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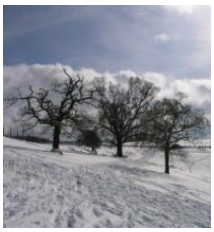

International Land Use Study Centre - Identifying international priority research challenges and opportunities

Workshop 1

25/11/2021

Professional workshop facilitators:	Diana Pound	Dialogue Matters Ltd
	Ross Freeman	Dialogue Matters Ltd
	Zoe Bullivant	Dialogue Matters Ltd
Volunteer small group facilitators:	Rowan Ellis	James Hutton Institute
	Aisha Chabdu	James Hutton Institute
	Diana Valero	James Hutton Institute
	Alys Daniels-Creasey	James Hutton Institute
	Laura MacLean	James Hutton Institute
	Nazli Koseoglu	James Hutton Institute
	Annabel Pinker	James Hutton Institute
Sorted by:	Elisha Whitling	Dialogue Matters Ltd
Checked and signed off	Diana Pound	Dialogue Matters Ltd

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About the workshop and this report

Purpose of the workshop

ILUSC is being established to deliver a high profile and high impact research centre at the forefront of land based scientific research. This dialogue is the first workshop to engage researchers and stakeholders in identifying international priority research challenges and opportunities. It will used to inform ILUSC's first 5 year strategy.

About this report.

This report is a record of what was noted at this workshop. During the workshop facilitators typed up the essence of everything said online in front of participants, checking the meaning in the moment.

Once typed, we have sorted and clustered the points within each conversation so that similar points are together. We do this because conversations don't progress in a linear way but go off at tangents, circle back and change direction suddenly making discussions reported in the order they were said, very hard to understand. By sorting similar points together, the main topics and themes of the conversation become clear.

The method we used to sort the outputs is called 'emergent processing'. This means we don't organise the text to pre-set expectations or titles but see what emerges. The ideas could have been grouped differently or different titles chosen, so no weight should be attached to them.

This report serves as a record of what people discussed and an *aide memoir* for those who took part in. We recommend a summary is created to communicate more widely.

This report follows the same order as the event.

Acronyms used in this report	Meaning
CAP	Common Agricultural Policy - EU
COP	Conference of the Parties (for the Climate, Desertification or Biodiversity Conventions)
CREW	Centre of Expertise for Water
CSIRO	Commonwealth Scientific and Industrial Research Organisation (Australia)
DG	Directorate General in the EU
EBS	Environmental and Biochemical Sciences Department
ESG	Environment Social and Governance
FAO	Food and Agriculture Organisation
ICS	Integrated Catchment Simulator
ILUSC	International Land Use Institute
JHI	James Hutton Institute
LU	Land Use
LUM	Land Use Management
NGO	Non-Governmental Organisation
SDGs	Sustainable Development Goals
SG	Scottish Government
SRP	Scottish Strategic Research Programme
RESAS	Rural and Environment and Analytical Services

1 Vision Exercise

1.1 Imagine it is 2031 and you are at an event celebrating the impact and outcomes of ILUSC's hard work. The two thing that pleases you most are…

Positive Environmental Changes

Behavioural changes
- Environmental justice drives land use decision making
- Step change in driving behavioural change to meet climate and environment goals
- Really encouraged by the enthusiasm of Crofters to make a difference to Climate Change & Biodiversity

Renewable energy
- To see Scotland at 100% of electricity from land, wind and hydro, and 35% of all other energy sources from renewables, I feel that we have really made important strides in making rural key to society's solutions.

Peatland restoration analysis
- Successful project on the analysis of peat restoration projects

Secure ecosystems
- Biodiversity decline has been stopped
- More on fragile ecosystems
- Demonstrable outcomes for land managers (and others) in terms of increased biodiversity

Food security
- More on food security
- There is no longer a divide between urban and rural land use and agriculture is nested within other uses of land

Adaptations to climate change
- Vulnerability to climate change has been decreased (less risk areas etc.)
- The climate change impact of land management is clear and understood, both emissions and sequestration
- Demonstrable outcomes for land managers around reduced carbon footprint/climate adaptation

Land use success stories
- Measurable changes to how land is used in Scotland
- I've just driven through the Crofting Counties, and I'm delighted to report there is real evidence of well managed landscapes, a mix of grazing & forestry.
- Evidence of changing land management practices as a result of ILUSC work

Impacting research, and policy

Informing future research and land use
- Open Science has become the norm for scientists, stakeholders and private enterprise and all BioSS and JHI datasets are open, FAIR, and freely available.
- Land Use research outputs included in the design and delivery (compliance and tech) of Green Finance programmes (Public and Private)- extensive engagement network
- Uncertainty has been embraced by ILUSC scientists, stakeholders and policy makers and being uncertain is not seen as a negative thing, but a positive thing. Quantifying this uncertainty has become key.
- New collaborative research across systems and linking systems approaches
- Both production and consumption are recognised in shaping natural resource management

- really clear understanding of the scale of further soil carbon sequestration in Scotland, what needs to be done to deliver
- It's so pleasing seeing the re-use of buildings and 'common ground' to create genuine rural community hubs. We've seen such an upsurge of social and private enterprises in these spaces, and with 50% of them being run by young people, it's way beyond my hopes for the repopulation and retention of young people to these communities.
- There are a series of presentation reflecting innovative research and transformative insights.
- Productive research teams have been developed.
- We know how to make best use of our land to meet society's needs and stay within planetary limits
- Circular use of nutrients and other materials has been demonstrated with synergistic sectors working together
- Agriculture and food production exists in a sustainable manner as an integral part of land use contributing to a reduction in CO2 and greenhouse gases
- Food producers have adapted to new ways of working/ land use with accurate data/tech/research
- The last multi-author, multi-disciplinary paper based on ILUSC data.
- Land Managers in Scotland have the quantitative data they need to enable long term decisions to be made

International influence and networking

- We have been contributing to agenda setting of international networks (e.g. Future Earth)
- We have created an internationally excellent land use change study centre integrating advanced technology (e.g. Earth Observation Technology) and social studies
- Major FAO conference on Land Use Futures hosted jointly by ILUSC and CSIRO
- Strong partnership with Governments and NGOs in UK and overseas with research informing better decisions.
- Well established international research collaborations

Impacting policy

- That ILUSC technology has increased the openness of policy making and deliberation
- That SG policy see ILUSC as the first point of contact for developing sustainability policy

Evidencing

- Evidence of impacts having been created of more than 1 type
- International examples of practical science-based solutions to major environmental problems
- It is possible to trace a direct line between an ILUSC research project or programme and a change in some aspect of international or national land use or conservation policy, enabling positive outcomes for society
- The work of ILUSC has led to real world change

Sharing Learning

- The work of ILUSC has educated people across the world in sustainable land use
- Enabled a community of practice to improve co-designed data-driven solutions to land and water resource systems.

Recognition

- ILUSC is seen as a global leader in land research with projects around the world
- First minister acknowledges major breakthroughs in research on 10th anniversary of centre

- ILUSC scientists are in demand for drafting or commenting on land use policy, reviewing proposals and speaking at major events
- Evidence of international recognition of the Centre (acronym/name ...)
- Recognised for contributing to local-global efforts to achieving nature positive and net-zero societal objectives.
- ILUSC are now an internationally recognised centre with representation from all around the world.

Societal impacts and involvement

Collaboration

- ILUSC has strong collaborations with researchers elsewhere in UK and internationally
- An exemplar of true interdisciplinarity
- Links into administrative data research network
- Strong international network of collaborators working on joint projects
- To see people coming together with a common purpose to serve humanity/ tackle climate change
- Indigenous groups and women
- The diversity of perspectives that are represented in the work on land
- The geographic diversity of the people who've come to celebrate.
- To see more people from diverse background invited and taking part

Community involvement and education

- Dissemination to local communities
- Inclusive and effective facilitation of citizen science
- People are attending and engaging the event in-person and virtually using a variety of means of digital methods.
- Successful community education on values of biodiversity

Changing public opinion

- The role of nature (all live everywhere) especially soils is widely recognised in its role of governing the global carbon cycle (and N etc) and hence climate
- We provided in a critical situation in which the establishment realized the seriousness of the problems to be faced and the total lack of any useful narratives to be used for guiding action (obsolete ideologies) a series of relevant alternative explanations about the critical factors associated with sustainability
- We provided an alternative narrative to the hegemonic use of economic storytelling that made possible to appreciate the relevance of natural processes for our sustainability
- Transformed how the public value science

Positive human impact

- Stories from people about how ILUSC has made a difference for them personally.
- It has raised awareness of social dimensions of land issues
- It can be seen to have significantly contributed to a socially just net zero transition

2 The external and ever-changing context of our work

2.1 What are the external trends and changes, post Covid, which we need to factor into our thinking?

2.1.1 Political

Conference of the Parties - COPs

- Life on land SDG may be one that ILUSC is reflecting on. To what extent do the political frameworks that have led to the COPs might be revitalised in the future. Will 30 years of COPs have exhausted that pathway. Will these goals have materially shifted in the future - something ILUSC might want to be perusing. What are these new political directions?
- What trends do DEFRA see emerging from the two COPs?
- Strong focus on COP-26 - what will be the momentum on just transitions and inclusion agendas in respect to moving forward to climate neutrality. Will there be another bump in COP-15 next year and what does this mean for ILUSC goals in the future
- By 2031 we will no longer have sustainable development goals - will have another agenda. What will the political aspirations be to post-SDGs. These may be a new framework for ILUSC to be developing on

Increased interest in land use and management

- On the agenda in the next few years: quite a lot. The thing that seems to be changing from a DEFRA perspective is how much higher the attention and profile is on environmental land use. The importance of the climate agenda gives us impetus to ask about land use and deliver some of the changes we have wanted to make for a long time (improve access to countryside and biodiversity)
- Very busy time for land use and land management - Brexit: still going through the fallout from that I think, the pandemic: shown fragilities in our food supply, the climate agenda: redesigning agri-environmental schemes from scratch - good opportunity to do things differently. New net zero scheme. Very exciting time for the centre politically
- So much activity going on at DEFRA at the moment with new environmental land management schemes

Globalisation

- Need to get better at recognising impacts of choices we make in nation states on the rest of the world. How does our consumption affect others.
- Something that has affected my work is the reduction is spending on overseas development aid which has a big impact on the potential for overseas collaboration and the types of things we can work on
- Devolved nations provide different ideas and new opportunities - strength
- Pandemic has provided hints at how that might go

Supply chains

- We have experienced this year what supply chains might look like - political shifts that have led to this might mean there is more pressure on land use to provide food supply sovereignty in the future

Increased conflict

- Increasing conflict over who has right over rural land and decreasing trust in political institutions and leaders
- New suspicion of science and scientific solutions is a feature of culture wars and makes everything we do a bit more political
- Populism and culture wars - there is political polarisation which can affect what people expect and want from land (culture wars - new term coming up in podcasts talking about America)

Migration and nationalism

- Growing nationalism - learn from history that every time there is an economic downturn humans become more nationalistic. How will the effects of climate change affect this political extremism and surely it will get worse
- Growing nationalism at a time when we need global thinking from governments whilst power of global MNCs remains strong. Will be having institutions tackle these global issues?
- Germany has acknowledged migration as a positive and they are likely benefiting from this, but we cannot acknowledge that yet
- Political management of international, urban-rural migration with relation to climate change. In US international migration has a very positive change in rural areas by reviving them but there is a resentment against it.

Social Justice

- This idea that there is not energy to look at social justice but rather scapegoating
- Concerned about the detail, which is driven by neoliberal efficiency gains agenda, but you don't see social justice agenda within these. Not much focus on transforming socio-political systems
- A lot of work needing to be done - joined at the time of a crisis. BME haven't been involved in this so far and feel as if there is a lot of pressure now.

Policy changes

- Disconnect between different areas of policy - need to bring together in a coherent way
- European commission level changes too - meeting for policy support. increasing importance of cohesive policy making - going to increase in future looking towards better solutions for our environment

Party politics

- Politics is about power - party politics, whose interests are shaping debates

Networking and cooperation

- Changes need to come from outside the organisation - need partnerships with other institutes (such as ILUSC) and the private sector to drive us forward and challenge the way we do things within government
- Key points of open science and open data
- JNCC - building their data solutions team too
- DEFRA - mainly England but also in partnership with Scotland, Wales, and NI. Challenges as countries all collect data in different ways and can be hard to scale up modelling outside of England
- More appetite for building the strength of data science in government and doing that alongside people in the outdoors
- The work in the open - various blog talking about working in the open

Finance

- UK government really pushing for innovation (build back better). We have the same in Scotland and where is the sustainable economy going to be coming from in 10 years' time with regard to people's wellbeing
- Public sector should regulate this investment space but is lagging behind. people can invest and reinvest very quickly which is problematic
- Companies attracted to net zero, but companies may invest in activities that are overpromised on what they can achieve - net effect is not what is expected in the end
- A lot of chat in Britain about post-carbon investment: devesting in petrochemicals and reinvesting in other options. This is starting to drive land value and land decision making. Accountability issues associated with private corporations - lack of transparency

Technology

- Political choice to put all our faith in technological solutions as opposed to more radical political solutions. May be contested in the future.

- Developing new technologies and innovate approaches for monitoring the environment - how will this look in the future

2.1.2 Economic

Trade deal
- Trade deals on use of land and sea

Carbon
- Pricing carbon
- Demand for biomaterial in a post-hydrocarbon world
- Multiple benefits in a net zero reach world

Ensuring sustainable production
- Incentive for more resilient food production
- Ensuring sustainable production ...include the farmers in the marketing strategies...engage more farmers promoting biodiversity
- Transforming approach of food production ...less dependent on externalities
- Who gets rewarded?
- Outcome based approaches for monitoring impacts
- Net environmental gain.
- Policy mix of carrot, stick and sermon
- Cost of climate inaction

Future Agriculture
- Vision for future agriculture... what will it look like in 10 years?

Public goods for public money
- Public goods for public money
- Balance between uses (connected to public goods for public money)
- Alignment between market and public (public good for public money)
- Neoliberalism and equality ...impact on the economic system
- Land as positional good
- Donation from communities invested in

Demand on resources
- Mineral extraction will be accelerating (prices are increasing)
- Land grab from many countries (e.g., China) to secure food and raw materials

Population pressures
- Non env. pressure...housing population shift
- More housing demands land push

Economic shock
- Increase vulnerability to economic shock

Tensions
- Tension between small scale and corporate agriculture
-

Embedded economy
- Economy might be embedded in nature (Dasgupta Review, SRI, doughnut economics)

Gender and farming
- Farming becoming a female activity

Short value chain
- Sustainable value chain ...short value chain...supply healthy food...short and equitable value chain

Post growth
- Land in a post growth world

Post covid debt
- National debt in a post covid society
- Is this real debt...the one made by countries to fix the pandemic?

2.1.3 Social and Cultural

Biodiversity and changing landscape
- Land needs to be managed for biodiversity. If it's not managed, then there are negative changes. That's especially important in marginal crofting areas.
- Cultural aspects of investment in land: cultural question is about public responses to changing rural landscapes - afforestation, will change landscape appearance.

Pressures on farmers and agriculture
- Farmers feel impacted and victimised by dietary change.
- Farmers feel like squeezed middle, Lack of profitability on farm. Farmers don't have much power. Volatile commodity prices. Causes long term stress and means no time to learn new things.
- If farmers don't do what is required in market, imports increase. Agriculture is not economically competitive.
- Problem a clear takeover of rural areas that provide food. Rural areas are about providing cheap commodities for cities. Any identity in rural areas is being eroded by globalisation. Farmers don't have power to defend their identity. Technological treadmill is a strategy for eliminating farmers. Increasingly lose identity for farmers and rural communities. In global north and south.
- Requiring changes from farmers which leads to defensiveness. Head in the sand attitude.
- Dramatic changes in how meat and dairy are produced. Could dramatically change the countryside. Laboratory products.
- Dietary changes: narrative of lifestyle and dietary changes that affects land use. That's the affluent global north. Counter trend in China and India of more meat consumption. And diary
- Potential for antagonism between farmers and others? Farmers feeling under attack, pushed into a corner, not permitted to make their own decisions. By other who don't understand.

Land ownership
- Ownership of land is key. If land is in trees that compromises food production. If land goes to highest bidder, what are the implications?
- Trend in agriculture when farms are for sale carbon factor is part of it. People buying farms aren't farmers they're companies offsetting carbon. Land ownership could change from traditional land managers to corporate land ownership. Money is important, e.g., west coast 500, price people out of living areas.
- Gentrification as a trend. New aspects of gentrification: people buying property to let as Airbnb. That's new.
- Trend in private investors buying land for carbon markets: cultural and social implications.

Employment
- Trends in labour. Who is doing work on the land? If new owners take over interested in carbon, are they place-based, taking an integrated approach, or is all contractor based? Not necessarily a problem, but question of impact of specialist contracts Vs place-based workers who are part of community
- Change in working pattern, potentially more thriving rural communities. People can work within their community.
- Community involvement in crofting not just crofters.
- Changing emphasis on who owns and manages land, the role of the community. In highland areas, crofts. People feel they have more right to influence how land managed.

Loss of rural history and culture

- Different forms of identity that have been marginalised offering lenses through which to understand land and environment e.g., Gaelic: striking most people don't know what words mean: it is a lens for understanding people, environment relations. Recognition becoming more literate in marginalised languages gives scope for insights into land management.

Access and diversity

- Trend a more culturally diverse countryside: underlying trend. Raises questions about social justice within more diverse countryside.
- Social justice access to land for more than just white people and to green space, decision making.
- Demography in UK is not one pattern. Some accessible rural areas under pressure: not enough housing. Other areas people leaving. Heterogeneity.
- Irresponsible access, from a minority. Land managers bear the brunt.
- Demand for opportunities in rural spaces, living.
- Accessible rural areas are preforming similarly to urban areas in terms of life changes. So most remote rural areas as disadvantaged.

Rural communities and identity

- As a community, as a national identity linked to land use, but people's perspectives may not be heard. People don't know about land use strategy. Don't know where to get information from? A lot of barriers. How can Scottish people contribute to the makeup of the land?
- Repopulation of rural spaces, general willingness for anyone to come. Back of the mind there's an idea that people coming to rural community are expected to think in the same way. If they're a "useful part of the community" what does that mean, for whom?
- Defending what you have now: farming systems you have now, part of national identity
- Rural land used as part of national identity, is that changing? With world becoming more urbanised: what land is for, how we imagine land
- Smart homes as a way for older people to live in rural communities. Most of it is private. Changes how we behalf cultural with other members of our family. Way to maintain rural communities.
- Challenge, potential for growing defensiveness of rural people against pressure for change e.g., climate change. Pressures on changing land use and diet. Farmers feeling they're being marginalised and neglected.
- Effect of change on working practices on resilience on rural communities. Challenges including lack of housing. Prohibits what people want.

Technology

- Autonomous self-drive cars being a solution to rural transport problems?
- Opportunity digital tourism in a way that isn't done now.
- Autonomous farming machinery. E.g., for fruit. Dairy, tractors.
- Potential for delivery of goods to change drones, could be transformational culturally. E.g., to islands.
- What happens with heavy machinery for land-based industries in terms of electrification?
- Electrification of transportation will have social implications: charging facilities in rural areas?
- Danger of not linking technology and social aspects together. Digitisation has social implications: winners and losers.

Water quality

- Wild swimming increased; higher expectation of what water quality should be. Go beyond WFD require for bathing waters. might change upstream is managed.

Wellbeing

- Poverty: focus on green or wellbeing economy. why can't there be both?

Succession
- Crofters are aging, a need to encourage thinking about succession. Provide new opportunities for younger crofters.
- New entrant farmers, interest from urban young people.
- Aging landowners.

Cultural wars
- Culture wars spilling into rural environment. Winners and losers of transformations. And real issues with poverty in rural areas.
- Growing illiberalism, resentment, anti-elite-ism, anti-science. Esp. in rural areas?

Changing values
- Increasingly seeing landscapes of consumption as well as production. In our imagination, not just physically going there.
- Wider shift, paradigm in how people value rural. Is this a new thing? A massive change? A trend t
- Related: changing values of rural land. Post-covid, appreciation of open space, ways people perceive and value rural land changing.
- Post covid increasing recreational use of countryside, people more aware of what's on doorstep.

2.1.4 Technological

Energy and emissions
- Trade-offs between renewable energies - value chains and water, there are difficulties in trade-offs between different promising techs (wind, hydro, etc), how to think about all of them
- Use of simple technologies - if Scotland's vision is net zero, there will be other things - welfare friendly production, what sort of tech will need to be implemented to ensure safety of people and animals (like cattle handling systems, hydrogen driven tractors) - evidencing that
- Role of mass communications in driving trends in how people understand environmental footprint of what they consume
- Moving away from fossil fuels is tricky - large pieces of equipment hold different challenges, how do you do that
- Moving away from fossil fuel to zero carbon energy sources - different equipment, different ways of doing things to decarbonise

Changes to daily life
- Idea of replacing in person things with online - what are social attitudes to this
- DESIRA project - digitalisations allow people to access opportunities they might not have been able to before (e.g., training)
- Automation - machine learning becoming sophisticated - what are the implications? something we will understand in the future
- Tech solutions for delivering parcels, different ways of doing things
- Things on the edge of social and tech - the way tech can change the way people are living now, enabling people to live in communities independently for longer, digital divides, change through time, differences between rural communities

Digital literacy
- Digital literacy
- Mark Logan's review - computing science needs to be taught separately, as well as other things - across conservation sector needing to upskill to increase level of impact, working towards healthier ecosystems
- Data literacy - people need to be data savvy and often that's not just the scientific/business communities, but people in general - people need understanding of how to use data - teaching in schools as an independent subject (goes across many other subjects)

- Skills to make use of tech
- Mobile phones - the basics

Impacts of COVID-19
- What changes due to covid are going to stay?
- Example of crofters used to sell produce separately - but now (since covid) they are selling collectively - innovations that have happened because of covid, like allowing people to work from home as well

Accessibility and equality
- How people get their knowledge and information
- Could people jailbreak their software?
- Worried about upskilling - if it doesn't happen across whole population = inequalities, as people can be lied to if they cannot ask sensible questions and data can become a weapon - knowledge inequality is massively important (already can be seen in some areas) - information asymmetry, moral hazard, data monopoly
- Tech needs for data - data sharing agreements and how that facilitates a lot of things like capital flows and political will
- Whether we will reach an acceptable level of internet connectivity - including rural areas - fairness and access

Agriculture
- Ability to fix tech - fixable by farmers themselves - resilience - business models develop around tech
- IFn light of reducing fertilisers that people are used to - international collaboration is key to develop tech quickly (like covid vaccines) - needs to be a societal will
- Genes - gene editing, will we be allowed to use this sort of tech? a lot of investment comes from industry (public v private) - specifically how will Scotland engage with this
- Labour issue - piecemeal work - a lot of growers already looking at tech/AI solutions
- Nitrogen fertiliser is biggest carbon contributor - we need alternatives
- On production end - a move away from mainstream agriculture in terms of inputs and towards nature-based solutions because we have to, not because it is what we're used to
- Digitisation - of agriculture, how people manage their land
- Move towards tech solutions that allow for increased circularity - incentivising new tech solutions

Standards and structures
- Structures are behind the tech advancements - why not 30 years ago? standards and structures are not ahead of the game - why do we have to wait?
- Delivery market integrity
- Sustainable finance taxonomy
- Gold standard
- Carbon measurement point of view - no real standard, greenwashing, what do people believe or not, what is the standard?
- Not allowing the information to be subsumed by supply chains
- Data security
- Lots of value to be had - who has rights to it, where does ownership lie - touches on governance
- Who owns it
- Who decides and what's the process - government involvement

Green finance
- Observation - how green finance is using surveillance, how this leads to particular governance models - coming to conclusions on climate risk to microfinancing - interplay and understanding how well we can use some of these technologies

Measuring biodiversity
- Need a biodiversity measurement - how do we use tech to achieve that? something with data and sensors, blockchain?

Job creation
- Having these developments could foster new businesses
- If they install something, people will come
- Young people - if we enable rural places with a more tech focus (way we invest in rural places) - how will that enable young people to develop businesses - e.g., one change in Skibbereen (Ireland) put in a gigabit line which developed a digital hub)
- Blockchain?

Collaboration and networking
- Have to collaborate with other nations, and investment in infrastructure - do we have expertise ourselves or need to work with others too
- Feedback the impact of what we're doing - sensory technology - indicators (robust, easy to use) - could be remote and part of how you quantify
- Many researchers are doing that - needs to be more widely - how do we get beyond people we're used to working with and scale up
- Needs to be closer connection between people on the ground and those doing research to implement tech advances
- Who pays for connectivity
- Accountancy community are driving it - have own language trying to take across, materiality, impact of business operations on wider range of environmental outcomes

2.1.5 Law/ policy

Food and drink
- To pay more linked to below
- We aren't prepared, afford
- We like meat and beer- need social change - Scottish economy built around food and drink
- Links to how food is locked in- needs to reinvent capitalism!
- For a lot of foodstuffs few people decide what sits on the shelf, e.g., 20 varieties of coke, 1 of barely driven by alcohol industry
- Do we want to go legal requirement for food to be labelled= visibility and accounting- GHG accounting

Agriculture
- Used to be more market gardens and food grown on land now classed as not suitable for arable- been degraded? About efficiencies and economies. Economies of Agri- farming is high risk
- ~10% of Scottish land is crop quality- around half which goes to animal feed or alcohol
- Land use- how much we use in Scotland to grow food. is it local good food that can get to market
- Industries (software) failure rate is high, creative destruction, but occasionally get things like zoom. Re agriculture lots of small businesses few can grow. Key thing with ag and farms, can do something new but it's hard to fit into existing economies of scale- lose identity, Retail end- fixed amount of shelf space that they are willing to give up (currently organic) so fixtures in system make it difficult to break through.
- Offshoring impacts- should we take responsibility for growing our own food - design landscapes
- Need radical shake up of what we expect from farming- what do people expect from consumption - livestock feeds etc far too intensive
- How CAP changes and how it sits relative toother- green deal, farm to fork- linked but put different DG in charge- do we put environ and ag in separate - or = land use Dept of env etc in England- Scottish context is Land use the thing that will bring it together

Supply chains

- Creating space for innovation- supply chain on a knife edge, any disrupting creates space. Scaling up is held back by institution

Biodiversity and land use

- Biodiversity seems to be much less visible in terms of obvious targets, not headline news, in a silo. Not good at reaching those targets- by the time we get round to doing something about biodiversity be too late.
- Land Use challenge set in next research programme- achieve net0 and 'other objectives' Biodiversity fairly high up list- achieving all elements in the round but worry that we get fixated on carbon- easier to count. Biodiversity loss is more subtle- not like flooding or storms etc. More difficult to see- levels of extinction are incredibly scary. Banks-
- Idea of moving to regional Land Use strategies- new isn't in Scotland- how will they operate?

Lack of visible action

- So, is it the voting system is the issue- not good enough? Give people the impression they have a say then nothing happens. Roaring engine depressed clutch
- It's down to the skill of the driver and window of time (winter) to do peatland work
- All very well having regs and policies but where is the capacity to deliver- lack of skill set. A lot of funding but not the operators to do the work. Due to number of things- need to get buy in, annual funding cycles so hard to get message that this is worth investing in as it is growing industry
- It's not a contradiction to ask for more data while acting- direction is often clear- can act and refine- adaptive management
- Need to reflect on why despite data change is not forthcoming
- Science becomes an excuse for inaction not action, enough data now to act on climate environment
- Shouldn't not act through lack of data
- Policies and best practice changing so fast hard to have science to show- e.g., peatland restoration- learning as we do- difficult from funding- trying to run before we can walk always been that way- don't have documentation- need to collect data to show how things work
- Make people aware that rhetoric and measures don't add up- make the invisible visible - e.g., nice landscape = "green desert "
- When started net 0 had 30 years but nothing changes

Disconnection between shareholders

- Disconnect between workshops with s 'holders but how is that being acted on- disconnect - Institution of disconnection to transfer from bottom up

Political collaboration between departments

- Re separate departments- need research on how to bring different depts together- in theory at cabinet level but is that the best level?? But they need consensus before they agree way forward. Somehow need to bring people together- getting into political. Officials used to be in the way things are - parliamentarians more interested in change

Adaptive management

- Monitor what we're doing for starters. Find out what works, learning y doing to inform models
- MAGIC project- irreducible complexity- don't have such models, if doing transformation can't know what's at other side- adaptive management- in small pieces.
- Where is best focussed, targets, how to get to net0, different ways won't suit all
- No mechanism to transmit way of doing things better, lack of transparency and decision making.

Increasing conflict
- Changing (rapidly) disconnect between ambition, promises etc tension at our level about where we are heading- lots of fighting. Complexity of interests means our science needs to untangle, steer, help resolve tensions.
- Interesting philosophical problems- better to have two separate or one together- risks one voice being stronger

Changing regulation
- Changes in regulation- tighter or looser, UK lessen reg post Brexit- command ad policy in Europe where will that go similar re UK

Emissions
- Carbon emission reduction is important
- May in some countries not in other slow v fast
- Policy- will see sig changes re climate change and need to act- so will policy be changing rapidly

2.1.6 Environmental

Interlinked systems
- Interlinked systems, including marine systems as well. Now we see marine something very apart from land and freshwater, but we need to manage these as a whole system (e.g., nutrients going to sea). Mayor driver across Europe (nitrogen levels on sea...) That links with agricultural and where the nutrients come from.

Economics
- Drive towards circular economy which means much more efficient and effective use of water, energy, and materials. Environment is only part of that driver
- Green finance - increasing interest financial institutions and how cand they engage with environmental: data and research findings, covering financial markets, traditional insurance, derivatives, associate things around agricultural production, facilitating low-carbon transition

Agriculture
- Agriculture relies heavily in antibiotics, agriculture and human health looking into antimicrobial resistance as an issue that needs to be addressed
- Agri-environment. There needs to be a change in how we farm, and that is going to be very challenging anywhere where the green transition is taking seriously
- Land degradation and loss of soils, that we have taken for granted without investing of them, and that is going to come back to haunt us

Biodiversity loss
- Reducing biodiversity loss - focus on biodiversity restoration when possible, just to focus on stop things from disappearing (the UK is already like a desert as far as these things are concerned)
- We should try to go next steps. To identify the most important actions to reduce biodiversity loss, pesticides problems regarding soils... In some areas we still have problems with nutrients, intoxication, fragmentation of habitats. All those problems can be similar although different because of population. Growing different crops that can be adapted to the different conditions. The key it is action to take in those problems mentioned before

Adaptation to climate change
- Strong driver behind mitigation of climate impacts and much less effort towards adaptation. And adaptation will rise in the agenda and mitigation will be seen as responsibility of governments, but people will directly experience adaptation
- Climate change is fundamentally the bigger driver of change: extreme weather, drought, floods, more storms. It is the number one environmental challenge with the declining biodiversity

- Timeframes and mismatch between the rate with ecological change is happening and the social change that is required to manage it. That could involve the actual speed but also critical thresholds

Community and cultural impacts

- We can't really understand the environmental change without understanding environmental justice. It is complex, but it is people having the scope to care. For example, pollution, that happens where people are poorer. They might care about environmental change but have the less power to do something about it. We can't talk about care without taking about power
- International impact environment. I don't feel the international community is really engaged actually. In COP, countries they don't want to do anything themselves either. Until we don't start seeing big impacts, it is going to be the same. Restoring peatland here in Scotland is not going to solve the problem. All we can do is to look at the local environment and try to mitigate locally.
- Most people are not engaged with the climate efforts or save the environment. They know the facts and care in a basic way, but they don't want to do anything themselves. They are not really engaged. Engagement is key and don't see how we can do that until people are affected directly by the effects of climate change.
- How the production of scientific knowledge has been tied with power and the production of social relations. Knowledge gained in a very extractivist way with not attention paid to the effects on the communities where the knowledge came from. Assumptions about who has the authority. Decolonisation is about power. Not only scientists being as having authority. Not just human seeing as having knowledge.
- Decolonising the academy. Indigenous ontologies. Human and non-human co-creation. It is very influential in academia but also in parallel in debates in society.
- Non-human agency It is not us doing things to the landscape, but more a partnership acting on the landscape.
- There is a growing school of thought about the environment being about us.
- A key thing it's that the environment doesn't care about climate change or us. The planet will be fine, just will look different. The things that we need to do are for our benefit. The planet is not going to care if we or any particular species goes extinct. We are not saving the world; we might be saving our world.

Hybrid land use systems

- Scope for incorporating more symbiotic systems, more hybrid systems of all kinds of land use

Implementing and measuring ecosystem restoration projects

- It is important to agree or explore the best ways to measure environmental performance of peatland restoration or replanting and be able to select the best indicators qualitative or quantitative that can represent best the performance of these actions. We don't really have the tools to quickly and objectively understand the impacts. The direction is actually influence by science and the knowledge aspects of the environment
- Geography of where those market mechanisms are realised. how much people who are at the consumer end of particular market mechanisms have any concept of placeness. (E.g., promise to plant trees) It is all about where they will be planted and the social and ecological impacts of that's). There are two things, one is to set up the mechanism and the other, at the consumption end the issue is how many people realised, how the effects are articulating.
- Peatland restoration, carbon sequestration...
- We do not necessarily and uniformly have the right governance structures for biodiversity restoration - we need landscapes, and connectivity... And sometimes is done is at small scales than that. If we need to restore and adapt to climate change, we need a governance structure that sits above that and operates at those big landscapes. For example, downstream requires action upstream.

Emissions

- Market-making: carbon markets, biodiversity off-sets, tradeable tokens markets. There is a big area about how market forces are coordinating, and how it translates in a specific area or catchment.

3 International land use issues and opportunities

3.1 What are the emerging issues that we could help address?

Environmental

Waste management

- Waste - specifically farm waste. Dealing with waste in a more environmentally friendly way

Regenerative agriculture

- Contrasting ways: regenerative agriculture practices and production problems having a very precise input high tech input

Available land

- UK footprint is big but the amount of land available for netting is negligible
- Farmers bought up by corporate...landscape can change in the future

Carbon farming

- Policy support of agriculture in last 50 years. We're rewriting the rules of the game now. Huge implications of those who own land. How they transition to new world of carbon farming. That's happening now. It can be a tension between groups or between uses. Pressing issue now.
- Carbon market generates demand for non-food land...implications on how we get pour food supplied...implications for equity

Climate change adaptation

- Too much focus on climate change mitigation and not enough on adaptation.

Biodiversity

- Too much focus on biodiversity loss adaptation and not mitigation. Need to think more about mitigating biodiversity crisis. And brining those responses together.
- Rewilding is a big story: quantifying the effect is a big issue. do we have enough evidence...what are the effect? essentials to convince businesses...standardising approaches
- Changing land use can have effects on biodiversity at local and broader scale
- Risk for carbon net zero alone...address biodiversity problems

Emissions

- Not trivial to find land for the net zero carbon policy?
- Effect on biofuel of net zero carbon policies...effect on good production...who owns the land
- How to achieve net zero
- Net zero

Information

Need for information

- Difficult as a land manager to know what to do. Role of enabling change by educating people on the ground by making sure they have access to the right information. (This is co-construction, a new way of doing science).

- Information both locally and globally
- Information, new dataset, temporal aspects
- Realise the potential for multiple benefits .... having new data

Measuring environmental changes
- We cannot measure change in water/ environmental implications
- Quantify target changes

Social

Social Justice
- Social Justice - issues around poverty, access to services
- Spatial justice issues - whether living in a place have the same ability to make the most of where they live
- All inclusivity issues...many interests. how we address that
- A lot of people cannot afford any change in the cost of food, cost of leaving. Any change that will have an effect on the cost of leaving, lots of people will suffer
- Ethnicity and age and abilities and gender intersect here. What is a safe and equitable urban future? These are re-design right now to meet targets for NetZero, and this is multidimensional because what we build now will last 100 years.
- Urban is part of the story. Rights of access and inequalities. Disenfranchisement in terms of access to land

Population
- What's driving that migration - where they were before no longer habitable? that has other implications for us as well - pop and what was being produced there to be replaced
- More broadly - migration
- Repopulation - whether there's a need to think about longer term resilience of rural in terms of optimum population levels

International impacts
- How decision here affects other countries

Greenwashing
- Effect of green washing

Planning and Management

Optimising change
- Democratising land-use decision-making. Co-construction
- Optimising land use change and planning...
- Land use change land use management

Supply-chain impacts
- Post-covid designing food production and supply chains for future disruptions
- supply chain ...potential effect from global to local

Privatisation of environmental restoration
- Narrative around env restoration - increasing privatisation as a way to get funds - what is the role of gov to reallocate resources?
- opportunities are available too

3.2 What are the issues on the horizon that we could help address??

Environmental changes

Adapting to climate change

- How we facilitate through species and habitat migration to adapt to cc - what are the human and governance changes that are needed
- Land use capacity under a changing environment. What is going to happen in 20, 30 years? We know how we can use land now, but in the future?

Water

- Water - extreme weather events and water management. Flood risk management
- Water stress. Scottish agriculture hasn't had to face. That brings opportunities of North-South learning.

Land use changes

Areas to remember in Planning

- Important for how developments are mitigated against - General area of environmental net gain
- Remember water in land use. Catchments, deficit in soil water.
- Role of global asset managers who are UK based and their role in coordinating land use, for whose gain. Fiduciary duty. Their role in the resilience of land use schemes.
- Uncertainty in the system, avoid lock in and path dependency. Using land for e.g., slow growth trees that locks off land from other uses.

Land ownership

- Trading of land under auspices of natural capital gains in Scotland: upland areas sold for carbon benefit. There are layers of complex land ownership which comes with a lack of accountability. How can we make sure the right thing is done without accountability?

Assetisation

- We're seeing assetisation in the crofting sector. Crofts not being worked to their full potential.
- Assetisation is partly about property rights. Need to think about this in crofting and other areas. Natural capital is positive but worrying it's not thought about through a property rights lens. (Property rights and NC debates are parallel not integrated)
- Assetisation of farmland and land in general. In developing countries and other areas. Land isn't a production input but an asset that can be traded, borrowed on etc. Financial instrument.

Rewilding

- Don't think rewilding or repopulation are either/or - sometimes there's a general impression that people being rehomed to rural communities is a rewilding agenda, but I don't think it is - challenge is rewilding in a culturally sensitive way

Increased conflict potential

- How we manage interactions between human and wildlife - urban sprawl, rewilding
- Tension in land for community and land for private productive asset and how the community balances. Particularly with rewilding. Land has a positional good character.

Social

Inequality

- The relative weight of communities of place and communities of interests. Lots of interest in place-based policies and use of resources, but places don't have equal

resources... Need for off-shore some of the mitigation and investment. E.g., woodland expansion, housing
- Inequality and its impact on land and land use in more extensively farmed areas in relation to house prices.

Changing diets
- Changing diets - lab based meats, plant-based diets, and the challenges of that for farming and land use - resources devoted to meat-based diet - changing is an incredible challenge to meet

Sharing of information
- Issue of miss information - fb ambitions to infiltrate knowledge and communication challenges around the world - needs to effect how we do research and knowledge we produce
- Ownership of data is a parallel issue: who owns data, satellite data, who has rights to use it? Data ownership issues we're 30-40 years behind the times in terms of legal and policy progress on that.
- Lots of learning that could be done from other contexts
- Help global north or Scotland learn from global south. There's really good scholarship on assetisation of land that policy makers aren't aware of.

Cooperation between stakeholders
- Natural capital: debate about how land is used: food, economic, renewables, services. Different groups have different requirements on what land should do. How do we have conversations about what land should do? Some of the policies are perverse to different uses at the moment. We need to clarify priorities for land.
- Alternative energy will be put on farmland, photovoltaic are renting land to put these things. That's changing the land use. There could be community conflict over how land used.

3.3 What are the opportunities emerging now, we could make the most of?

Scientific method

Transdisciplinary Approach
- Transdisciplinary science
- Facilitating q collective view for the future of land management all sectors can buy in
- Collaboration between bits research...collaboration between disciplines
- Currency of the concept of climate justice, which allows us to do more an interdisciplinary approach.

Reliable Data
- Independent reliable and accurate source of data
- Trusted independent organisation

Data sharing/ communication
- Co-development mode between scientists and those who use data
- Necessary to go for reliable data in the right place and cover gaps
- Open science agenda big opportunity … open data set for people... more transparency
- Discussion on grade data ...make decision right place right scale for water ...farm scale wider system scale?
- https://cesium.com/open-metaverse-podcast/
- Opportunity for ILUSC to integrate high tech with social science

- Opportunities in the media as to how research is done and communicated - tech can make it much more engaging - striking how in few years, ethics, and awareness of how land is used/ owned is at forefront - community of interest there and they are hungry to learn about science

Environment

Restoration projects

- Scottish context - the green lairds rewilding agendas (people, companies buying land in Scotland but also other parts of the world)

Politics

Policy

- Policy opportunities and there are new policy activities to which ILUSC, and partners can and should contribute at EU level, UK and Scotland, and opportunities of funding in Horizon Europe to the discussions pointed. Funding that will bring the next 6 years and the forthcoming research programme of the Scottish Government, that will take us to 2030.
- Opportunity in terms of policy drivers...land use climate change policy offers new opportunities
- Immediate opportunity still in the context of developing post Brexit policies and can feed into the policy process

Other Sectoral opportunities

Investment

- New commitments for spending in overseas research - Scotland is still committed to in difference to the UK government, what brings a differential opportunity
- More research money available to study rural areas because of growth in illiberalism?
- Positives from finance and companies wanting to be more transparent about value chains. And wider ESG.

Greening Business

- Interest from businesses in terms of how they respond to the cc agenda - thinking about designing inventions and mitigation - opportunity comes from businesses under pressure - they then look to research for solutions

Greenwashing

- Green recovery is focused on rural land. But why isn't there isn't a focus on landscapes of consumption? Only focus on production. Are land issues part of greenwash?

Tourism

- Internationally - be a welcoming and friendly nation, to increase tourism
- Communities are hungry to learn more about Scotland - over the next years we can change the nature of the outdoors

Technology

- Abundance of technology on the ground...real data. inform model
- Better use of some of the tech. ability to tie with real time data (water efficiency)
- Business can invest in new technology
- Still ongoing increase in computer power, the things we can do continue to evolve - e.g., geographic analysis in early 90s to now - bringing previously invisible onto desks - awful lot more data as well that can be drawn on in land use domain - can have a daily 3 m image of Scotland

Social

Engagement

- New generation of young people who have different outlook provide hope, there's a big youth movement protesting climate change. (But caveat, putting too much pressure on young generation?)
- What's emerging on back of COP26, freshened people's minds - time for env and outdoor groups to speak up again - what we do, how to get involved, a good time to reach out to boost involvement - small bus, ILUSC, policy's - opportunity to reach out to mass public

Changing behaviours

- Changing patterns of behaviour is the only way to solve climate crisis, but that's very difficult.
- Following on - the question around how you can implement and design interventions that will mitigate CC, how you prioritise solutions
- Climate Change offers new opportunities for change in land use rural land, for people or communities that have bought land (community buy out)

3.4 What are the opportunities on the horizon we could make the most of?

Political

Agricultural policy

- The emerging changes in policy in food production (e.g., good food nation), in agriculture, post CAP...
- There is an opportunity to understand land use in less siloed way - integrating more - opportunity how do you take this forward in governance to allow hybridity in human side of integrated land us

Beyond sustainable development goals

- Change momentum politically or increasing momentum on how land can contribute to biodiversity loss and social agenda, acceleration in dialogue on what succeeds the current SDGs, to get to 2030, we need to have something in place, and ILUSC can have something to say in the discussions of land post-2030, including political and financial agendas. What is the opportunity to be taken? Identifying the frameworks that are going to be post 2030 and the pathways to those

Net 0 Agenda

- To what extent these longer opportunities will be harder - put off the harder things - the last 20% of net 0 will be much harder than the rest
- Net 0 agenda how is that going to play out and be fulfilled? We are going to be at the sharp end of it in 10/30 years' time - a lot of comments allude to this... will be institutional, land use, lots of areas
- Renewable energy

Financial

Funding

- Capitalise on private investment opportunities
- Funding ...and expertise...need funding
- Growing enthusiasm in financial support for open forms of science that bring new actors to engage with science.

Green finance and economy

- UK green finance strategy this is a good platform for Hutton to be involved in. Bring research and data about standards to this. What are good market mechanism and their impact?
- Just transitions - mentioned a lot. wider society and within land use sector - what does it look like

Agricultural production

Precision agriculture

- Robots for precision agriculture and nutrient management
- Precision agriculture and trying to reduce pesticides with the use of new technology

Diverse production

- Better integration of different outputs or products from land, if you are producing food or fibres... increasing diversity production to multiple benefits

Scientific method

Science's role

- Different view on what science can and should do. We can be more engaged in raising uncomfortable questions to find solutions, not just being critical from ivory tower. Acceptance of new way of doing science.
- Been seeing as honest brokers - need for data literacy and that skill is not well-spread. Potential to be impartial brokers

Sharing Data

- Joining up things we already have (taxation health outcomes and farm census)
- New forms of data that we don't have at the mo., building on them or being able to access novel data sources - might help us understand things in different ways
- In Hutton we're in large systems projects allowing us to learn across EU and beyond. We'll have more data about private investment, mechanisms for transformation, how value changes work across EU. Opportunity for bringing together ambitious learning.
- Learning from other nations even within the UK. England are further ahead in land management schemes. England thinking about balancing out payments for wider environmental benefits and production. Dynamic time for land management schemes. Since WWII.
- Huge opportunities for building resilience and how we can actually expand the notion of land within the base resource and address the wicked problems (climate change, biodiversity loss and more importantly food systems). In Africa, report Status of Agriculture in Africa - huge interest in land use intensification for cropping in developing world. This has implications for resilience, biodiversity loss... The Institute can be knowledge broker and data provider about how land use can be used to understand resilience

International cooperation

- Commonwealth can be an opportunity outside EU
- We do not know relationship with Europe
- Importance of Malawi in Scotland relationships. Opportunities there.
- To what extent opportunities are regarding Scotland, UK, the EU, international? There are huge opportunities for international research that were not harnessing before (Macaulay Institute), but that can be harnessed now.

Collaboration

- Co-constructed solutions with multiple stakeholders and action on the ground is critical.

- Opportunities for ILUSC may come from other challenges - how do we resolve conflicts that will emerge over land use? will require changes of mindset, individual farmers, and landowners and societal - this is an opportunity for research.
- Opportunity from growing appreciation of land -based resources: green and social prescribing, new spaces for interdisciplinary collaborations around land use

The Unknown

Uncertainty

- Any kind of opportunity: it could be technological, political, social...
- Horizon is unclear and uncertain, you've got to be adaptive and flexible and respond to new imperatives in a more volatile (politically, economically, environmentally) world. Grasp land-material nexus.

4 Making the most of our strengths

4.1 Looking at our vision… What are we already doing well to achieve that? (Include strengths, capacity, skills, projects, attitudes, track record etc.)

Question of clarification

- We need to define "we" - people participating are from different organisations. Is Hutton focused?
- It should be Hutton / ILUSC focused. What ILUSC might do in collaboration with others

Knowledge base

Scientific approach

- Hutton known for presenting good papers. Known as interdisciplinary group that works on land use.
- Platforms good long term and practical link between research and application
- Draw on SEFARI partnership? In RESAS research that's properly transdisciplinary working across research providers.
- Some of the work that's integrated, and stakeholder informed and lead - helps us get international perspective that doesn't always happen in theoretical research has come in from a non-specialist angle - managed to spot areas that are obvious cross fertilisation from other areas - practical and transitionary a-approach helps connections and knowledge transfer from different places
- Transdisciplinary science: bio physical scientists, social scientists, different expertise within the Institute and work with stakeholders, although maybe some groups work more/better with stakeholders than others. So, make it more connected. Also, more co-design and co-development of projects and outcomes.
- Hutton has strengths on research on how to work together, governance, partnership building, complicated contexts (especially on catchments but translates well)
- Not just interdisciplinary and transdisciplinary, but we have established mechanisms for doing that. So, it demonstrates our capability.
- Interdisciplinary working is talked about more and much more experienced - it's the norm now
- Interdisciplinarity- helps to get integrated approach to land management- can see the whole pic
- Interdisciplinary and transdisciplinary collaborations -strength of these types of organisations
- Huge interdisciplinarity- connections of Hutton- help achieve the vison

- Hutton has a good reputation in interdisciplinary work and easing into transdisciplinary work. Well positioned to build on hat. Esp. in social, biophysical sciences: bridging the two.
- Looking boarder - linking health, land use, ... appetite for data integration and institutionally trying to make it happen
- Data methodology

Collaborating with stakeholders

- We are good already at collaborating with external stakeholders (academia, industry, policy) and bringing those stakeholders together. But we need to find ways to scaling that up and expanding it more, because it is easy to go to the ones already known and that we know that would be receptive.
- We are very good at working with a range of stakeholders and understanding their expertise - transdisciplinary working that a lot of us have done for a while - opportunities to do more and support others to do it too - harder now than it was when we started
- Work linking to farmers goes on in Dundee. Development of new varieties for farmers, testing and demonstrating new varieties of crops and the research that feeds into breeding and testing. Commonwealth potato collection. New ways for farmers to grow crops: berries, to cope with changes in demand from customers and environmental and pathogen pressures. How much linkage is there between that work and ILUSC?
- Have had a number of projects with JHI, actively engaging land managers- needs many people to come together, good at that, info and practical help is good and do quite well its comms front re translating science and application
- Lots of research on farmer decision making.
- Demonstration farms and ability to trial things to understand the impacts. Very practical farm managers in touch with farming practice. Help with adaptation of farming.
- Good links with farming community
- Related- long term platforms- farms and long-term resources - unique

Access to information and data

- National soil archive.
- Centres for expertise are important.
- Platforms like Glen Finglas. Access to historic datasets. Long term research running, which is rare.
- Never heard of Hutton, Link- Lee-Ann reached out otherwise wouldn't have known, need more community engagement
- Sometimes you can see things change at an institution level but it's hard to attribute to a single thing
- Defra as an example - huge effort into codesign - manual on website - example of how this can be done, it's a bit of a contrast

Funding

- Good at bringing in EU funding.

Current projects and research

- Paola Ovando's natural capital work.
- Peatland research is valuable and at cutting edge.
- Strength in extensive landscapes and upland research.
- Hutton strong on plant pathology and soil research. Not sure how integrated that is into the bigger picture. Impacts in scientific circles.
- linked strong legacy in soil research, land capacity evaluation and data sets
- Running this initiative and this workshop, taking a broad sweep of sectors and expertise

- Land capability mapping is a strength.
- Thinking about blurring or rural/urban boundaries - is this something that is a strength of the institute or something that could be stronger? how do we join them up? aware of people doing more urban work (treescapes have an urban area) - more in socio-economic side of things
- Hutton known for not just land use: rural issues as well.
- Knowledge of how to achieve impact
- Skills, projects, track records... It might be difficult for who is not very familiar with Hutton

Policy

- Research policy well aligned Scotland, UK Europe and international
- Strong links with Scottish governments, and weakness going beyond that.
- Good connection with policy side, well connected to Scottish policy re LUM
- Particularly in Scotland very strong links with policy and stakeholders. About translating science into impact. We're good at that.

Technology

- EBS and ICS strength in catchment modelling and hydrology.
- Water and hydronation is valuable and cutting edge. CREW is vital for policy. Close collaboration with one planet choices project. Researcher embedded in project team, really good way to work.

Social

Social Justice

- Hutton staff- are they diverse? Do have a lot of training round equality etc and always partner up with experts.
- Working on generational renewal. and greenspace and outdoor access. Important for social justice.

Recognition

- Interpretation of Hutton - very skilled and capable individuals - good at project work but chasing funding from gov etc so maybe limiting from the wider picture as limited by the pay master
- Track record and name recognition under land use, but the name might become a question mark in the future. ILUSC - Hutton - Macaulay. The recognition of the name/brand is a strength, but confusion might become a weakness
- Interested in how people not from Hutton perceptions

International relationships

- We're doing a lot of international work but may not be well know, helps build capacity and our skills and how we work in other contexts. Challenges include working in Malawi, India- different biophysical challenges, access to data, thinking about cultural issues.
- Strengthen international collaborations, even if they depend on funding streams

Integration

- Integration - something does well, but there is room to improve - e.g., given 2 data sets that in government it is institutionally harder to combine whereas easier for Hutton

Community engagement

- Strong embeddedness in the region
- The more you involve people the more you build interest
- Whole systems approached ds so can see trade-offs between elements of systems

- As a community, effective in collaborating across the topics at the forefront of policymakers thinking, approaches to NetZero and transformations in food systems can be strength by research. Two dimensions: how we expand collectively the strengths of those partnerships? And exploiting the existing strengths on the contributions to the topics and funding agendas

4.2 What can ILUSC do to enhance and build on our strengths? (Which couldn't happen without ILUSC)

Collaboration

Expand knowledge sharing

- An ambition in new strategic research programme to try to join up silos got a bit of experience at EU level - in previous research programmes they've been in a separate silo
- Social scientists at Hutton could have a great role in translational research in practice community. Land managers know SRUC, but Hutton could develop the role translating the social sciences issues in the transition to a post-carbon age. Need to become an agent in co-constructed change process more strongly.
- Making data available publicly in accessible way
- Align data collection across land use types. Dundee low ground arable, Aberdeen more upland? Data collection as separate exercise Look at overlaps and get people to work together across land use types to look at systems
- More visiting scholars.
- Integrated - Integrated land use or the integration in the study and then for across expertise, topics, disciplines? There is a lot of focus and groups on aspects of land and uses. The bit that we couldn't do without ILUSC is the bridging across disciplines.
- Bringing together internally and externally (do it for a purpose, common interest/skills to meet project need) - training and knowledge sharing

Build new relationships

- Have some good collaboration pathways with certain sectors, but need to build new pathways - hard to get balance
- Discussion is very much around internal - what institute can build itself but there's also place for what it can bring in from elsewhere - external expertise that can build on existing strength - partnership working
- Like the idea it could help with networking - we all have networks but would be good to have a brokerage role.
- Building on previous issue of raising Hutton profile through collaboration building new partnerships
- Interact with stakeholders, many stakeholders already interact with us but a personal level. Maybe ILUSC constitute an entry space that allow us to scale-up those interactions

Communication

- Better collaboration between depts at institute level and out with
- Struggling to separate SRP and ILUSC, maybe ILUSC can help internationalise what we are doing
- Social media- transparency and robustness important
- Championing role for agreements, data sharing, openness, transparency in the way we do things. Try to push forward the study of land use and make it more community orientated. Community orientation is going to be very important in the future and making land use data open could be a really big area for ILUSC.
- tools and apps potential for user friendly publicly

- Challenge is to see what the centre does specifically? this would define its role - coordinator? educator? way of generating/ enhance funding as more visible to enable work of Hutton? - clarity of purpose and how it will do these things
- Promote our work and help us to do what we already do, better
- Enhancing the visibility of Hutton's - advertising who you are and what you are?
- Communication and breaking down silos between works and teams. Better teamwork between stakeholders and scientist

Expansion and inclusivity

- Stimulate beyond ILUSC and the Institute. Leading to more work
- Become more actively inclusive and ensure a broad range of interests are included in all discussions.
- Scale of transformation in land use to get to 1.5c world is pretty profound and will require very different skills and management and nature-based solutions - facilities that are used for that so build on their strengths
- Bridging scale gaps,
- So much going on - this is one of the challenges (advances etc) need to be aware of ilucs main resources is 50% Lee Ann's time and is building on her interest - interest in digital world - becoming further reaching with that rather than just becoming a space in Scotland. Trying to understand how people interact with natural environment env.
- Greenspace and health: Who isn't able to access those benefits and develop capabilities to develop those benefits

International collaboration

- A lot of EU projects align with SRP, so bringing all of relevant research together under one umbrella.
- International, working in partnerships overseas, ability to bring ideas and different ways of working. Particularly in terms of working with farmers, establishing sustainable ways of working, vision for change, how food systems could be different, more sustainable. The international focus could bring that back to Scotland and feed that into RESAS themes.
- International - build capacity in other countries that are less advanced - avoid silo approach go direct into inclusive
- Participatory mapping and GIS could publicise activities on that. You need that kind of work in international collaborations. Potential to collaborate.

Resources

Streamline finance

- If to do over and above - tackle transaction costs of trans disc research - capacity building and networking so can build the right team efficiently - be proactive in creating those opportunities. At the mo., as have to chase money in particular way, thwarted - ILUSC could be strategic and take away some friction
- Building upon collaborations between organisations to prevent bidding across
- Risk in terms of money coming from EU. Strengthen international networks so they can survive loss from EU if it occurs. Make Hutton indispensable as a partner.

Green credentials

- Wider point - this issue of leakage - production in Scotland, other countries don't have those standards so cheaper so having to export those green credentials - leakage

Consumption

- In terms of land use - a lot of discussions focus on management methods of production side and how that can be incentivised - with much less attention on consumption and market force and influencing transformation in that sense - could this be potentially aligned?

- Consumption in the wider sense which we do have expertise in (tourism)

Scientific Method

Robust data

- Important to always be challenging robustness of data, understanding how data sets are different
- If role of ILUSC is to reflect critically on methods of multiple projects - synthesis so can say something more influential as based on multiple projects - make it greater than the sum of its parts

Creative research

- Hutton work is defined by government research themes. This centre could go beyond and think further about the vision for transition of land and testing those out in a way can't do in research themes. More creative approach.
- Having methods as a key pillar of ILUSC - can be a key vehicle to transdisciplinary - needs to be a way to broaden out - i.e., use Lee- Ann's strengths but she's only one human - what might be missed?

Monitoring strategies

- ILUSC could help design and support monitoring strategy's- help think about consistent monitoring across countries and p4rojects

Adapting existing methods

- ILUSC can promote the integrated perspective but feel that the question is a bit incorrect. That the Institute could be able to make already all that without ILUSC.
- Study - There is a lot on policy and practice on the ground, but not sure that the word 'study' always set best with that. So, underpinning theoretical understanding will be key in ILUSC
- Focused debate on an area, while the Institute might have a wide focus. ILUSC can focus on a smaller area disciplinary, although big in terms of impact
- Expand definition of land use to include other activities we do at the Hutton which are relevant but get siloed, e.g., farm work and other work. E.g. water resources and water environment.

4.3 Where could we become major players (but aren't now)?

Exemplar research

Open, accessible Science

- Become a flagship, a beacon for openness and transparency for land-use data science. Who owns data, keeping data for oneself? There are benefits for sharing data openly
- Potential for ILUSC to become an exemplar of open science and explore challenges and boundaries of open science. And make data and outputs more widely and easily accessible.
- Make a plea! a lot of what you say is not accessible - please make this the case to get the maximum buy in
- Trying to push distribution as much as can but not always a lot of interest

Participatory research

- The go-to place for participatory and citizen science and research.

Transdisciplinary science

- People at Hutton are pretty transdisciplinary, good at working outside comfort zone could be doing more
- Elements to integrate social, economic aspects and others

Support

Decision and logistical support

- The go to point in Scotland for decision support and co-development models and tools with stakeholders for water resources and environmental challenges and practical issues
- Individual research specialist centres forming. Look at different mechanisms and how they work together: grants, government, supply chains, map that out and help people understand the most effective way of achieving just transition in land using those mechanisms.
- Hutton could be the go-to place for land tenure, land use, policy analysis. On an international level: different approaches for looking at land use. Hutton could be a leader.

Funding

- Funding for networks, platforms National and international
- Draw down investment and identify areas for additional funding

Translating research

- Could promote good capacity to translate research on soils and Nat cap, translate good research at international context
- In institute we are strong on geographical aspects of land use through history of data sets and understanding geographies of identity, experience, attitudes, values - if going to tackle distribution need to be able to bring those kinds of knowledge together - we have those skills, but they need to be more synergised

Informing policy

- Big issue around better understanding distribution of costs and benefit on how we use land and sea - at heart of issues related to cc and state of nature. most policies tend to look at aggregate cost and benefits not the distributions. could make better choices if we understood better

Social gain

Social Justice

- Ideas about justice fit within social science but try to build into programmes - keeps reappearing. net 0 and new justice issues - bringing to the fore those social justice issues as so many potential landscape changings which will raise these issues. how much do we bring in diverse voices into decision making and what are the reactions to that

Public health

- Scope for us to be engaged in conversations in public health spaces. Health and wellbeing in social and green prescribing interesting policy driver. We do work on outdoor access and greenspaces but could join the dots with public health agenda. NHS desire to take green space benefits on board. We could be more translational.

International collaborations

- Become major players in an area not yet explicitly discussed: just transitions in land use. The land uses are going to be part of the solutions for tackling climate change and loss of biodiversity, and how lessons learnt and right changes during centuries in Scotland can be put back on the global agenda.
- Become major players at larger scale - international but also UK. We are probably not the first to go place in the UK yet
- Scope for looking at international partners, e.g., CSIRO in Australia. Network of global partners looking at land use. By acting collectively, you become more prominent collectively. Add value more strongly.

- International - Intention to internationalize the activity to a greater extent. Opportunity to expand the scope of the research
- Welsh government are looking to Scotland about community empowerment legislation which is seen as good. Role for ILUSC in making conversations happen and showcasing Scotland is a world leader in things. E.g., land policy.

Research area – value and economy

Circular economy

- Scottish enterprise and H&I enterprise working on circular economy solutions. Nutrient reuse. Universities are working on that. Role for linking circular economy solutions and enabling synergistic sectors to come together. Holistic look role of demonstrating those circular economy solutions.

Natural capital

- We have a lot of expertise on different dimensions of landcover- Maybe more easily move into Nat Cap area quickly specifically private investment

Green finance

- Green finance, should we be moving into? Funding available coming through Leeds and Oxford, opportunities for partnership. Re-plumbing financial system. Co-ordination aspects deliver rural development framework. How do mechanisms land in rural areas? That are linked into global networks or not. Useful areas to coming into. E.g., link with southwest Scotland lens at local level. And national level. Role of insurance and re-insurance of rural communities to flooding. If rural communities become more linked to finance how does that affect them? How portfolios have an impact on structuring land use. Conservation finance pioneers are looking at this as well. Hutton could ink with existing groups that are already looking at this.

Requirements for this

- What our key performance indicators are going to be? It is impact with one stakeholder and one decision? What are the dimensions of our aspirations? What "major player" is going to mean, understood, measured? That will help us to assess motivations and directions
- To become major players (without extra resources we have to win them/make best of what we have)

4.4 What is saturated with researchers and not worth competing in that space?

Never enough research

Collaboration not competition

- Science is not a competitive process, is a collaborative process. Don't like the question - Don't think that any space should be closed. We might collaborate in those spaces if we think we can bring something to the table.
- The focus area is already being defined. For example, it doesn't make sense to go into climate research, but that doesn't mean that you cannot link with it
- We shouldn't be excluding any area... If we have a contribution to make, and if it is a good enough idea with enough capabilities, we would win the competition. An area will be good populated and have interesting angles, but that doesn't mean that the solutions are found... So maybe that's not reason for excluding areas

Resource limitation

- We might be forced to that space because the way science and funding is structured, but we still can push for collaboration.
- Never enough research so saturation is not a real thing - competitiveness of money in one location - potentially shrinking?

- Is anything saturated? Is an issue that we don't have enough capacity

Accessibility of data
- People can download data, but they come back to us to help understand it (soil map app)

Collaboration

Transdisciplinary
- Transdisciplinary in the sense that everyone's talking about it - Hutton got a good track record but very congested - maybe not make huge waves in

Community engagement
- Social science- calls to do community engagement- lots of other people doing that well already - maybe not so much energy to that
- Opportunities for participatory engagement but not do the how to do it research

Stick to what ILUSC does best and collaborate
- Other institute have better, more capacity so collaboration is the way forward, do what we do well
- Differentiating ourselves. What are we aiming for? Terminology evolves very quickly... We used to talk about sustainable agriculture, but not the buzzword is regenerative agriculture...

Technology
- Not only lack of expertise but lack of infrastructure for digital technology etc- huge investment we can't do.
- Lot of emphasis on tools and apps, we shouldn't be competing with that, but we should provide the science, support their use, and evaluate how they are used

Remote sensing
- Remote sensing and earth observation in particular

Specific research areas
- Niche areas are not our strength, not be hyper specialised
- There is a risk to not having a universal offer. In the way grants are structured these days, reflects that. It is important to have an offer across the board withing the land use space. So many staff might become engaged in May conversations (which it's one of the strengths of Hutton already). To keep universality
- Some EU proposals are highly subscribed. Ecological proposal for example.

Wildlife and prescribed burning
- Wildfire and prescribed burning.

Insects and pollinators
- There's burn out, transaction costs, and wasted energy on some topics that are oversubscribed. E.g., insects and pollinators.

Green spaces and wellbeing
- Health and greenspace might be saturated
- Green space that's only looking at benefits of landscapes to health and wellbeing is oversaturated. Who isn't able to access those benefits and develop capabilities to develop those benefits

Natural capital
- Natural capital accounting. Some areas there are gaps: health of soils. Not fully saturated. Look where to focus. Accounting is the first step, need to translate it into

management on the ground. NC protocols help land managers understand their interdependency on resources. That's the missing bit.

Carbon and emissions

- Carbon quantification world is saturated. Pulling together what people have already done? Holistic look at how net zero fits with biodiversity. Pull together to make better land use decisions.
- A lot of people working on carbon - we got to think what the trade-offs are for biodiversity, food security... Focusing on a single area, there is a lot people working on that. The strength will be working across areas

Urban land

- Urban land context we might not be competitive. Planning and green finance can be urban. We might not have necessary credibility in that space. Could include green infrastructure in urban space. A lot of other people working on that.

5 For cutting edge and high impact…

5.1 Out of everything you have discussed, what for you are the priority high level challenges ILUSC should address?

Evaluating Land use

Land use impact measurements

- How to deliver multiple benefits from the land - balancing trade-offs between different demands
- Land use benefits are locally specific so need to take system understandings and understand geographic applicability? Need to match function to geography
- Identifying and selecting indicators of environmental performance for agriculture - so farmers can also identify them
- Multiple benefits & integrations to all uses of the land (agroforestry, regenerative techniques...). Tendency about corridors and steppingstones, but most of them are relevant for all the landscape. The scale of the integration
- Grassland and soils. Communication and understanding

Redefining land use

- Redefining the field of land use study to reflect the interlinked nature of land use challenges

Pathways for land use change

- Pathways for just transitions for visions of land use for the future, some work around what Land Use of the future is and how are they integrated- fit well with ILUSC

Restoration and management

- Improving our understanding and developing practical measures for wetlands restoration and management including peatland restorations

Systems approach

- Look at big shifts (rewilding etc) as a whole not as individual
- Understanding systems where the boundaries and uncertainty are

Knowledge sharing

Establish a name

- ILUSC has a challenge in distinguishing its own name. Has to stay relevant as things change. Key project, large initial challenge to put it on the map. (One big funder to drive that forward?)
- How to get research and plans implemented beware of social media

Data integration

- Data integration - what are usually different sectors, government data and how this can be brought together (at different levels) to get greater value out of existing data
- How is this measure success in this?
- More relevant in data rich countries
- Significance is what it enables to happen - necessary but not sufficient
- Global data could be integrated with local social and environmental data.

Engagement

- Develop and apply innovative ways to engage - open up conversation
- To what extent is this immediately transferrable internationally - cultural contact and language or can it be transferred everywhere?

Partnerships

- Long-term partnerships with key partners on the ground (translational research) on food-water-energy nexus. Planetary limits model. Action laboratories.
- Knowledge transfer on soils to come across to land managers - so land managers can implement the changes and be influencers

Knowledge/ Data openness

- Data openness, sharing agreement of land use data
- Pay attention to how knowledge claims are made and how it's used. Take a step back and look at context

Right scale, right place

- Research /inform how to target measures at right scale and place - need help of targeting esp. river basin planning

Funding

Private capital

- ID ways to coordinate private capital - in all of this and carbon futures
- Disclosures - what do we believe - international whereas what do we imagine as sustainable futures is quite local specific
- It's a process as well so is needed to achieve transformative change
- Supporting these groups private investment. Effectively measure and verify gaps-international standards

Funding streams

- Funding streams: maintaining impendence and international reach while maintaining funding. How to make it all work?

Climate change mitigation

Climate change mitigation

- All should to be framed for mitigating for +1.5 and adapting to+3 and being nature positive

Low carbon farming

- Transition to low carbon farming - boarder to low carbon futures

Carbon targets

- NetZero targets in agricultural, forestry and land use sectors. Improving the robustness of the approaches and provide evidence. Support individual farmers and national policy. Actions on the ground

Collaboration

Shared decision making

- Environmental inclusion and democratizing decision re land use, collective vision, and co-construction with broad range as possible

Co-development

- Co-development and cocreation and quantify trade-offs - adopt and use tools

Transforming Farming

Streamlining food system

- Where Scottish brands fit at a local and global scale. High value products sold internationally not necessarily used locally. Making changes to food system that meets local needs while fitting in with agricultural economic context.
- Transformational change that needs to be happening in farming and how to facilitate that transformation

Methods of valuation

Green Finance

- Green finance. What we measure and how we measure

Natural Capital

- Relationship with International Panel for Biodiversity and Ecosystems services. Natural capital. New economic principles.

Circular economy

- Applying notions of the circular economy to land use. Carbon cycles, nitrogen cycles, water cycles... To close those down to the local scales

Land ownership and access

Access to land

- Need to get a much better handle of the distribution of cost-benefits analysis on access to land
- Young people and access to land (not only farming and crofting) but also place-based community development. Pro-use agenda for Scotland. Fairness and potential in access to land
- Increasing the inclusivity of who has access and make use of land
- Environmental justice distribution of costs and benefits, engaging young people ...

Assetisation of land

- Research around land an asset and a private finance - and international comparable research on land and assets

Community land ownership

- Scotland further on in relation to community land ownership. Is community land ownership a better model for delivering public goods than private land alternatives? Long term monitoring of these land ownership models versus private models.

5.2 Prioritisation of prioritised shortlist for ILUSC to research

No. of dots	Idea	What more do we need to know to inform further discussion?
13	**Transformational change that needs to be happening in farming and how to facilitate that transformation** • Transition to low carbon farming - boarder to low carbon futures • pathways for just transitions for visions of LU for the future, some work around what are LU of the future and how are they integrated- fit well with ILUSC	– Need to bring farmers and crofters with you and recognise culture and fear of change
9	**Finance** • Green finance. What we measure and how we measure • ID ways to coordinate private capital - in all of this and carbon futures • supporting these groups private investment. Effectively measure and verify gaps- international standards	– Need to maintain independence and trust – Aware of international standards and solutions e.g., Regen Network, IndigoAg"
9	**targeting measures at right scale and place - need help of targeting esp. river basin planning**	– Applies to all interventions; woodland expansion/afforestation, peatland restoration, protec6ted areas, etc – Need to understand the trade-offs between multiple benefits - this requires experiments/trials that are correctly monitored to provide the right data for models for upscaling. Models and decision support tools need to be co-created with stakeholders for knowledge transfer. This is linked to open data but also collecting new data and understanding complex system interactions and the associated uncertainty and the need for trans-disciplinary science. This point is also linked to the point about green finance."
9	**Environmental justice**	– I think this is essential - and links to transformation & open conversations
9	**Improving our understanding and developing practical measures for wetlands restoration and management including peatland restorations**	– Need to understand the effect of all nature-based solutions as well as new farming practices for multiple benefits

8	**look at big shifts (rewilding etc) as a whole not as individual**	– This should include regenerative agriculture, and precision farming and measuring impacts of these - see original ideas board. Grouped measures rather than individual actions – It is linked to transformational change topic"
8	**Long term partnerships with key partners on the ground (translational research) on food-water-energy nexus. Planetary limits model. Action laboratories.**	– South Scotland Enterprise an idea place to start – my thought was that these should be geographical areas: Orkney Cairngorms National park or Southern uplands and they would be strongly multi-actor partnerships"
7	**Land Use and Data Openness** • Land Use and Data openness, sharing agreements and data justice • Land use, data openness, sharing agreement. (Reach and significance depend on the success of the project. Has potential for high reach and significance)	– Improving sharing and reuse of a broad range of data. – Many companies are commercialising this data. Source of revenue if ploughed back into research?"
7	**All should to be framed for mitigating for +1.5 and adapting to+3 and being nature positive**	– a global framing for everything ILUSC does – How to deliver to both CC and nature objectives, from the field to national level."
6	**redefining the field of land use study to reflect the interlinked nature of land use challenges**	– For me this is important to recognise the changing definition of 'land use' and thinking more broadly about landscapes of leisure/consumption as well as production. – For me, it is key to success of the Centre for people to know if or how they fit in and how the Centre sees those connections"
6	**Increasing the inclusivity of who has access and make use of land**	– This could be part of environmental justice? But also, to finance and Assetisation
5	**Develop and apply innovative ways to engage - open up conversation**	– Service design and using digital technology e.g., AR/VR – This for me is quite similar to the point about engaging farmers in the transitions but chose this because I see the engagement as wider and can imagine a whole host of interesting methods to engage. – I would like to have voted for this as a way of working to achieve behaviour change"
4	**pay attention to how knowledge claims are made and how it's used. Take a step back and look at context**	– Taking a critical view of science and the different contexts (international) about how data and science are used or understood?
4	**Global data could be integrated with local social and environmental data.**	

Annex 1 Agenda

International Land Use Study Centre (ILUSC)

Thursday 25 November 2021

ONLINE

- This Agenda sets out indicative timing and the sessions and questions (minor refinements may be made between now and the workshop).
- During the workshop you will sometimes be in small groups and sometimes all together - and you will get to contribute your thoughts to all of the questions.
- The workshop is carefully designed and structured, and it will feel interactive and informal. Everyone will have the chance to share their views on an equal footing

Workshop 1 – Thursday 25 November 2021

	Registration	
09:00	**Welcome** Briefing and Starting Activity	
	▪ Briefing and scene setting	Lee Ann Sutherland
	▪ Facilitator's introduction	Diana Pound -Dialogue Matters
	Q Imagine it is 2031 and you are at an event celebrating the impact and outcomes of ILUSC's hard work. The two thing that pleases you most are…	
	Add your thought to those of others	
	Part 1: The external ever-changing context for our work	
	Q What are the external trends and changes, post Covid, which we need to factor into our thinking? (Political, Economic, Social and cultural, Technological, Law/Policy, Environmental)	
10:30	**10 minute break**	
10:40	**Part 2: International land use issues and opportunities**	
	Q What are the emerging issues that we could help address?	
	Q What are the emerging opportunities we could make the most of?	
11:40	**10 minute break**	
11:50	**Part 3: Making the most of our strengths**	
	Look at the vision	
	Q What are we already doing well to achieve that? (Include strengths, capacity, skills, projects, attitudes, track record etc)	
	Q What can ILUSC do to enhance and build on our strengths? (which couldn't happen without ILUSC)	
	Q Where could Hutton become major players (but aren't now?)	
	Q What is saturated with researchers and not worth competing in that space?	
	Part 4: For cutting edge and high impact …	
	Out of everything you have discussed what for you are the priority high level challenges ILUSC should address?	
	Q Now prioritise the short list/spheres for ILUSC to research?	
	Q Add what we need to know to inform further discussion about this?	
12:50	**Wrap up the day**	
	▪ Next steps	
	▪ Feedback	
	▪ Thanks	
13:00	**Official Finish no later than this**	

Potential half hour networking space for participants

Annex 2 List of Attendees

1 Alessandro Gimona - The James Hutton Institute
2 Ali Karley - The James Hutton Institute
3 Bill Slee - The Macaulay Development Trust
4 Cathy Hawes - The James Hutton Institute
5 Clive Mitchell - NatureScot
6 Dan McGonigle – Defra
7 Dave Burslem - University of Aberdeen
8 David Miller -The James Hutton Institute
9 Emily Taylor - Crichton Carbon Centre
10 Fiona Harrison – Scottish Government
11 Jane Craigie – The Rural Youth Project
12 Katrina Brown - The James Hutton Institute
13 Keith Matthews - The James Hutton Institute
14 Kirsty Blackstock The James Hutton Institute
15 Kit Macleod - The James Hutton Institute
16 Kevin Urama – The African Development Bank
17 Leland Glenna – Penn State University
18 Lee-Ann Sutherland – The James Hutton Institute
19 Mags Currie - The James Hutton Institute
20 Mairi Mackenzie - Scottish Crofting Commission
21 Maria Nijnik The James Hutton Institute
22 Mario Giampietro – Autonomous University of Barcelona
23 Martin Phillips – Leicester University
24 Matthew Kelly - Administrative Data Research Unit – Wales
25 Michael Woods - Aberystwyth University
26 Miriam Glendell The James Hutton Institute
27 Nav Bakhsh - Boots and Beards, Scotland
28 Nick Schurch - The James Hutton Institute
29 Nicola Melville - SEPA
30 Nina Clancy – RSABI
31 Peter Reichert - Swiss Federal Institute of Technology
32 Petra Boevink - The James Hutton Institute
33 Robin Pakeman The James Hutton Institute
34 Rosalaura Romeo - FAO Mountain Partnership Secretariat
35 Rowan Ellis - The James Hutton Institute
36 Scott Newey - The James Hutton Institute
37 Stephen Young - Scottish Land and Estates
38 Zisis Gagkas - The James Hutton Institute