat (e.g., those of EUNIS) and multiple covers or habitats in an area may be subjected to a “use” such as grazing.</p>	<p>FAO – ‘Land cover is the observed (bio)physical cover on the earth's surface’ CORINE – ‘the biophysical characteristics of the Earth's surface’. EUNIS is a habitat typology Hutton “Land cover describes the principal features and characteristics of the countryside”.</p>	<p>LU & land management. E.g. LC is grass, LU is grass for what.... Grass tends to be harder to read LU off from LC. What happens with forestry? Is this the same? Yes, multiple uses from the same type of tree cover. Macaulay Land Cover Map differs from CEH Land Cover map – CEH has only single land cover types, ours have mosaics. E.g. forestry is one land cover, or used to distinguish between types of trees (deciduous or coniferous etc). Raises questions about what the planning unit should be. NCAI – EUNIS index for habitat types that links to land cover. National forest inventory. So lots of different types of land cover maps and data sets – these might condition what people think of when we say land cover. Corinne land cover. Biophysically defined. Some based on function (e.g., converting from habitat (conservation) to agriculture or forestry (so with use intended). Do we include non-rural land (e.g. urban, sealed). Also, National Vegetation Classification: National Vegetation Classification: Users' handbook (jncc.gov.uk) is another habitat typology</p>	
Land Rights	The limits on how land can be used and the expectations. Formal and informal aspects. Property	The SG Land Rights and Responsibilities does not explicitly define land rights but the principles for the statement include	In Scotland, there is a formal statement on Land Rights and	*

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	rights (and responsibilities) in law but also social expectations (e.g., responsible access rights).	a reference to human rights see: https://www.legislation.gov.uk/asp/2016/18/section/1 https://www.lawscot.org.uk/news-and-events/legal-news/land-rights-and-responsibilities-statement-up-for-review/ https://en.wikipedia.org/wiki/Land_law	RESPONSIBILITIES – there is a spectrum from very specific formal legal property rights to a more philosophical social movement about ethics, identity and human rights (e.g. indigenous claims on traditional lands). New Land Reform Bill due 2023 Also Human Rights Bill (2023) – definitions will be part of this.	
Land Tenure	The legal framework that links people (or other legal entities) and land and defines limits on how land can be used/managed. Typically distinguishes - Owned, Rented (durations), Partnerships, Communities and Commons			*
Land Use	The use of land by humans to produce a range of multiple benefits.	US EPA – ‘the human use of land. It represents the economic and cultural activities (e.g., agricultural, residential, industrial, mining, and recreational uses) that are practiced at a given place’. Land Use US EPA There is no specific definition of Land use in the Land Use Strategy (2021-26) but the introduction talks about what we ask from our land “Our land produces much of the food we eat, supports the renewable power we use to heat our homes, and the timber and land to build our houses and communities. It is the basis for the ecosystems that we rely on for the air we breathe and the water we drink. It is a vital part of our natural capital, an asset that underpins our entire economy and in particular the nature-based ‘green’ economy that will employ more and more people in years to come. Our land also supports the habitats and living creatures that make up Scotland’s unique and precious biodiversity, and our awe-inspiring landscapes that are recognised and loved by both the people of Scotland and beyond. It is where we go for exercise, recreation, and to connect with our environment and our history.	To note that in the Climate Change Plan, land use is separated to agriculture, yet agriculture section of CCP talks about forestry and multi-functional land use; and the land use section talks about agriculture. However, this might help us understand what policy actors think is (or is not) covered by ‘land use’ – see https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/pages/13/	*
Land use conflicts	Disagreements over the potential or actual use of a land resource.			*

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Land Use/Landscape conflicts	<p>Interactions between uses or users – sometimes between locations windfarms vs housing (between locations) or recreation vs agriculture (one location)</p> <p>A land use conflict is a situation where there is a disagreement on the use of a certain piece of land and/or a belief that people’s rights or well-being are being threatened by an action or undertakings of another, or the inaction of another party.</p>	<p>LAND USE CONFLICT.pdf (cost-rely.eu) Learmonth R., Whitehead R., Boyd W., Fletcher S. (2007). Living and working in rural areas: A handbook for managing land use conflict issues on the NSW North Coast. Department of Primary Industries, Australia: Wollongbar, 124 p. Von Der Dunk, A., Grêt-Regamey, A., Dalang, T., & Hersperger, A. M. (2011). Defining a typology of peri-urban land-use conflicts–A case study from Switzerland. <i>Landscape and Urban Planning</i>, 101(2), 149-156. Raška, P., Frantál, B., Martinát, S., & Hruška, V. (2022). Exploring local land use conflicts through successive planning decisions: a dynamic approach and theory-driven typology of potentially conflicting planning decisions. <i>Journal of Environmental Planning and Management</i>, 1-20. https://doi.org/10.1080/09640568.2022.2060806</p>		*
Land-based business	<p>Any business that is primarily based on the products from or use of land. Term used by organisations in the land sector for ‘more than farm’ businesses.</p>	<p>Midgely et al 2008 (Microsoft Word - Primary land based business study - Report - draft - 8 Apr\205 (researchgate.net))</p>		*
Landscape	<p>Collections of human and more-than-human elements engaged in an ongoing performance which gains meaning through the practices for which it is used. An evolving ‘taskscape’. Landscapes are emergent in the stories that people tell about them</p>	<p>Ingold, T. 2017. Taking taskscape to task. In <i>Forms of Dwelling. 20 years of taskscapes in Archaeology</i>, by U. Rajala and P. R. Mills (eds.). Oxford, UK: Oxbrow Books. Ingold, T. 2011. <i>Being alive. Essays on movement, knowledge, and description</i>. Abingdon, Oxon: Routledge. Olwig, K.R. 2002. <i>Landscape, Nature and the Body Politic. From Britain's renaissance to America's new world</i>. London: University of Wisconsin Press.</p>	<p>This is a specific theoretical perspective on landscape. Olwig (2002) demonstrated the complex history of the term ‘landscape’, pointing out that there is no agreement among even amongst scientists about whether ‘landscape’ refers to landforms or the visual image of a particular area.</p>	*
Landscape aesthetics	<p>As a landscape characterisation, aesthetics is described in CICES v5.1 as “the beauty of nature” with the following ecological clause: “The bio-physical characteristics or qualities of species or ecosystems (settings/cultural spaces)”. The</p>	<p>Gobster, P.H., Nassauer, J.I., Daniel, T.C., Fry, G. (2007). The shared landscape: what does aesthetics have to do with ecology? <i>Landscape Ecol.</i> 22 (7), 959–972. Haines-Young, R. and Potschin, M.B. (2018). Common International Classification of Ecosystem Services</p>	<p>From Castellazzi, M., Aalders, I., Irvine, K.N. (2022). A prototype methodology to mapping selected bio-physical aspects of CICES-defined Aesthetics in</p>	*

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	<p>perceiver characteristics, such as its cultural background, its origin (local/visitor), and its appreciation of ecosystem functions can influence its perceived aesthetics value of the landscape; and thus landscape aesthetics can also be defined as a subjective process.</p> <p>x</p>	<p>(CICES) V5.1 and Guidance on the Application of the Revised Structure.</p> <p>Jorgensen, A. (2011). Beyond the view: Future directions in landscape aesthetics research. Landscape and Urban Planning. Vol 100, 4, 353-355.</p> <p>Parsons, R. and Daniel, T.C. (2002). Good looking: in defense of scenic landscape aesthetics. Landscape and Urban Planning. 60, 43-56.</p>	<p>Scotland. RESAS 1.4.1 Method testing for aesthetics cultural ecosystem services. James Hutton Institute, Scotland, UK. <i>Aesthetics is a highly charged word generating contrasting and sometimes polemic discussions (Parsons and Daniel, 2002; Jorgensen, 2011; Gobster et al., 2007). Landscape aesthetic has been the focus of a wide range of scientific research (Haines-Young et al., 2018) from arts and humanities, environmental psychology and landscape ecology to landscape urbanisms; each with their own perspective on what aesthetics is and how to evaluate it (Parsons and Daniel, 2002; Jorgensen, 2011).</i></p>	
Landscape architecture	The planning, design, management, and nurturing of the built and natural environments			MC
Landscape capacity	Landscape capacity refers to the degree to which a particular landscape character type or area is able to accommodate change without significant effects on its character, or overall change of landscape character type. Capacity is likely to vary according to the type and nature of change being proposed.	<p>A Guide to Commissioning a Landscape Capacity Study Toolkit. NatureScot.</p> <p>Toolkit 110523 (nature.scot)</p>	Links to vulnerability and resilience.	*
Landscape Character Assessment	The distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape. It is a standard methodology for identifying, describing, classifying and mapping.	<p>The European Landscape Convention (Florence, 2000).</p> <p>The European Landscape Convention (coe.int)</p> <p>LANDSCAPE_CHARACTER.pdf (cost-rely.eu)</p>	Ties to landscapes of consumption.	*

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	<p>what is distinctive about landscapes. It is used in the assessment of landscape impacts for land use changes.</p> <p>NatureScot: “Landscape Character Assessment (LCA) is the process of identifying and describing variation in the character of the landscape. LCAs identify and explain the combination of elements and features that make landscapes distinct from one another by mapping and describing Landscape Character Types and Areas. The associated description of their distinctive characteristics shows how the landscape is perceived and experienced by people. LCA analyses in detail the three main physical landscape components of:</p> <ul style="list-style-type: none"> - landform (e.g. hills, straths, glens) – such as, are hills rounded or angular? - land cover (e.g. rivers, lochs, woodland, farmland) – such as, what is the dominant type and pattern of woodland? - settlement (e.g. towns, villages, farmsteads) – such as, what is the pattern of settlement? <p>It then looks at how all these combine to form the landscapes we see and experience. Areas with similar patterns of components are mapped together as a particular Landscape Character Type.” (SNH, 2019)</p>	<p>SNH (2019) Landscape Character Assessment. https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/what-landscape-character-assessment Julie Martin Associates and Carys Swanwick (2003). ‘Overview of Scotland’s National Programme of Landscape Character Assessment’. Scottish Natural Heritage Commissioned Report F03 AA307. SNH Commissioned Report 29: Overview of Scotland’s national programme of Landscape Character Assessment (nature.scot)</p> <p>Ode, A., Fry, G., Tveit, M.S., Messenger, P., Miller, D. (2009). Indicators of perceived naturalness as drivers of landscape preference. J Environ Manag 90(1):375–383 https://doi.org/10.1016/j.jenvman.2007.10.013</p>	<p>For Scotland, SNH produced two Landscape Character Assessments: 2003 and 2019. The 2003 version has a higher classification of 57 classes (“level 3”), whereas the 2019 consists of 390 individual Landscape Character Types (LCTs).</p>	
Landscape Character Units	An area defined by a specific combination of characteristics, both physical and socio-cultural	https://www.gov.uk/guidance/landscape-and-seascape-character-assessments	Same as Landscape Description Unit (‘a representation of a Landscape Type in a specific location. These are the basic building blocks of the landscape and are defined by a combination of six key characteristics relating to geology, topography, soils, tree	*

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			cover character, land use and historic settlement pattern') or Landscape Character Areas? Relies on a clear understanding of 'what is a 'landscape''?	
Landscape characterisation approaches	<p>Natural science or bio-physical approaches to landscape characterisation tend to consider that a descriptive investigation of the landscape by experts using transparent methods and spatial datasets are likely to reach repeatable results (McHarg, 1969 in Simensen et al., 2018). The landscape tends to be perceived as an object, independent from the observer (Simensen et al., 2018).</p> <p>In contrast, a holistic approach, also referred to as "Landscape Character Assessment" by Simensen et al. (2018), considers the landscape as a social construct or an Aesthetics object which is dependent on human perceptions. The "Landscape Character Assessment" approach is being followed by the European Landscape Convention, and usually is structured in 2 stages: a process of characterisation using social science (people-centred), followed by a judgement/value assessment based on this initial social-focused characterisation (Simensen et al., 2018).</p>	<p>McHarg, I.L. (1969). Design with nature. Published for the American Museum of Natural History by Doubleday/Natural History Press, Garden City, N.Y.</p> <p>Simensen, T., Halvorsen, R., Erikstad, L. (2018). Methods for landscape characterisation and mapping: a systematic review. Land Use Policy, 75, pp. 557-569, http://doi.org/10.1016/j.landusepol.2018.04.022</p> <p>Text copied from: Castellazzi, M., Alders, I., Irvine, K.N. (2022). A prototype methodology to mapping selected bio-physical aspects of CICES-defined Aesthetics in Scotland. <i>RESAS 1.4.1 Method testing for aesthetics cultural ecosystem services</i>. James Hutton Institute, Scotland, UK.</p> <p>https://www.hutton.ac.uk/sites/default/files/files/waters/aesthetics/AestheticsReport.zip</p>		*
Landscape ecology	The study of the pattern and interaction between ecosystems within a region of interest, and the way the interactions affect ecological processes, especially the unique effects of spatial heterogeneity on these interactions	https://www.nature.com/scitable/knowledge/library/principles-of-landscape-ecology-13260702/		MC
Landscape governance	The processes of goal-oriented formulation, coordination, management and decision-making about utilisation and protection of landscape involving governmental and non-governmental actors (general public, NGOs, private sector etc.).	Buizer M., Arts B., Westerink J. (2016). Landscape governance as policy integration "from below": A case of displaced and contained political conflict in the Netherlands. Environment and Planning. C, Government & Policy, 34(3): 448–462.		*

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		Castree N., Rogers A., Kitchin R. (2013). A dictionary of human geography. Oxford University Press, Oxford.		
Landscape quality	The perception of the holistic environmental, cultural, sensory and psychological characteristics of a landscape with respect to their benefits or significance to people. It is relative, not absolute, requiring interpretation in the context of geographic scale (i.e. local, regional, national) and, or human experience.	LANDSCAPE_QUALITY.pdf (cost-rely.eu) Lothian, A. (1999). Landscape and the philosophy of aesthetics: is landscape quality inherent in the landscape or in the eye of the beholder? Landscape and Urban Planning, 44(4), 177-198. Daniel, T. C. (2001). Whither scenic beauty? Visual landscape quality assessment in the 21st century. Landscape and Urban Planning, 54(1-4), 267-281.		*
Landscape sensitivity	The degree to which the character and qualities of the landscape are affected by specific types of development and land-use change.	Swanwick, C. (2002). Landscape Character Assessment. Guidance for England and Scotland. The Countryside Agency Scottish Natural Heritage. Landscape Character Assessment - Guidance for England and Scotland (nature.scot)		*
LANDSFACTS (Landscape Scale Functional Allocation of Crops Temporally and Spatially) model	A modelling tool to create scenarios of crops or land uses within the landscape. It uses a stochastic and rule-based model of spatial land use allocation. Advantage of approach: the rule-based part allows to strongly condition how the new land uses should be (forbidden land use changes, target of land use areas, land capability...) and the stochastic part allows some variability in the land use change produced (probabilities of land use change). The model provides a range of potential land use change meeting the rules. This is different from an optimisation land use model, which would provide a unique optimised result for the given parameters.	https://www.hutton.ac.uk/research/departments/information-and-computational-sciences/tools/landsfacts Castellazzi, M.S., Matthews, J., Angevin, F., Sausse, C., Wood, G.A., Burgess, P.J., Brown I., Conrad, K.F., Perry J.N. 2010. Simulation scenarios of spatio-temporal arrangement of crops at the landscape scale. Environmental Modelling and Software 25, 1881-1889. https://doi.org/10.1016/j.envsoft.2010.04.006 Brown, I., Castellazzi, M. 2014 Scenario analysis for regional decision-making on sustainable multifunctional land uses. Regional Environmental Change. 14 : 1357-1371. https://doi.org/10.1007/s10113-013-0579-3 Cf. Entry under: stochastic and rule-based model of spatial land use allocation		MC

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LCM (Land Cover Map)	Specifically, when referenced with a numeric date appended (e.g. LCM2007), a snapshot of the land cover of the UK produced from interpretation of satellite imagery.	https://www.ceh.ac.uk/data/ukceh-land-cover-maps	Land parcels are classified into one of 21 classes, with a translation to UK Biodiversity Action Plan (UKBAP) broad habitat classes. Early versions of the map are known to have errors associated with some of the classes.	KM
Legitimacy	The right and acceptance of an authority, usually a governing law or a regime. The belief that the government does things in terms of policy and law-making that are acceptable to the citizens of that state	https://en.wikipedia.org/wiki/Legitimacy_(political)		KM
Lemmings model	“Landscape Ecology MoveMent on Irregular Net polyGon Simulator” simulated species movement over a vector landscape through a random walk approach under land use and climate change.	Castellazzi M., Gimona A. 2018. Lemmings tool: assessing functional connectivity based on random walk of individuals in a vector landscape under land use and climate change - RESAS 1.4.2cii [D10] - Beta version of vector-based connectivity tool. Approach similar to: Palmer, S.C.F., Coulon, A., Travis, J.M.J. (2011) Introducing a ‘stochastic movement simulator’ for estimating habitat connectivity. <i>Methods Ecol. Evol.</i> 2, 258-268. (https://doi.org/10.1111/j.2041-210X.2010.00073.x)		AG
LFASS (Less Favoured Area Support System) versus Areas of Natural Constraint (ANC)	Less Favoured Area Support System – the system of payments for areas with biophysical constraint (also hides peripherality – in the fragility classes). Justified as income support, farm systems support, community etc. Even justified as CC and biodiversity. Frequently criticised by EU, dropped by DEFRA, with uplift for moorland areas in BPS. Would have been replaced 2017 or so by Areas Facing Natural Constraint – new area definitions.	KBM ANC work and reports. See ANC workshop materials – June 2016 – here: https://ics.hutton.ac.uk/research/land-systems-research-team/cap-analysis/anc-analysis/ See also https://webarchive.nrscotland.gov.uk/3000/https://www.gov.scot/Topics/farmingrural/SRDP/ANC2018		*

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		<p>Related work by Grieve, Cook, Moxey, Slee report here: https://www.gov.scot/binaries/content/documents/govscot/publications/progress-report/2016/07/evaluation-less-favoured-area-support-scheme-lfass-development-areas-natural/documents/00502550-pdf/00502550-pdf/govscot%3Adocument/00502550.pdf</p>		
Lock-in	<p>The tendency of institutions or technologies to become committed to remain the same (?) or develop in certain ways because of their structural properties or their beliefs and values.</p> <p>From resilience literature – a maladapted system that typically has small number of entities holding all the resources of a system, over time this becomes less resilient to change (seen in slow change variables) and may be prone to sudden collapse with substantial loss of various capitals, special case can be a downward spiral of resource degradation.</p>	<p>Cairns, R.C. (2014), Climate geoengineering: issues of path-dependence and socio-technical lock-in. WIREs Climate Change, 5: 649-661. https://doi.org/10.1002/wcc.296</p> <p>Cecere, G., Corrocher, N., Gossart, C., Ozman, M. (2014) Lock-in and path dependence: an evolutionary approach to eco-innovations. Journal of Evolutionary Economics 24, 1037–1065. https://doi.org/10.1007/s00191-014-0381-5</p> <p>Shackley S, Thompson M. (2012) Lost in the mix: will the technologies of carbon dioxide capture and storage provide us with a breathing space as we strive to make the transition from fossil fuels to renewables? Climate Change 2012, 110:101–121. https://doi.org/10.1007/s10584-011-0071-3</p>	<p>Depth of the “lock-in” “lock-in per se is not the problem; it is rather the depth of lock-in which creates problems because deeper lock-in reduces flexibility and increases the ‘error cost’ (i.e. the cost of a decision which turns out to be based on incorrect understanding) and should be avoided.” (Shackley and Thompson, 2012)</p> <p>“Lock-in” can imply “lock-out”, maintaining diversity can allow alternatives to survive.</p> <p>Can link to path dependency but not a given</p>	*
LoRa - short for Long Range	A communications protocol allowing data packets to be sent using radio frequencies.	<p>https://lora-alliance.org</p> <p>https://en.wikipedia.org/wiki/LoRa</p>	The combination of low bandwidth but long range makes it ideal for sending remote sensor data at high resolution time steps, removing the need for physical download of data from the sensor;	MCC

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			additionally the low power requirements mean sensors can operate for long periods of time with minimal/no maintenance. Often used interchangeably (but incorrectly) with LoRaWAN which is a software protocol used to manage LoRa traffic from multiple sensors and applications on the same network.	
Management interventions	Term commonly used where land managers make a change in management with the intent of achieving a specific goal or eliminating a particular issue. The change can be influenced by internal or external drivers.	What is Land Management Intervention IGI Global (igi-global.com)		MA
MAUP (modifiable areal unit problem)	An issue caused because data tabulated for different spatial scale levels or according to different zonal systems for the same region will not provide consistent analysis results	https://www.sciencedirect.com/topics/earth-and-planetary-sciences/modifiable-areal-unit-problem		AG
MIDAS (Met Office Integrated Data Archive System)	A database containing land surface (weather) observation data from the Met Office station network.	Cite as: Met Office (2019): Met Office MIDAS Open: UK Land Surface Stations Data (1853-current). Centre for Environmental Data Analysis, <i>date of citation</i> http://catalogue.ceda.ac.uk/uuid/dbd451271eb04662beade68da43546e1	Not all stations record the same variables, and the length of record varies, with some stations no longer recording, but having historic data still available. Access is restricted although a subset of data is available via MIDAS-open.	KM
Mitigation	The process or result of making something less severe, dangerous, painful, harsh, or damaging	https://www.merriam-webster.com/dictionary/mitigation		MR
Mode 1 and 2 thinking	Mode 1 is characterized by theory building and testing within a discipline towards the aim of universal knowledge, while Mode 2 is			KM

Item	Explanation	Citation	Issues/Points of difference	Person
	characterized by knowledge produced for application			
Multiple benefits	A humanly constructed view of seeing particular policies or activities/phenomena as able to provide simultaneous provision of many different ecosystem services.		Synonymous with co-benefits, though this implies a secondary benefit after the “main” benefit is delivered, multiple benefits may be equally valued.	*
Narratives	A particular way of understanding or explaining events.	Cambridge Dictionary	A method of qualitative data analysis i.e. ‘narrative analysis’	*
Natural Capital	<p>Natural Capital can be defined as the world’s stocks of natural assets which include geology, soil, air, water and all living things</p> <p>UK government - “Natural capital includes certain stocks of the elements of nature that have value to society, such as forests, fisheries, rivers, biodiversity, land and minerals. Natural capital includes both the living and non-living aspects of ecosystems.”</p> <p>Natural capital means the stock of renewable and non-renewable resources, including plants, animals, air, water and soil, that combine to provide benefits to people.</p>	<p>Linking to HM treasury Enabling a Natural Capital Approach guidance - GOV.UK (www.gov.uk)</p> <p>Natural Capital (cbd.int)</p> <p>Pioneering natural capital approach to land use management in the Scottish uplands The James Hutton Institute</p>	<p>What is value £? But even if what society values more widely, which parts of society?</p> <p>Stock in soc-met terms are non-renewables whereas funds are renewable.</p> <p>Linking to other capitals (human, social, built, financial, cultural/symbolic) – for understanding system as a whole.</p>	*
NBS (Nature Based Solutions)	Actions to protect, sustainably manage, or restore natural ecosystems, that address societal challenges such as climate change, human health, food and water security, and disaster risk reduction effectively and adaptively, simultaneously providing human well-being and biodiversity benefits.	https://www.worldbank.org/en/news/feature/2022/05/19/what-you-need-to-know-about-nature-based-solutions-to-climate-change#:~:text=Nature-based%20solutions%20are%20actions,well-being%20and%20biodiversity%20benefits.		MA

Item	Explanation	Citation	Issues/Points of difference	Person
	Nature-based solutions (NbS) involve working with nature to address societal challenges, providing benefits for both human well-being and biodiversity. Specifically they are actions that involve the protection, restoration or management of natural and semi-natural ecosystems; the sustainable management of aquatic systems and working lands such as croplands or timberlands; or the creation of novel ecosystems in and around cities. They are actions that are underpinned by biodiversity and are designed and implemented with the full engagement and consent of local communities and Indigenous Peoples.	https://www.naturebasedsolutionsinitiative.org/what-are-nature-based-solutions		
Non-equivalent (non-commensurable) perspectives	Concept from societal metabolism analysis – the idea that there are ways of looking at systems that cannot be boiled down into one single metric. This is partly a reaction to ideas of translating biophysical things into financial values and then using economic modelling methods. The essence of this is keeping biophysical elements in their native units (tonnes, MJ, etc). Links to concepts of issue framing and hypocognition.			
Non-linearity	A mathematical term describing a situation where the relationship between an independent variable and a dependent variable is not predictable from a straight line.	https://www.investopedia.com/terms/n/nonlinearity.asp		AG
Path dependency	What can be done now depends on what was done in the past. Can lead to lock-in.	Cairns, R.C. (2014), Climate geoengineering: issues of path-dependence and socio-technical lock-in . WIREs Climate Change, 5: 649-661.		*
Peat cutting	The activity of cutting peat which is then dried and used as a fuel source.		Still carried out domestically in Ireland and the Western Isles of Scotland as a cultural practice, although most commercial cutting has now ceased.	MA

Item	Explanation	Citation	Issues/Points of difference	Person
Peatlands	Organic soils must be present- "Peatlands are terrestrial wetland ecosystems in which waterlogged conditions prevent plant material from fully decomposing. Consequently, the production of organic matter exceeds its decomposition, which results in a net accumulation of <i>peat</i> . In cool climates, peatland vegetation is mostly made up of <i>Sphagnum</i> mosses, sedges and shrubs and are the primary builder of peat, whereas in warmer climates graminoids and woody vegetation provide most of the organic matter"	https://peatlands.org/peatlands/what-are-peatlands/	Peatland habitats always on peatland soils (ref NS mapping of peat and peatland vegetation?)	*
PES (Payment for ecosystem services)	Payments to farmers or landowners who have agreed to take certain actions to manage their land or watersheds to provide an ecological service	https://www.ied.org/markets-payments-for-environmental-services	(linking basic concepts of ES valuation to 'who pays' question and conversations around taxation, insurance, policy prioritisation and the identification of 'win-win' policy levers that provide long-term payment for ES within short-term electoral cycle priorities of policymakers).	MA
Phosphorous reuse	The reuse of phosphorus containing wastes and by products to potentially reduce application of mineral P fertiliser	https://www.crew.ac.uk/sites/www.crew.ac.uk/files/publication/CRW2017_04%20P%20flow%20mapping_Summary_report_1.pdf		MCC
Planetary Boundaries	From Rockstrom, " The planetary boundaries concept presents a set of nine boundaries within which humanity can continue to develop and thrive at the global level for generations to come. The planetary boundaries framework defines a safe operating space for humanity based on the intrinsic biophysical processes that regulate the stability of the Earth system.	https://www.stockholmresilience.org/research/planetary-boundaries.html	An anthropocentric point of view. Thus, historically, does the planet ever exceed its own boundaries. Boundaries carry an element of subjectivity about what is and isn't desirable (a value judgment). Thus, some argue that these boundaries over or underestimate resilience and sensitivity of the planetary system.	*

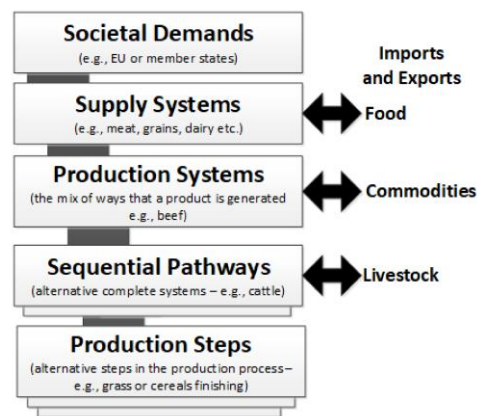
Item	Explanation	Citation	Issues/Points of difference	Person
Planning lock-ins	Planning lock-ins originate in situations when suboptimal planning policies are utilised as a consequence of path dependency. A combination of traditional institutional and behavioural paths and current socio-economic conditions shapes planning decision-making although more beneficial planning outcome is possible. Planning lock-in results in an ineffective course of action as self-reinforcing decision-making mechanism prevents change in planning practice.	Hetz, K., & Bruns, A. (2014). Urban planning lock-in: implications for the realization of adaptive options towards climate change risks. <i>Water International</i> , 39(6), 884-900. https://doi.org/10.1080/02508060.2014.962679 Cantarelli, C. C., Flyvbjerg, B., van Wee, B., & Molin, E. J. (2010). Lock-in and its influence on the project performance of large-scale transportation infrastructure projects: investigating the way in which lock-in can emerge and affect cost overruns. <i>Environment and Planning B: Planning and Design</i> , 37(5), 792-807. https://doi.org/10.1068/b36017		SM
Population dynamics	The study of how and why populations change in size and structure over time.	https://www.nature.com/subjects/population-dynamics#:~:text=Population%20dynamics%20is%20the%20study,of%20reproduction,%20death%20and%20migration.		AG
Production steps	In societal metabolism analysis the smallest units of analysis – these component are linked to create more complex Sequential Pathways representing the flows of materials.			
Production systems	Production systems are comprised of multidimensional components and drivers that interact in complex ways to influence production sustainability	https://www.sciencedirect.com/science/article/pii/S0304380016301417		KM
R Shiny	A package for the R software language designed to build interactive web apps	https://shiny.rstudio.com		KM
Raster or vector	Raster data consists of a matrix of cells (or pixels) organized into rows and columns (or a grid) where each cell contains a value representing information, such as temperature. Vector data is a way to represent real world features using sets of geographic coordinates.	https://desktop.arcgis.com/en/arcmap/latest/manage-data/raster-and-images/what-is-raster-data.htm https://support.esri.com/en/other-resources/gis-dictionary/term/7cbd3f7c-e17f-4bb0-a51a-318ccf5b68f1	There are many formats for raster and vector data	MA

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Region	A particular area or part of the world, or any of the large official areas into which a country is divided. An area of a country, especially one that has a particular characteristic or is known for something	https://dictionary.cambridge.org/dictionary/english/region		MC
Resilience	The ability of a system to handle shock or gradual change without collapse or radical transformation.	Climate Resilience Portal - Center for Climate and Energy Solutions Center for Climate and Energy Solutions (c2es.org) Resilience dictionary - Stockholm Resilience Centre	More generically ability of system to maintain functions – not necessarily preserving component entities. For example system provides job but not the same jobs is resilient (adaptable).	*
Rewilding	The large-scale restoration of ecosystems to the point where nature is allowed to take care of itself	https://www.rewildingbritain.org.uk/explore-rewilding/what-is-rewilding/defining-rewilding		TP
Risk	The possibility of loss or injury			MR
Risk Perceptions	The subjective judgement that people make about the characteristics and severity of a risk	https://en.wikipedia.org/wiki/Risk_perception		MR
Sankey diagrams	A type of flow diagram in which the width of the arrows is proportional to the flow rate	https://en.wikipedia.org/wiki/Sankey_diagram		KM
Scale	Spatial scale is the extent of an area at which a phenomenon or a process occurs. Scale has often been defined as the spatial, temporal, quantitative, or analytical dimensions used to measure and study any phenomenon (Gibson et al. 2000), or simply: the “measuring rule”. - proxy for granularity links to MAUP (Modifiable areal unit problem, Jelinski and Wu, 1996).	Gibbons, M. 2000. Mode 2 society and the emergence of context-sensitive science. <i>Science and Public Policy</i> 27:159-163. Jelinski, D.E. and Wu, J. (1996). The modifiable areal unit problem and implications for landscape ecology. <i>Landscape Ecology</i> , 11(3), 129–140. https://doi.org/10.1007/BF02447512	Concept of being mappable – is it possible to represent the phenomena (accuracy, representation – boundaries or transitions) Scale relating back to paper – large scale – big areas less detail vs small areas big detail	*
Scenario	A description of possible actions or events in the future	https://dictionary.cambridge.org/dictionary/english/scenario		MR
Scotland PLC branding	A term commonly used to cover the wider branding of Scotland as an exporter of quality foods, drinks and other products. Generally taken	PowerPoint Presentation (www.gov.scot) Toolkit Scotland.org		MA

Item	Explanation	Citation	Issues/Points of difference	Person
	to mean the way Scotland operates and is perceived as a coherent business unit, even though that is demonstrably not the case.			
Sensitivity	The proportion of samples that are genuinely positive that give a positive result using a specific test	https://www.technologynetworks.com/analysis/articles/sensitivity-vs-specificity-318222	Note relationship to specificity which is the proportion of samples that are genuinely negative that give a negative result using the test in question	SM
Sequential Pathways	A series of Production Steps (processes) that chain together to define a production Ssystem.	10.1016/j.jclepro.2019.119210		*
SFNC	Scottish Forum on Natural Capital	https://naturalcapitalscotland.com/	A forum to bring together land use and other stakeholders to discuss natural capital issues. Hutton (Kerry Waylen) chairs the Sustainable Land management group.	KB
Simulation	The imitation of the operation of a real-world process or system over time	https://en.wikipedia.org/wiki/Simulation		KM
Societal demand	In societal metabolism analysis the scale at which the operation of a social-ecological system is defined – societal demands (or expectations) define both what is desired in biophysical and quality of life terms.			
Societal metabolism	Societal metabolism is the study of the set of flows of materials and energy that occur between nature and society, between different societies, and within societies.	https://societalmetabolism.hutton.ac.uk/		*
Soil carbon ecology	Changes in the pool of soil carbon due to chemical and biological processes	https://jacksonlab.stanford.edu/sites/g/files/sbiybj20871/files/media/file/jackson_et_al._arees_2017.pdf		TP

Item	Explanation	Citation	Issues/Points of difference	Person
Soil health indicators	A composite set of measurable physical, chemical, and biological attributes which relate to functional soil processes and are being used to evaluate soil health status	https://link.springer.com/chapter/10.1007/978-981-15-2039-6_13	Indicators may vary according to land use	MA
Soil inputs (rock dust)	Waste from rock quarrying which is rich in minerals and can be applied to soil as an alternative to chemical fertiliser for some elements			MA
SMCA (Spatial Multi-Criteria Assessment)	Structured approach to spatially integrate multiple spatial datasets to support decision making. Technically, each spatial dataset is rescaled 0-1 (rescaling methods must be adapted to the dataset characteristics) and combined with others to lead to an overall spatial ranking.	Chakhar, S., Mousseau, V. (2008). Multicriteria Decision Making, Spatial. In: Shekhar, S., Xiong, H. (eds) Encyclopedia of GIS. Springer, Boston, MA. https://doi.org/10.1007/978-0-387-35973-1_839		MC
stochastic and rule-based model of spatial land use allocation	Modelling approach used by the LandFACTS software. Advantage: the rule-based part allows to strongly condition how the new land uses should be (forbidden land use changes, target of land use areas, land capability...) and the stochastic part allows some variability in the land use change produced (probabilities of land use change). The model provides a range of potential land use change meeting the rules. This is different from an optimisation land use model, which would provide a unique optimised result for the given parameters.	https://www.hutton.ac.uk/research/departments/information-and-computational-sciences/tools/landsfacts Castellazzi, M.S., Matthews, J., Angevin, F., Sausse, C., Wood, G.A., Burgess, P.J., Brown I., Conrad, K.F., Perry J.N. 2010. Simulation scenarios of spatio-temporal arrangement of crops at the landscape scale. Environmental Modelling and Software 25, 1881-1889. https://doi.org/10.1016/j.envsoft.2010.04.006 Brown, I., Castellazzi, M. 2014 Scenario analysis for regional decision-making on sustainable multifunctional land uses. Regional Environmental Change. 14 : 1357-1371. https://doi.org/10.1007/s10113-013-0579-3		AG
Stock	The quantity of a given resource – in societal metabolism the special case of a non-renewable fund (within a given time frame)			KM

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Story maps	A web-based application that allows users to create a narrative which combines maps, text and other multimedia content	https://doc.arcgis.com/en/arcgis-storymaps/get-started/what-is-arcgis-storymaps.htm		KM
Structural and functional types	In societal metabolism this is used as way to compare between systems – functional types define what is being done – e.g. moving energy as liquid fuels. The structural types in this instance could include super-tankers and a donkey cart with jerry cans. The importance of these ideas is in making sure that comparisons are like for like and that classifications are rigorous and well documented. This underpins the grammar used to frame the societal metabolism analysis.	Frontiers Unraveling the Complexity of the Jevons Paradox: The Link Between Innovation, Efficiency, and Sustainability (frontiersin.org)		KM
Sudoku	Analogy for societal metabolism where the values of components needs to sum to the whole of the systems – and often with intermediate scales such as regions or sectors. Sometimes the Sudoku implies the need to make best guesses e.g. on rates from benchmarks and experiment to see if the system can be balanced.			*
Supply systems	A level of analysis in societal metabolism that define how Societal Demand is met – i.e. from local supplies or imports (or exports limiting availability). Examples for land systems would be processed (i.e. consumption ready) food (meat, dairy, grains etc).	Matthews et al. https://www.mdpi.com/2071-1050/13/18/10080		



Item	Explanation	Citation	Issues/Points of difference	Person
Sustainability	The ability to maintain or support a process continuously over time			MR
Sustainable bio-energy	Sustainable bioenergies are renewable and low-carbon energy systems based on biofuels and biomass energy that are each step along the way from their production, processing to energy consumption guided by sustainability principles. Sustainable bioenergy systems manage natural resources responsibly, protect biodiversity and maintain ecosystem services, contribute to the circular economy, do not impair food security, reduce greenhouse gas emissions, avoid negative impact on their neighbourhoods and are designed and operated in the participation with local communities.	<p>Scarlat, N., Dallemand, J. F., Monforti-Ferrario, F., & Nita, V. (2015). The role of biomass and bioenergy in a future bioeconomy: Policies and facts. <i>Environmental development</i>, 15, 3-34. https://doi.org/10.1016/j.envdev.2015.03.006</p> <p>Mai-Moulin, T., Hoefnagels, R., Grundmann, P., & Junginger, M. (2021). Effective sustainability criteria for bioenergy: Towards the implementation of the european renewable directive II. <i>Renewable and Sustainable Energy Reviews</i>, 138, 110645. https://doi.org/10.1016/j.rser.2020.110645</p>		SM
Technosphere	The part of the environment which is made or modified by humans.	<p>https://en.wikipedia.org/wiki/Technosphere https://en.wikipedia.org/wiki/Anthroposphere</p>	Arose from discussion regarding conceptual framework and the use of 'technosphere' in the processor in Societal Metabolism studies	*
Tipping point	A critical threshold that, when crossed, leads to large and often irreversible changes in a system	https://www.annualreviews.org/doi/10.1146/annurev-environ-102511-084654		AG
Transformations	<p>Means change at its simplest, but transformation implies that the degree of change is substantial, system wide, beyond incremental and is initiated rather reacted to (contrasting with system collapse).</p> <p><i>Systems transformations are multi-dimensional, multi-faceted, and multilevel, cutting across national borders and intervention silos, across sectors and specialized interests, connecting local and global, and sustaining across time. A theory of transformation incorporates and integrates multiple theories of change operating at many levels that, knitted together, explain how major systems transformation occurs."</i></p>	<p>Quinn Patton (2019) Blue Marble Evaluation: Premises & Principles</p> <p>There is now a working paper developed from H2020 MERLIN project here: https://www.hutton.ac.uk/sites/default/files/files/06_%20Transformation Plenary 06.pdf</p>	<p>Suggested as part of QST0.2 workshop!</p> <p>Associated with Complex Adaptive Systems theory.</p> <p>Example definition work for C3 but there will be lots in the transformations and systems literature.</p> <p>Point being that whilst it is about change – the exact moment, type and outcome of the change is unpredictable, especially when not planned or when there are differences in what is desirable.</p> <p>Transformation can be a planned activity with a desired goal(s), set of</p>	*

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			<p>milestones and processes. What is perhaps unpredictable is the consequences of the transformation.</p> <p>Might be worth distinguishing between components of transform – physical, beliefs and attitudinal etc.?</p>																					
UKCP 18	A set of projections used to predict future UK climate.	https://www.metoffice.gov.uk/research/approach/collaboration/ukcp		KM																				
Uncertainty	<p>A degree of variation from accuracy and precision.</p> <p>There are fairly standard classifications of statistical uncertainty, again probabilities, and the significance of particular information or data.</p> <p>Uncertainty has a wider framing in science for policy – e.g. Epistemic, Ontological and Ambiguity. See table right</p> <p>There is also a useful distinction between Risk (probabilities estimable) vs Uncertainty (probabilities not estimable). Economists call the latter <i>Knighthian Uncertainty</i>.</p>	<p>Table 1 in https://academic.oup.com/policyandsociety/article/37/4/441/6402480?login=false</p> <p>Table 1 Nine types of uncertainty.</p> <table border="1"> <thead> <tr> <th></th> <th colspan="3">Type of uncertainty</th> </tr> <tr> <th>Object of uncertainty</th> <th>Epistemic</th> <th>Ontological</th> <th>Ambiguity</th> </tr> </thead> <tbody> <tr> <td>Substantive</td> <td>Lack of knowledge about the substance of the issue (e.g. what is the level of water pollution in the river?)</td> <td>Irreducible unpredictability of the substantive issue (e.g. how excessive will extreme rainfall events be?)</td> <td>Different frames about the substance of the issue (e.g. is this water scarcity a water supply or a water demand problem?)</td> </tr> <tr> <td>Strategic</td> <td>Lack of knowledge about the (inter)actions of actors (e.g. who is part of the water policy network?)</td> <td>Irreducible unpredictability of the (inter)actions of actors (e.g. how will actor A respond when publicly accused of corruption?)</td> <td>Different frames about the (inter)actions of actors (e.g. is this a genuine proposal for concertation or rather a delaying tactic?)</td> </tr> <tr> <td>Institutional</td> <td>Lack of knowledge about the rules of the game (e.g. what are the formal rules for public-private partnerships?)</td> <td>Irreducible unpredictability of the rules of the game (e.g. how will the upcoming elections affect the environmental regulation?)</td> <td>Different frames about the rules of the game (e.g. how should the precautionary principle be applied to this specific case?)</td> </tr> </tbody> </table>		Type of uncertainty			Object of uncertainty	Epistemic	Ontological	Ambiguity	Substantive	Lack of knowledge about the substance of the issue (e.g. what is the level of water pollution in the river?)	Irreducible unpredictability of the substantive issue (e.g. how excessive will extreme rainfall events be?)	Different frames about the substance of the issue (e.g. is this water scarcity a water supply or a water demand problem?)	Strategic	Lack of knowledge about the (inter)actions of actors (e.g. who is part of the water policy network?)	Irreducible unpredictability of the (inter)actions of actors (e.g. how will actor A respond when publicly accused of corruption?)	Different frames about the (inter)actions of actors (e.g. is this a genuine proposal for concertation or rather a delaying tactic?)	Institutional	Lack of knowledge about the rules of the game (e.g. what are the formal rules for public-private partnerships?)	Irreducible unpredictability of the rules of the game (e.g. how will the upcoming elections affect the environmental regulation?)	Different frames about the rules of the game (e.g. how should the precautionary principle be applied to this specific case?)	<p>At one end of the spectrum of knowing we have those things that we know and are confident we know. So, for example there might be some parameter of a process that we are interested in, we collect the evidence and based on the evidence are confident that we know ‘all’ about it. But our process may not be deterministic we may in fact be looking at a stochastic or random process, where there is some irresolvable indeterminacy about how the process will evolve over time. Again, we can collect some data about this randomness or aleatory (statistical) uncertainty and express it as a probability distribution and its moments. To use the coin toss example having thrown the coin a thousand times we would be able to express with great</p>	*
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			<p>confidence via a probability distribution the probability of a head or tail occurring. Paradoxically that's all we can say about the next coin toss. While we can characterise aleatory uncertainty very well it also represents an irreducible limit on knowledge (the known unknowns of Don Rumsfeld?).</p> <p>Beyond uncertainty are the unknown unknowns – that raise questions for how issues are framed but there may be unknowable unknowns for which strategy needs to be in place to make decisions robust. See Black Swan and Antifragile.</p> <p>Links to the ideas of the end of the “Cartesian Dream” – the idea that we can use science to analyse and then decide with certainty, rather for complex coupled social ecological systems it may be necessary to devote greeter efforts to experimenting for real and adapting.</p>	
Viability	The ability to work as intended or to succeed	https://dictionary.cambridge.org/dictionary/english/viability		KM

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Viewshed	The geographical area that is visible from a location	https://en.wikipedia.org/wiki/Viewshed#:~:text=A%20viewshed%20is%20the%20geographical,e.g.,%20building%20trees)		MC
Vulnerability	The tendency of the environment to respond either positively or negatively to changes in human and climatic conditions.	Eneanya, A. N. (Ed.). (2018). Handbook of Research on Environmental Policies for Emergency Management and Public Safety. IGI Global. Equihua M, Espinosa Aldama M, Gershenson C, López-Corona O, Munguía M, Pérez-Maqueo O, Ramírez-Carrillo E. Ecosystem antifragility: beyond integrity and resilience. PeerJ. 2020 Feb 11;8:e8533. doi: 10.7717/peerj.8533. Moving project reports are here: https://www.hutton.ac.uk/research/projects/moving-mountain-valorization-through-interconnectedness-and-green-growth-2020-2024	Part of a big web of concepts – lock in etc Links to MOVING project conceptual framework (Kirsty) - here they only use vulnerability as something that is negative; and resilience is ability to respond to a negative threat. Opposite to resilience; anti-fragility, redundancy vs “efficiency” - only need one species to do x, but what if x goes, not redundancy but resilience.	*
water balance;	A method of book keeping used to summarize the amount of water cycling from the atmosphere, through the ground, into the ocean, and back to the atmosphere			AG
WCC (Woodland Carbon Code) carbon calculator		https://woodlandcarboncode.org.uk/standard-and-guidance/3-carbon-sequestration/3-3-project-carbon-sequestration		AG

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