Land is Life: Learning for Sustainable Development Goals in the Land Use Sector

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**Foreword**

*Saving our planet, lifting people out of poverty, advancing economic growth... these are one and the same fight. We must connect the dots between climate change, water scarcity, energy shortages, global health, food security and women’s empowerment. Solutions to one problem must be solutions for all* - Ban Ki-moon, Secretary-General of UN, 2007-2016

This guidebook is the outcome of a one-year pilot capacity building programme “Land is Life” (in the following LiL), which was implemented in 2019 by Lund University Centre for Sustainability Studies in Sweden and East Africa, funded by the Swedish Institute. The capacity building programme LiL targeted civil servants in eastern Africa and addressed issues of access and management of sustainable land resources, a fundamental part of the fight against poverty, food insecurity, inequality, unemployment, environmental degradation and poor management of vital land resources. The programme centred around SDG 15, Life on Land, which is central for the achievement of a range of other SDGs. The case of land is therefore a nice example for the interlinkages between the SDGs in general and is used as a case study in this book.

SDG 15, Life on Land, is to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation and halt biodiversity loss. SDG 15 is a part of the foundation of sustainable development as the sustainable management of our planet’s natural resources, such as land, is a prerequisite for social and economic development. Land degradation is one of the world’s most pressing environmental problems and it will worsen without rapid remedial action. According to the UN Secretary General in 2019 “the 2020 targets of Sustainable Development Goal 15 are unlikely to be met, land degradation continues, biodiversity loss is occurring at an alarming rate, and invasive species and the illicit poaching and trafficking of wildlife continue to thwart efforts to protect and restore vital ecosystems and species.” (UN Secretary-General, 2019, p. 25).

The loss of forests continues at an alarming rate. Biodiversity loss is happening at an accelerated rate, the risk of species extinction has worsened by about 10 per cent over the last 25 years and one million plant and animal species are at risk (IPBES, 2019). Globally, about 25 percent of the total land area has been degraded, affecting directly 3.2 billion people. Land degradation is additionally one of the most important contributors to climate change.

Poverty is strongly interconnected to SDG15 and land issues, as extreme poverty today is concentrated and overwhelmingly affects rural populations, where most are dependent on land, e.g. employed as agriculture workers or do their own farming, animal husbandry and forestry. The share of the world’s population living in extreme poverty has decreased from 36 per cent in 1990 to 10 percent in 2015. However, the pace of improvement has decelerating and extreme poverty remains stubbornly high in sub-Saharan Africa. In 2017 more than 413 million people lived in extreme poverty in sub-Saharan Africa and this figure has been climbing in recent years. Just as problems are interrelated, the solutions to poverty, inequality, climate change, land degradation and other global challenges are also interlinked.

The purpose of this guidebook is to contribute capacity building in implementing SDG 15. We offer insights into how to develop a deeper and holistic understanding of the SDGs related to land use challenges with examples from eastern Africa and how to develop skills to put theory into action towards achieving SDG 15. The approach that we have developed is based on the LiL pilot programme experience in 2019. We explain the interdisciplinary perspective of the SDGs – ecologic, social and economic goals and engage with interlinkages and trade-offs between different SDGs related to land challenges in eastern part of Africa. The intention is to deepen a system understanding and improve sustainable decision-making in practice, which on the long-term is contributing to achieving SDG 15. The guidebook wants to inspire and enable people working in the land sector to take leadership towards a more sustainable land management, that takes into account all perspectives of sustainability. To
conclude, this guidebook provides insights that the SDGs are contested since they are politically negotiated goals and especially targets. This guidebook shows how to be aware of these contestations and how to navigate them from perspective of concrete and practical examples from LiL pilot programme participants from eastern part of Africa.
1. Introduction

1.1. The Agenda 2030 for Sustainable Development

The Agenda 2030 for Sustainable Development is a “plan of action for people, planet and prosperity” (UN, 2015) with the 17 Sustainable Development Goals (SDGs) at its heart to be achieved by the year 2030. When the Agenda and the SDGs were adopted by all United Nations Member states in 2015, it was the first time in history that nations cooperated in a participatory way on setting a universal set of goals, applying to every nation and sector. It was the first time ever that several agendas were combined that have been going on for decades. Typical development sector goals, which previously were expressed in the Millennium Development Goals, were combined with social and ecological goals to create a set of integrated goals. The SDGs recognise that the work for poverty eradication and social justice must go hand-in-hand with the improvements in health and education, the stimulation of economic growth, the reduction of inequalities as well as global environmental protection and the fight against climate change.

1.2. A short history of United Nations policy work on sustainable development

The concept of Sustainable Development was already introduced in United Nations policy work by the Brundtland report “Our common future” in 1987. This report recognised that human resource development in the form of poverty reduction, gender equity, and wealth redistribution was crucial to formulating strategies for environmental conservation, but also recognised the environmental-limits to economic growth existed.

The eight Millennium Development Goals (MDGs) launched in 2000, were successful in their focusing efforts on, and supporting a global political consensus around issues such as hunger, inequality, poverty and health. But also criticized for their narrow focus on the human aspects of development, while overlooking the importance of material limits in the biosphere. Furthermore, the MDG framework failed to capture the complex interdependencies between the goals, and there was little cross-referencing between targets and indicators. The MDGs have also been criticized for top-down approaches and for too strong focus on developing countries, and for not having the universal ambition of transforming sustainability pathways for all countries.

1.3. The Sustainable Development Goals

At the United Nations Rio+20 Summit in Brazil in 2012 the UN adopted the 2030 Agenda for Sustainable Development with the goal to inspire a global transition towards a sustainable planet through bold and transformative change. The 2030 Agenda for Sustainable Development seeks to build on the MDGs and complete what they did not achieve. The Agenda 2030 is a plan of action for people, planet, prosperity, peace and partnership, known as the five Ps. It is a universal call for national actions and global cooperation to end poverty, protect the planet and improve the lives and prospects of everyone, everywhere.

With Agenda 2030, world leaders have committed to:

- Abolish extreme poverty
- Reduce inequalities and injustices in the world
- Promote peace and justice
- Solve the climate crisis
1.3.1. Characteristics of the SDGs

The SDGs are interlinked and need to be looked at as an overall framework. They are indivisible and need to be implemented in an integrated manner.

The SDGs are global in nature and universally applicable, taking into account national realities, capacities and levels of development and specific challenges. All countries have a shared responsibility to achieve the SDGs, and all have a meaningful role to play locally, nationally as well as on the global scale.

- Recognition of universal principles, standards and values
- Sustainable development issues exist in all countries
- Interconnectedness of national and global development challenges
- Universal commitment to leaving no one behind

Notion of Three dimensions

The 2030 Agenda integrates in a balanced manner the three dimensions of sustainable development – economic, social and environmental.

Notion of Indivisibility and Interlinked

The 2030 Agenda is also indivisible, in a sense that it must be implemented as a whole, in an integrated rather than a fragmented manner, recognizing that the different goals and targets are closely interlinked.

Notion of Transformation

Transformations are necessary for achieving the SDGs. A major change in societal structure, both economic, political, technological and social is needed to achieve long-term sustainable development.

1.3.2. Assessing the achievement of the SDGs

Each of the 17 SDGs has a list of targets, 169 targets in total, that are measured with indicators. Like the formulation of the 17 goals, the targets and indicators are the result of a political negotiation and need to be looked at critically. The SDG targets are an ideal set of goals. They are defined as global in scope and are aspirational. Governments are responsible for setting their own national target with local priorities and global aspirations in synergy. Government are also responsible for how goals and targets
are considered within strategic planning and policy processes at the national level. The SDGs should take into account “different national realities, capacities and levels of development and [respect] national policies and priorities” (UN, 2015, p. §55).

What may look technical and academic is therefore rather the result of political processes that translate values, priorities, and social norms into targets and indicators. In some cases, finding an adequate indicator proved to be difficult. For other goals, for example, reduced inequalities, there is a contestation about the agenda and the selection of indicators which can “pervert the meaning of the goal” (Fukuda-Parr & McNeill, 2019, p. 10). Research has shown that the choice of measurement indicators and methods at the national level affects the country SDG ranking, and ranking is used to assess the accountability and progress on Agenda 2030 (Miolo & Schiltz, 2019). This is important to consider since it has been shown that data is political and can distort development and create distorted standards and perverse incentives (Fukuda-Parr, 2014).

1.3.3. Implementing the SDGs at national and international level

While the SDGs are universal and apply to every nation and every sector, they are not legally binding. Governments are expected to take ownership and establish national frameworks for the achievement of the 17 Goals. The implementation at national levels is challenging and stakeholders at all levels and across all sectors are expected to be engaged in formulating the targets and goals. Since there are interlinkages between all of the goals, policy areas that used to be separated are encouraged to cooperate, for example, the global Covid-19 pandemic shows the critical importance of tackling SDG 15 (Land) and SDG 3 (Health) in collaborative ways. Here for example, ministries of health should collaborate with ministries of environment. Departments in government should collaborate across boundaries on setting integrated goals and targets.

Making the 2030 Agenda reality requires strong commitment by all countries and cross-country collaboration plays an important role. SDG 17 dedicates an extra goal to “Partnerships for the goals”, with special focus on north-south relations, using the SDGs as a shared framework and a shared vision for defining the collaboration between nations. More than ever collaboration is critical to tackle vast and complex challenges in the land use sector. The ways in which land is governed and managed in one place, is a consequence of historical, political and social decisions at difference scales and contexts. The actions of one society impacts others in globally connected ways.

There are of course many challenges in implementing the SDGs. Capacity challenges include the lack of knowledge about interconnections between sectors and goals, the poor understanding of the role of measurement and the potential development implications of measurement. The way we measure our SDGs and monitor their progress is not simply a technical issue. Finally, the way that we govern, manage and lead the implementation and effectiveness of the SDGs matters. New approaches to the way we lead for action on the SDGs is important, yet often, overlooked area of focus in the land use sector.

1.4. Education and Agenda 2030

Education is an essential strategy for the achievement of the Agenda 2030. It is included in the 17 sustainable development goals as a stand-alone goal, SDG 4, and also as a means for achieving all the other SDGs (UNESCO, 2017). There has been a decades long discourse about education and sustainable development which led to the well-established approach of Education for Sustainable Development (ESD) (Chapter 2.2). This guidebook connects to two of the on-going strands of discussion within ESD.

One strand of discussion within ESD is about competences. Several authors have suggested lists of competences (Barth, et al., 2007; Rieckmann, 2011; Wiek, et al., 2011). SDG implementers need a range of cross-cutting skills and key competences for addressing SDGs (SDSN, 2019, p. 12). These include: Systems and critical thinking, self-awareness, integrated problem-solving, and anticipatory, normative, strategic and collaboration skills; creativity, entrepreneurship, curiosity and learning skills, design
thinking, social responsibility, partnership competences, and well versed in inter-disciplinary settings. For students to develop such a variety of competences, skills and knowledge, a multi-method approach is necessary, i.e. the combination of different methodologies and pedagogies (UNESCO, 2006, p. 17). Lozano et al. (2017) are among the first scholars to combine the discourse about ESD competences and ESD methodologies and develop a framework. Their study shows that no single pedagogical methodology alone covers the whole set of ESD competences. They see a need for further research that combines pedagogical methodologies and competences, which so far in literature have been studied separately. They suggest testing the validity of their framework in different contexts such as disciplines, geographical locations and sizes of universities.

1.5. Innovative learning structure
In this guidebook, the authors present a new learning structure of how to better understand the Agenda 2030. The framework builds on three integrated modules that explain the SDGs and their interlinkages (Knowing), how to critically measure the SDGs’ progress (Measuring) and what kind of leadership is required to put the SDGs into practice (Leading).

The experiences with the capacity building programme “Land is Life” inform this structure as an active education format. This approach was explored and tested successfully as a way to educate on a broad set of competences contributing to a more sustainable work practice in their fields. Presenting the case of the capacity building programme is facilitated by ESD discourse on pedagogical methodologies competences (Lozano, et al., 2017).

The module Knowing is to be understand as foundational module and aims at deepening the basic knowledge of SDGs and targets. It emphasises the interlinkages between the SDGs and shows trade-offs.

The module Measuring builds on the Knowing module, and engages with ideas of measurement, goals, targets and indices, as well as aspects of project management, especially monitoring and evaluation. The authors see Measuring as the SDG indicator framework and the backbone of Agenda 2030. It is important to critically discuss measurement because if the Goals are to be reached by 2030, it is important to be able to understand the role of measurement and its limitations. This is one of the most challenging aspects of the SDGs and reveals basic differences between disciplines.

The module Leading builds on the previous modules and engages with different leadership models highlighting sustainable transformational leadership.

1.6. Focus: SDG 15 Land is Life
Land is a naturally occurring finite resource that holds everything that constitutes terrestrial ecosystems, and provides the foundation for the survival of living things. The United Nations defines land as “a delineable area of the earth’s terrestrial surface, encompassing all attributes of the biosphere immediately above or below this surface including those of the near-surface climate, the soil and terrain forms, the surface hydrology (including shallow lakes, rivers, marshes and swamps), the near-surface sedimentary layers and associated groundwater reserve, the plant and animal populations, the human settlement pattern and physical results of past and present human activities” (UN 1994). While an essential resource for humanity as a whole, land remains the most fundamental asset for the majority of vulnerable populations living in developing countries, as their livelihoods are directly linked to agriculture.

Besides providing an environment for diverse forms of production (including agricultural, industrial, and others), land is also an essential condition for improved environmental management, greenhouse gases remedial functions (as sinks), recycling of nutrients, amelioration and filtering of pollutants, and
transmission and purification of water as part of the hydrologic cycle. These functions can be affected negatively by changes in the condition of land – its degradation in one form or another.

In 2015 the FAO estimated that “83 per cent of rural people in Sub-Saharan Africa depend on land for their livelihoods, but 40 per cent of Africa’s land resources are currently degraded” (FAO, 2020). Working towards achieving SDG 15 “Life on Land”\(^1\), i.e. conserving natural habitats and biodiversity, is therefore central for the achievement of a range of other sustainable development goals (SDGs). Figure 2 shows the many synergies between SDG 15 and related SDGs. However, there are also conflicts between the SDGs: e.g. land and biodiversity conservation cannot overrule people’s ability to generate livelihoods if poverty is to be reduced (SDG 1) and hunger to be eradicated (SDG 2). Therefore, sustainable land management must take into account the multiple interlinkages between different development aspirations and find sustainable trade-offs. Understanding these synergies and trade-offs and knowing how to measure SDG progress and including this into sustainable decision-making are important leadership challenges in order to initiate and mainstream change towards achieving SDG 15.

1.7. Lund University “Land is Life” programme

The objective of the programme was to develop capacity, leadership skills and partnerships among the participating civil servants from different organisations in the East African land sector to be able to contribute to achieving the target set out in SDG 15 in their home countries.

The approach of the LiL programme was threefold and structured into three integrated modules:

1) **Knowing**: to strengthen knowledge about SDG 15 and its synergies and trade-offs to achieve other SDGs,

2) **Measuring**: to build skills in how to make use of measuring tools for SDG 15 to identify the scale of certain land problem(s) and to keep track of and predict the progress and effectiveness of specific measures.

3) **Leading**: to enhance leadership to initiate change towards achieving SDG 15. Leadership skills of individuals and within their organizations, but also leadership in a wider sense, by strengthening a knowledge exchange platform of land-related organizations that – in the long run- will develop capacities to actively influence and push sustainable policy-making and implementation on the system level.

\(^1\) SDG 15: to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation and halt biodiversity loss. Available at: www.sustainabledevelopment.un.org/sdg15
All modules combine action-based learning with experiential learning, facilitated through a series of lectures, mentor-guided problem identification and participatory group exercises. Field visits were part of all modules in Africa and in Sweden, in order to connect theory with practice. Based on participants’ previous experiences and their organizational context, the participants developed a change project, linked to a land challenge in their home country, which they developed throughout the programme by integrating the acquired knowledge from all three modules. Output of the change project was a policy brief and an action plan (see Appendix). Academic and local mentors supported these projects and peers gave feedback.

The 14 participants came from eastern African countries, namely Tanzania, Uganda, Malawi and Kenya, because of the significant and unique land challenges in their countries. The participating civil servants were on an intermediate level of their careers in organizations and ministries with diverse but land-related topics. The participants were in the early stages of their careers, but had time to train and develop their capacity on the SDGs.

What made the capacity development programme unique and innovative, was the new learning structure that approached SDG-related problems and solutions in an innovative way. By applying a holistic, systems perspective to understand the multi-sectoral aspects of a problem, e.g. land and its synergies and trade-offs with other SDG goals, the approach deepens and strengthens participants’ understanding of complexity through a collaborative and participatory learning environment. Together with the emphasis on leadership and sustainable decision-making skills, the programme linked theory with action. The training activities paired with networking activities developed leadership capacity not only for the involved participants, but also for a wider platform of organizations. The use of participants as local mentors as well as the inclusion of alumni into a growing knowledge exchange platform, plus strong regional platform coordination through local NGOs, are unique features of this programme. These features contribute to more local ownership and to the achievement of SDG 17, strengthening the means of implementation and revitalizing the global partnership for sustainable development.

For more details on the LiL programme: www.lunduniversity.lu.se/landislife.
2. Framing our learning on SDG Land is Life

2.1. Introduction

In this chapter we set out our basic structure for education and capacity building LiL programme on SDG 15. This aim is to integrate the SDGs according to three interwoven modules on knowing, measuring and leading the SDGs. The formation of three interlinked teaching modules allow for a structured approach to advance knowledge and understanding of sustainable development and to critically assess measurement and effectively and better understand the role of leadership and the soft skills required in advancing action on the SDGs. We see these elements as critical and tightly interwoven into a structured learning model on the SDGs. We build the structure from our interdisciplinary learning expertise in sustainability science and leadership. This provides the context (in situ) and learning activities (participation, understanding of data, and skills in stakeholder engagement) which have allowed us to build new integrated competences and skills among our participants on the SDGs. We draw on the literature from Education for Sustainable Development and also the emerging literature on Education for Sustainable Development Goals, a subset of thinking on the SDGs.

The chapter presents a brief review of the emergence of Education for Sustainable Development (ESD) and existing gaps in learning and pedagogy approaches. The chapter presents the three key elements of three elements of the programme in the context of questions on what constitutes each element (module)? How is it connected to the other elements (modules)? Why is each element of the framework (module) relevant? The chapter concludes with some reflections on the limitations and strengths of the structure and approach that we adopted in the LiL programme.

2.2. Education for sustainable development (ESD)

The SDGs are transformative and aim to shift the world onto a sustainable path. Figure 4, developed by the Stockholm Resilience Centre, illustrates how environment is the limiting factor forming the basis of the SDGs. Johan Rockström and Pavan Sukhdev presented a new way of looking at the SDGs as a ‘cake’ with interlinked layers of economy and society and biosphere. In order to attain the SDGs societies are required to transition toward a world logic where the economy serves society so that it evolves within the safe operating space of the planet. There are three underpinning conditions to achieve the SDGs (Norström, et al., 2014) and relevant to SDG15. Firstly, seeing people as integral to the biosphere, where humans and nature are well integrated as a whole. Second, navigating tradeoffs between the goals and actor interests. To be motivating the goals and targets need to be set at a level that is achievable for different groups in society. The goals need to be connected to existing values and norms, in particular recognize local understandings of nature and acknowledge diverse forms of managing natural resources with local knowledge and skills.
The challenge of transformational change to sustainable development pose new opportunities for Education for Sustainable Development (ESD). Transformations are physical or social changes such as value systems, regulation, financial institutions, technical or biological systems (IPCC, 2012). They also include psycho-social processes and human potential (O’Brien and Sygna, 2013). Transformations are often contested in meaning regarding what exactly needs to be transformed and why, how, in whose interest, and what the consequences will be? (ibid, 2013).

The discourse on ESD has evolved over several decades. The first time ESD was acknowledged was in 1992 UN Conference on Environment and Development (UNCED) in Rio de Janeiro and since then has been topic of global sustainable development summits. Between 2005 and 2014 the UN proclaimed the United Nations Decade of Education for Sustainable Development (DESD) aiming at the integration of the principles and practices of sustainable development into all aspects of education and learning. ESD is also recognized in other key global agreements, such as the Paris Agreement (Article 12) (UNESCO, 2017).

Education for Sustainable Development faces opportunity for development under the rapid changes in climate change, biodiversity losses and health crises globally. Within the education sector it is clear that there is a need for new skills, values and attitudes that can contribute to sustainable transformations. Education systems are faced with the challenge to change and widen learning and pedagogical approaches. Specifically, by defining relevant learning objectives and contents, new pedagogies that empower people and provide them with agency to lead and navigate changes to sustainable development within their institutional goals and objectives (UNESCO, 2017, Foreword). Moreover, the Agenda 2030 provides the basic direction for education in SDG 4 (Education) and with the interlinkages of education within other SDGs, “...education is both a goal in itself and a means for attaining all the other SDGs… and is a key enabler” of sustainable development (ibid, 2017).

ESD has a strong focus on empowerment. Empowerment of people to take well informed decisions and responsible actions for transformations. ESD also engages with competences that facilitate the skills and expertise to look forward, navigate change, and enable transformational actions. For example, managers within the land use sector are increasingly required to think locally and globally at the same time, and to consider diversity and inclusion of perspectives, knowledge and different values on how to govern land, food, forests, and livelihoods for sustainable development, now and in the future. These are complex contexts with many challenging decisions, yet it is critical for these managers that they...
interlinkages between the realities on the ground are well connected to national and global priorities in ways that are fair and just.

ESD is characterised as holistic and transformational education. It has evolved to deal with content and outcomes, pedagogy and learning environment (UNESCO, 2017, p. 7). ESD has developed forms of learning that allow for student-centered teaching and learning environments. It is dynamic with action-oriented and transformative pedagogy. This supports the very kinds of competencies required for transformations such as self-directed learning, participation and collaboration. It is also closely aligned to sustainability sciences in that it focuses on problem-centered and solutions-oriented approaches, and inter and trans-disciplinary approaches.

### 2.2.1. SDGs and pedagogical methodologies

Putting the SDGs into action requires new learning. Learning will require to skills and expertise to engage with the complex and interconnected nature of the SDGs. There is a tendency for people to think in reductionist ways and to simplify complexity (SDSN, 2019, p. 12) What will be required are new pedagogical tools, skills and understanding that go beyond dualistic solutions. Key to this novel learning context is the ability to think about complexity (what is it?), thinking outside of the box (beyond individual disciplines), the value of discussion and skills to listen, and ability to change perspectives and ask questions.

There are a growing number of pluralist and interdisciplinary approaches to learning. These include new competences in ‘cross-cutting’ skills and key competencies (ibid, 2019). These competences include systems thinking, critical thinking, self-awareness, creativity, entrepreneurship, curiosity, design skills, social responsibility, collaboration and complex and uncertain knowledge settings.

In addition, researchers have identified the necessity of a basic knowledge and grasp of the foundations of the SDGs. The basic knowledge constitutes the SDG framework, its history, background and rational for its existence (ibid, 2019). However, there is less written about the need to combine the basic knowledge and skills with how to understand and actively explore the role of measurement and monitoring the SDG, or the role of leadership in organization or as an individual. This relates to the types of social values, beliefs and attitudes that contribute to social transformation.

For students to develop a variety of competence, skills and knowledge, a multi-method approach is necessary, i.e. the combination of different methodologies and pedagogies. In 2006, the UNESCO’s Framework for the UNDESD (United Nations Decade of Education for Sustainable Development) International Implementation Scheme, which was collectively elaborated by UN agencies, national governments, civil society organizations and NGOs, experts and specialists, describes the kind of education that involved partners consider essential to facilitate sustainable development. One important feature is that ESD needs a multi-method approach (UNESCO, 2006, p. 17).

Lozano et al. (2017) conducted a literature overview on ESD in higher education and explored the relationship between ESD competence and the methodologies and proposed a framework, that for the first time connects ESD pedagogical approaches to ESD competence. The authors used pedagogical methodologies from well-cited references in ESD literature or that are known to be broadly used. The results (Figure 5) show that no single methodology alone covers the whole set of ESD competences.
There are many methodologies such as case studies, project and/or problem-based learning, community service learning, jigsaw/interlinked teams, participatory action research, eco-justice and community, place-based environmental education, and supply chain/life cycle analysis with a good coverage of the competences. The authors see a need for further research that combines pedagogical methodologies and competences, which so far in literature have been studied separately. They suggest to test the validity of their framework in different contexts such as disciplines, geographical locations and sizes of universities.

Lozano et al. (2017) state that there are specific pedagogical choices to be made depending on the pedagogical and educational goals, and the context or the learning environment. For example, who are the students and who are the teachers, and where will the learning take place and be used? One important element that they propose is the diversity of approaches is a good thing. It allows students to explore and develop new and different learning approaches in a portfolio of activities. In theory this should allow students to be able to grow and learn in new ways, that will stimulate their learning and potentially leadership capacity on complex topics. We suggest to create learning communities for teachers to exchange on methodologies as suggested by some (Hong, 2020; Zamora-Polo & Sánchez-Martin, 2019).

2.2.2. Learning and the SDGs

Looking at the previously described ESD competences it becomes clear that conventional classroom teaching style cannot foster SDG implementation competences. It is not enough to cherry pick some SDGs for inclusion in the learning curriculum. The Agenda 2030 with the 17 SDGs and the indicators are appealing and straightforward and there is abundance of material to learn about the different SDGs (SDG Resources for Educators: https://en.unesco.org/themes/education/sdgs/material). The colorful graphical design has the potential to be a good pedagogical tool to teach sustainable development, however, this is not sufficient for teachers who have not been exposed to the topic of sustainable development before or the students. By 2030 SDG 4 seeks inclusive and equitable quality education and promote life-long learning.

Key challenges to effectively integrate SDGs and learning are: firstly, a pedagogical framework is missing on how to teach the Agenda 2030 with its 17 SDGS and indicators as a whole, and integrated
manner. Secondly, by providing a more holistic understanding of the Agenda 2030 there is potential for students to develop more than just knowledge about the SDGs, but also transversal competences, contributing to becoming SDGs implementers. Recently Cottafava et al (2020) have put forward the idea of Education for Sustainable Development Goals, as a subset of the ESD domain. ESDG is defined as ‘holistic and transformational education that addresses learning content and outcomes, pedagogy and the learning environment’ (UNESCO, 2015, 2017). Two important elements are the physical place where teaching takes place and the connection between values and practice ‘leading by example’ (Cottafava, et al., 2020, p. 222).

Despite the Agenda 2030 is explicit in its recognition of the interdependencies between the SDGs the SDG framework and resource material does not put enough weight on the interlinkages between the SDGs, neither on the pedagogy of measuring and monitoring the SDG indicators, or the soft skills and leading component of the SDGs (SDSN, 2019, p. 40). The interconnectedness of SDGs and complexity of sustainability concept pose new challenges to relate to the SDGs in educational learning outcomes (Kioupi & Voulvoulis, 2019). Transformations to sustainability require specific knowledge, skills, behaviours, and attitudes. Here, the selection of sustainability competences is important. These include both cognitive aspects, knowledge and understanding of environmental, social and economic systems and higher order thinking, such as reasoning and synthesis, as well as socials skills, values, emotions, and ‘affective domain’ or change in learning (ibid, 2019). Conditions for change include competences of open-mindedness, empathy, and meta-cognition such as monitoring and action. Allowing for connecting ‘what I learn’, what I think’, and what I do’ in frame of mind and action (ibid, 2019). Competences are underpinned by ethical frameworks and norms and values. Kioupi and Voulvoulis (2019) have systematically collated a list of key sustainability competencies:

- Systems thinking - capability to engage with complex systems
- Future oriented thinking - ability to into account and anticipate futures
- Collaboration - ability to work with other people
- Strategic thinking - ability to set goals and plans and evaluate
- Normative thinking – capacity to deal with norms and values in individuals and society
- Critical thinking - capacity to ask questions about personal and collective thinking and norms
- Self-awareness – has personal motivations, feelings and beliefs
- Emotional Intelligence - engages with perspectives, responsibility, emotion
- Social media and communication skills - capacity for communicate, collaborate, act
- Problem-solving - ability to deal with complexity and ambiguity
- State of the planet - engaged in deep scientific understanding and assessment

We included in LiL a focus on learning competences and learning objectives. The learning objectives set out by (UNESCO, 2017, p. 11ff) for each of the SDGs are connected to one of the following:

1. Cognitive domain. This comprises knowledge and thinking skills necessary to better understand the SDG and challenges in achieving it.

2. Socio-emotional domain, which includes social skills that enable learners to collaborate, negotiate and communicate to promote the SDGs as well as self-reflection skills, values, attitudes and motivations that enable learners to develop themselves.

3. Behavioural domain, which describes action competences.
2.3. The Structure: Knowing, Measuring, Leading the SDGs

The three integrated modules Knowing, Measuring and Leading provide an overall framework for teaching of the Agenda 2030 (See Figure 6).

![Figure 6 The three integrated modules](image)

In accordance with the UNESCO learning objectives, module 1, Knowing, covers the cognitive domain. The module 2 Measuring, aims to build integrated problem-solving competence and anticipatory competence - the ability to collectively analyse, evaluate, and craft rich pictures of the future related to sustainability issues and sustainability problem-solving frameworks, and module 3, Leading, the behavioural and socio-emotional domain.

2.3.1. Knowing SDG 15

The first module Knowing aims to strengthen knowledge about SDG 15 and its synergies and trade-offs to achieve other SDGs. The first module is associated with concepts and is organised as a basic background training in the history, context and development of the SDGs. It focuses on establishing the basic understanding of the interdisciplinary nature of the SDGs. The first module builds on the idea of a cognitive domain and the knowledge and thinking skills necessary to better understand SDG 15 and challenges in achieving the goals in the land use sector.

The pedagogical competence for Knowing SDG 15 are associated with:

- Systems thinking and complexity
- Normative skills, including beliefs, values, awareness
- Critical thinking with a focus on whose knowledge counts / what kinds of knowledge matter
- Tolerance for ambiguity and uncertainty (e.g. not always data available on land use change)
- Empathy and perspective (field trips; sharing perspective, peers)

2.3.2. Measuring

The second module is designed to show the challenges of measuring and implementing the SDGs. The aim is to build skills in how to make use of measuring tools to identify the scale of certain land problem(s) and to keep track of and predict the progress and effectiveness of specific measures. The module is associated with tools and is underpinned by the question of data, underpinned by the ways in
which we construct the pathway to assessing the targets and goal. The relevance of measuring is in realising the challenges of different value systems in how for example we measure land use change.

The pedagogical competence associated with Measuring includes:

- Systems thinking, complexity and dealing with change
- Normative skills (which target counts most)
- Critical thinking: who decides what to measure and the target (performativity)
- Tolerance for ambiguity and uncertainty (when there is no data)
- Anticipatory capacity (foresight, future)
- Integrated problem-solving competence
- Understanding of assessment and evaluation

2.3.3. **Leading**

The third module introduces leadership and is underpinned by theories of organisational. Change and practice theory. The aim of Leading is to enhance leadership to initiate change towards achieving SDG 15. The module is associated with action and the focus is on leadership skills of individuals and within their organizations. It also includes leadership in a wider sense, by strengthening a knowledge exchange platform of land-related organizations that – in the long run- will develop capacities to actively influence and push sustainable policy-making and implementation on the system level leading to transformational leadership. This module also engages in how to manage negotiation and conflicts in stakeholder management.

Pedagogical competence for Leading includes:

- Systems thinking, thinking, complexity and dealing with change
- Normative skills (which goal counts most)
- Critical thinking on whose interests, who wins and who loses, how to navigate
- Decision-making under uncertainty
- Anticipatory competence (future and strategic thinking)
- Integrated problem-solving competence
- Interpersonal relations and communication
- Empathy and perspective (justice, responsibility and ethics perspectives)
- Collaboration

2.4. **Limitations and strengths**

The model we have developed has been considered clear and logical with well-integrated parts of the modules. The LiL programme structure has been to include the elements of the Education for Sustainable Development Goals, particularly the participatory method, site visits, peer review, (DPSIR, problem trees specifically teaching in context in the land use sector in Africa. The clarity of the linkages between the structure and competences has been a successful aspect. Overall, the interdisciplinary nature, the opportunity for in situ and experiential learning, learning about the SDGs, their measurements and the leadership aspect have been helpful. The real-world context and the benefits of networking and being exposed to a local community of innovative and entrepreneurial learners was a huge positive in which to test the structure and learning model.

With regards to limitations the learning model of Agenda 2030 and LiL is in development so there are gaps in the ambition and the time available. There as a challenge of creating an understanding of inter and transdisciplinarity, Further focus on leadership, pedagogy and critical conflict and negotiation skills with further practical tools for creating action plans would be beneficial to strengthen.

The next chapters will now describe and present the outcomes of the three modules and the competences gain. The final chapter summarises and reflects critically on the outcomes of the programme
3. Knowing SDG 15

3.1. Understanding complexity, uncertainty and sustainable development

The programme started with connecting participants previous knowledge and understanding to the Agenda 2030 framework. A deep understanding of the Agenda 2030 framework and the details of the SDGs is a prerequisite to align the participants’ work on land challenges with the SDGs’ goals, targets and indicators.

The SDGs provide a holistic and multidimensional view on development in contrast to conventional development agendas focusing on a restricted set of dimensions. The holistic nature of the SDG framework implies that a large number of potential interactions across the 169 targets. These interactions among the SDGs may cause diverging results and we can identify synergies and trade-offs. A significant positive correlation between SDG indicators is classified as a synergy while a significant negative correlation is classified as a trade-off.

The 2030 Agenda can be described as preferred future for 2030. However, the world in 2030 will be very different than it is today. Accelerating technological transformation together with social, demographic and environmental changes creating new challenges and new opportunities for achieving the SDGs. The future cannot be predicted and to plan for this uncertainty we need to provoke innovative thinking and develop strategies to identify the strategies best suited to advancing SDG goals and plan for the uncertain future.

3.2. Interdisciplinarity thinking

SDG 15 Life on Land is at the heart of the interdisciplinary challenge of learning about how to tackle multiple and interrelated issues of environment, economy and society. The starting point and the whole premise of land use and land use change management is an interdisciplinary challenge.

To halt land degradation, deforestation and biodiversity loss, to reach SDG 15 goal, cannot be achieved by focusing only on the natural resources. The problems, but also the drivers and impacts of the problems, have to be analysed and comprehended from many different perspectives. To identify and understand the effects of synergies and trade-offs entails going beyond individual discipline. Important is also to recognize local understanding of nature and acknowledge local knowledge and skills of managing natural resources.

Many of the participants in the LiL programme are working in organisations with a strong focus in one discipline. But when the participants with different background came together and discussed the land challenges, they were challenged and opened up to think outside of the box, beyond their individual training and discipline.

3.3. SDG and Knowing competences

From a pedagogic perspective three groups of competences on SDG 15 were developed through the knowing module: (1) Critical thinking competence - the ability to step back from the immediate problem and reframe how one defines and solves a problem. (2) Systems thinking competence - the ability to (a) see how organizational systems (internal/external conditions, processes, people) interact and influence each other, and (b) how these systems create and contribute to specific issues and strengths. (3) Normative competence - the ability to communicate about value-issues in objectively neutral terms within a pluralistic environment.
3.3.1. **Critical thinking competence**

Critical thinking examines assumptions, discerns hidden values, evaluates evidence, and assesses conclusions. It reframes the problem’s definition and solution by skilfully analysing, assessing and reconstructing them (Wiek, et al., 2011). The interdisciplinary learning environment where participants shared their views, values and understanding facilitated the training in critical thinking. As one of the participants expressed it: *I learned a lot, but it was challenge to leave my comfort zone and tried to see my problem from different perspectives.*

3.3.2. **Systems thinking competence**

Achieving the targets set out in the SDGs requires not only deep knowledge about the SDGs and the sustainability challenges we are facing, but also understanding the complexity and the inseparable links between the human and natural systems. Complex systems are far more than a collection of elements; they are bound together by the flow of energy, matter, and information. This flow is often two-way, forming feedback loops, both positive and negative, within the complex system. Achieving the SDGs is fundamentally a question of observing and responding to feedback.

Systems-thinking competence is vital to understand and analyze complex systems across the different domains, (environment, society and economy) and across the different scales (local, global), and comprehend cascading effects, inertia, feedback loops and other systemic features related to sustainability. As noted by one LiL participant: *Before I didn’t see the connection with fish depletion and land degradation, to save the fish we have to improve agriculture.*

3.3.3. **Normative competence**

Normative competence is the ability to collectively map, specify, apply, reconcile, and negotiate sustainability values, principles, goals, and targets. This capacity is based on acquired normative knowledge including concepts of justice, equity, social-ecological integrity. Another important competence is the ability to communicate about value-issues in objectively neutral terms within a pluralistic environment (Wiek, et al., 2011). One participant expressed: *The forest conservation plan developed by my department is jeopardizing the local community livelihoods and access to land.*

3.3.4. **Activities to develop these competences**

*Problem tree analysis*

To train the participants in systems and critical thinking they started with drawing a problem tree of a selected land challenge, e.g. deforestation, land degradation, and invasive species. This was a group exercise and a corner stone for the development of an interactive, transdisciplinary and sharing learning environment. Problem tree analysis is a graphic representation of a problem, its causes and its consequences. This analysis tool helped them get a quick glance of how a range of complex issues contribute toward a problem and how this problem branches out into a set of consequences. ODI (2009) lists the advantages with the problem tree analysis are

- problem can be broken down into manageable and definable parts. This enables a clearer prioritisation of factors and helps focus objectives;
- There is more understanding of the problem and its often interconnected and even contradictory causes.
- It identifies the constituent issues and arguments, and can help establish who and what the political actors and processes are at each stage;
- It can help establish whether further information, evidence or resources are needed to make a strong case, or build a convincing solution;
- The process of analysis often helps build a shared sense of understanding, purpose and action.
To further develop the participants’ competences they continued to analyse the selected land problem and developed a DPSIR model. DPSIR is a causal framework for describing the interactions between society and the environment: Human impact on the environment and vice versa because of the interdependence of the components. It provides a structure within which to present the indicators needed to enable feedback to policy makers on environmental quality and the resulting impact of the political choices made, or to be made in the future. The DPSIR framework assumes a chain of causal links starting with ‘driving forces’ (economic sectors, human activities) through ‘pressures’ (emissions, waste) to ‘states’ (physical, chemical and biological) and ‘impacts’ on ecosystems, human health and functions, eventually leading to political ‘responses’ (prioritisation, target setting, indicators). Establishing a DPSIR framework for a particular setting is a complex task as all the various cause-effect relationships have to be carefully described and environmental changes can rarely be attributed to a single cause.
Stakeholder analysis

In LiL programme stakeholders are defined as people or organisations who are involved or affected in the specific land challenge. A stakeholder analysis encourages LiL participants to include a diversity of viewpoints and incorporate the perspective of potentially underrepresented stakeholders in the project. The stakeholder analysis is not only to identify valuable stakeholders to enlist in the project, but also identify stakeholders in order to make joint efforts and align goals and plans. Stakeholder analysis is an important tool to identify conflicts of interest. United Nations Environment Programme identifies and engages with nine specific major stakeholder groups for sustainable development projects under their oversight: farmers, women, scientific and technological community, children and youth, indigenous peoples and their communities, workers and trade unions, business and industry, nongovernmental organizations, and local authorities (UNEP, 2018).

The stakeholder analysis performed by the LiL participants focused mainly on following questions:

- Who is involved?
- Who is affected?
- Who is responsible?
- Who takes the lead?
- What are the conflicts of interest between different stakeholders/actors?
- What are the conflicts of interest between national, regional and local policies?
Field visits – Learning by seeing and meeting

To gain in-depth knowledge and understanding of the land issues and their impact on local communities and individuals not only seeing but also listening, meet organisations people, see problems and solutions and discuss.

Communication - Policy brief

Collaboration and peer review and feedback were an important element throughout the programme and the participants have been trained in communicating to people with different background and expertise. This has increased their self-confidence and sharpen their argumentation.

The policy brief they produced pushed them to present the problems in a short coherent way. It includes not only the DPSIR and stakeholder analysis, but also responses to solve the problem and synergies to other SDGs. The policy briefs were presented at a Stakeholder Forum in Nairobi, where the LiL participants also acted as workshop facilitators and moderators. “I felt confident when I presented my case study, and everyone listened to me”
### 3.4. Interrelation with Measuring and Leading

The Agenda 2030 consists of 17 SDGs, which are specified by 169 targets (sub-goals) and 237 indicators. The 17 SDGs are expressed in broad aspirational terms and describe the future we want. These goals may be national, state or regional goals and the goals are important to guide development initiatives. But the 169 targets, or subgoals, specify more in detail what we have to achieve by 2030. These targets are universal and set to be realistic to achieve, but also important is that they are measurable. It is vital to understand the process of how the goals and targets were designed and to create a critical analysis of what is included and what is missing from the targets and indicators. The knowing module focusing on this understanding and analysis of the goals, targets and indicators, especially SDG 15 and its 12 targets and 13 indicators, see Figure 10. This basic understanding of the targets and indicators was later developed in the measuring module.

In the knowing module the participants got new knowledge and skills, but also deepened and broadened their previous knowledge and they became confident to share their knowledge and understanding with others. Many of the participants took a lead when they returned to their home organisations and implemented new ideas in the organisations. This shows that in-depth knowledge and improved skills are of great importance for taking a leading role.

There are thirteen indicators which represent the metrics by which we can track if targets are achieved. These are listed as:

![Figure 10 Twelve targets specifying SDG 15 (Source: www.globalgoals.org)](image)

15.1.1 Forest area as a proportion of total land area
15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type.
15.2.1 Progress towards sustainable forest management
15.3.1 Proportion of land that is degraded over total land area
15.4.1 Coverage by protected areas of important sites for mountain biodiversity
15.4.2 Mountain Green Cover Index
15.5.1 Red List Index

15.6.1 Number of countries that have adopted legislative, administrative and policy frameworks to ensure fair and equitable sharing of benefits.

15.7.1 Proportion of traded wildlife that was poached or illicitly trafficked.

15.8.1 Proportion of countries adopting relevant national legislation and adequately resourcing the prevention or control of invasive alien species.

15.9.1 (a) Number of countries that have established national targets in accordance with or similar to Aichi Biodiversity Target 2 of the Strategic Plan for Biodiversity 2011–2020 in their national biodiversity strategy and action plans and the progress reported towards these targets; and (b) integration of biodiversity into national accounting and reporting systems, defined as implementation of the System of Environmental-Economic Accounting.

15.a.1 (a) Official development assistance on conservation and sustainable use of biodiversity; and (b) revenue generated and finance mobilized from biodiversity-relevant economic instruments.

15.b.1 (a) Official development assistance on conservation and sustainable use of biodiversity; and (b) revenue generated and finance mobilized from biodiversity-relevant economic instruments.

15.c.1 Proportion of traded wildlife that was poached or illicitly trafficked.
4. Measuring SDG 15

4.1. Introduction

Land is a naturally occurring finite resource that holds everything that constitutes terrestrial ecosystems, and provides the foundation for the survival of living things. The United Nations defines land as “a delineable area of the earth’s terrestrial surface, encompassing all attributes of the biosphere immediately above or below this surface including those of the near-surface climate, the soil and terrain forms, the surface hydrology (including shallow lakes, rivers, marshes and swamps), the near-surface sedimentary layers and associated groundwater reserve, the plant and animal populations, the human settlement pattern and physical results of past and present human activities” (UN, 1994).

While an essential resource for humanity as a whole, land remains the most fundamental asset for the majority of vulnerable populations living in developing countries, as their livelihoods are directly linked to agriculture. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2018) defines land degradation as: “the many human-caused processes that drive the decline or loss in biodiversity, ecosystem functions or ecosystem services in any terrestrial and associated aquatic ecosystems” (IPBES, 2018). Land degradation would generally lead to the disruption of a healthy balance between key ecosystem functions, such as, carbon capture and sequestration, food production, water retention and the recharge of underground water supplies, the provision of fibre, and microclimate regulation, thus affecting the livelihoods of the most vulnerable. The rapid degradation of land is often the result of a broken economic system, characterized by inefficient food production, combined with other land polluting and degrading practices which usually achieve short-term economic returns that tend to benefit a few, at the expense of many (UNCCD, 2017).

Sustainable Land Management (SLM) was defined at the Rio Earth Summit in 1992 as “the use of land resources, including soils, water, animals and plants, for the production of goods to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions” (Sanz, et al., 2017). SLM is crucial to minimizing land degradation, and the optimal use of land resources for the benefit of present and future generations.

4.2. Considerations for building capacity on SDG 15 - Key themes articulated in the measuring module

Developing capacity for measuring and monitoring of SDG 15.1.1, 15.1.2, and 15.3.1 requires the articulation of a number of themes as part of the capacity building package. These are themes that are directly relevant to the process and practice of research design for data collection, analysis and interpretation in relation to changes in land, landscapes, and land resources. In this case, the themes included an exploration of the process and thinking behind the design of Sustainable Development Goals (SDGs), (the goals, targets, indicators and sub-indicators), from a data collection, availability, use, and comparison perspective. It also included guidance on human-nature interactions and resulting outcomes on land and land resources; relating theoretical understanding of land use changes, land degradation and other land processes to real world cases and outcomes; and human roles in land cover and resource dynamics in tropical landscapes. The special focus on tropical landscape was dictated by the LiL participants being from East African countries.

4.2.1. Human-nature interactions and resulting outcomes on land and land resources

The environment (and in this case land), provides vital resources to society, such as food, fuel, fibre and many other ecosystem services that support production functions, regulate risks of natural hazards, or provide cultural and spiritual services. Humans interact with the environment to obtain these resources to support their lives and well-being, as well as to ensure economic, social and cultural development. The interaction of humans with their environment has been perpetual – indeed this has been going on
since people first walked the Earth. By using the land, society alters and modifies the surface of the land, as well as the quantity and quality of the provision of these services (Verburg, et al., 2015; Henderson & Loreau, 2018). In the land system, these interactions are connected across scales with multiple feedbacks, leading to so-called ‘teleconnections’ or ‘telecoupling’ in the earth system (Verburg, 2014). The changes brought about by these interactions in land systems can have major consequences for the local environment and human well-being and are at the same time pervasive factors of global environmental change (Verburg, et al., 2015). The term “land use” is used to refer to the human utilization of land, and represents the economic and cultural activities (such as agricultural, residential, industrial, mining, and recreational uses) that are practiced at a given place.

The role of measurements and monitoring comes in as one of the initiatives employed to ensure that human land use is sustainable. Measuring and monitoring permits land users and policy makers to understand the state of land resources, trends related to their quantity and quality, and projections for their availability in the long term. Measuring and monitoring human-nature interactions on landscapes and relating to land resources generally faces a number of challenges (especially in developing countries). These include: (i) Limited resources to support data collection at the ground level: the lack of systematic ground surveys mean that there is a general lack of comprehensive data on the types and rates of land use and land cover change, and even less systematic evidence on the causes and consequences of these changes. In some cases, the ever-increasing amount of remotely sensed data from a diversity of aerial and space-based platforms contributes to reducing the need for field surveys. It must be noted, though, that there are many aspects of measuring and monitoring that cannot be replaced by aerial and space-based remote sensing technologies. (ii) Issues with approaches to data classification and measurement: estimates of the extent of various land uses differ with scale, across data sources, and in some cases, with the level of detail desired by the analyst. Even within the same administrative zone (such as a country or region), different administrative investigators may be using different classifications, measurement approaches, methodologies for analysis and interpretation, and sampling time frames. These have the potential of limiting the ability for comparison of measurements across time and spatial scales. (iii) Practical problems of implementing theoretical classifications of land and land-based resources on the ground: land use is generally a function of laws, policies, or management decisions that may not always be possible to infer by examining the ground via surveys. In the same light, the interpretation of trends cannot be done independently of local contexts if one were to strive for a meaningful understanding of the condition of land, its resources and trends. In measuring land condition and monitoring change, comparisons across spatial administrative and cultural land use units therefore need to account for local interpretations of land condition and trends.

4.2.2. Relating theoretical understanding of land use changes, land degradation and other land processes to real world cases and outcomes

Fieldwork has been defined by Lonergan and Andresen (1988) as ‘any arena or zone within a subject where, outside the constraints of the four walls classroom setting, supervised learning can take place via first-hand experience’. The value of field experience when investigating or learning about SDG 15 is indispensable. It helps bridge the gap between the classroom and the real world. It provides an opportunity to connect with the environment (the land) which is the object of attention in SDG 15 – an opportunity that may be priceless for people who are predominantly urban dwellers with limited knowledge of human relationships with the land at more fundamental levels. It provides an opportunity to observe, question, evaluate, communicate, analyse and draw conclusions from real-world land use challenges, opportunities and potential solutions being lived by real communities. To understand SDG 15, a field experience permits learners to assess and understand the rationale behind the data sources used, their limitations, and the strengths and weaknesses of the assumptions and simplifications associated with the data. This applies to the techniques of data processing and analysis that are used to arrive at results, and their interpretation.
Beyond facilitating the collection of local level information that is not available through secondary sources, fieldwork encourages students to be active citizens prepared to offer their opinions and aspirations for their community. This is important in developing an understanding and sensitivity about the culture and people of a given field area, and may change the student’s biases, and in some cases the simplicity with which important and sensitive questions are being approached in relation to land and environmental resources use (see the tasks in Table 1).

4.2.3. **Human roles in land cover and resource dynamics in tropical landscapes**

Land cover changes are some of the most observable of all environmental changes and are connected to a wide range of environmental and societal processes. Understanding the scale and pace of land cover changes as well as their underlying and proximate causes can provide us with insights into a variety of interdependent socio-environmental processes. These systems include natural resource use and management; economic activities; issues such as those of equity and sustainability. Land cover changes can take place at a variety of spatial scales - from a few hectares to thousands of hectares. They also occur at a variety of temporal scales – from short events with detectable effects only for a few months to those with effects after several seasonal cycles, and long-term, permanent changes (FAO, 2007). At all levels (local, regional, and global) land cover changes have the potential of affecting important land processes which contribute to the well-being of populations that depend on such lands (Mahmood, et al., 2016). It follows, therefore, that land cover changes and the patterns that emerge from them have the potential of contributing to the vulnerability or resilience of populations to the effects of global environmental changes, their ability to meet key development challenges, and even the socio-cultural and politico-economic futures of societies. The conversion of land from one land cover to another may modify the structure and function, and hence the ecosystem services associated with it (Pielke et al. 2011). Studies have found that such conversions can have effects on the availability and quality of water, the spread of invasive species, habitats and biodiversity, nutrient fluxes and fluctuations, energy balance, and even climate variability (Slonecker, et al., 2013; Mahmood, et al., 2016; Luyssaert, et al., 2014).

An understanding of land cover changes and the land use processes associated with these changes also provides insights into questions that are key to the achievement of sustainability goals for local communities, national governments, and the international system. It has been argued that such information can contribute to the understanding of the potential and extent of vulnerability of societies to environmental changes as well as their ability and capacity to be resilient (Bonan, 2008; Mahmood, et al., 2014; Pielke, et al., 2011).

4.3. **Measuring land degradation**

Sustainable Development Goal (SDG) 15 – “Life on Land” addresses the global challenge of land degradation within Agenda 2030 (UN, 2015). Target 15.3 sets out a new global ambition, which is at the heart of the battle to address land degradation, the degradation of ecosystems, and the services they provide. It commits to: “By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought, and floods, and strive to achieve a land-degradation-neutral world.” To quantify this Target, a Working Group was established to define relevant indicators for monitoring progress toward what has become known as the land degradation neutrality (LDN) target (Indicator 15.3.1: “Proportion of land that is degraded over the total land area”). The concept of LDN, which has become increasingly popular in the search for solutions for land degradation has two dimensions. Wunder et al. (2018) point out that the notion of neutrality is not only about “… halting the loss of healthy and fertile land, but also about actively reversing degradation by restoring land in order to counterbalance losses that cannot be avoided”. The working group agreed on three main sub-indicators to track land degradation and to derive the spatial extent and thus the percentage of total land that is degraded. These include (i) land cover and land cover change, (ii) land productivity, and (iii) carbon stocks, above and below ground, which can be used for monitoring and reporting progress towards SDG target 15.3 (Cowie, et al., 2018). To date, LDN targets have been set and endorsed on a
voluntary basis by almost all countries of the sub-Saharan Africa region, as part of their obligations under UNCCD and in connexion with their commitments to UNFCCC, as well as to the CBD. As part of the LDN approach, a specific LDN impact investment Fund (LDN Fund) was established to support private investment in economically viable Sustainable Land Management (SLM) projects, in complement to existing and developing public investment funds operating, inter-alia, with co-financing from Global Climate Fund (GCF).

Measuring land degradation for sustainable development requires a combination of elements that include:

**Indicators:** Indicators to monitor changes, and a framework that explains the root causes, driving forces, status, and impacts of and responses to land degradation. For example, the progress towards a land degradation neutral world (SDG 15.3) is assessed using indicator 15.3.1 “proportion of land that is degraded over total land area.” Three sub-indicators are used to assess SDG 15.3.1. These include: (i) Land productivity is the biological productive capacity of the land, the source of all the food, fibre and fuel that sustains humans (Sims, et al., 2017). Land productivity points to long-term changes in the health and productive capacity of the land and reflects the net effects of changes in ecosystem functioning on plant and biomass growth (United Nations Statistical Commission, 2016); (ii) Land cover refers to the observed physical cover of the Earth’s surface which describes the distribution of vegetation types, water bodies and human-made infrastructure. It also reflects the use of land resources for agriculture, forestry, human settlements and other purposes (FAO-GTOS, 2009); (iii) Carbon stock refers to the quantity of carbon in a “pool” - a reservoir which has the capacity to accumulate or release carbon and which is comprised of above and below-ground biomass, dead wood, dead organic matter, and soil organic carbon (Eggleston, et al., 2006). The ‘One Out, All Out’ statistical principle that applies to the evaluation of changes in the sub-indicators mean that if one of the sub-indicators has negative changes for some area, then this area has negative productivity (Cowie, et al., 2018). The three types of changes expected of the sub-indicators could be positive or improving; negative or declining; sustainable or unchanging (Sims, et al., 2017; Kussul, et al., 2020) (also see Case 1). The drivers, pressures, state, impact and response (DPSIR) framework is an indicator-based environmental reporting approach, which aims to describe environmental problems by identifying the cause-effect relationships between the environment and various anthropogenic activities in a wider socio-economic context (Song & Frostell, 2012). For a more in-depth look at the drivers, pressures, impacts and responses, to aid interpretation of changes in state, and to evaluate implementation of policies to achieve LDN, the DPSIR approach to environmental monitoring can be useful. This is the framework used to conceptualize cause and effect in the scientific conceptual framework for Land Degradation Neutrality (Cowie, et al., 2018).

**Datasets:** Many considerations are required when examining data for SDG 15.3.1 assessments and monitoring. These include the availability of datasets of the desired location, at the right scale, the appropriate resolution, in the right temporal dimensions, etc. The choice of data used can be a major determinant of the results derived from the land degradation assessment (Burrell, et al., 2018). In addition, there are important considerations to be made when carrying out assessment at different scales (sub-national, region, global), as the datasets available or relevant for one scale may not necessarily be available or useful for another scale. With regard to the SDG 15.3.1 indicator, the three sub-indicators (land cover and land cover change; land productivity; and carbon stocks above and below ground) need to account for variations in conditions over space and time (see Case 1), and potential differences in the representation of degradation among the sub-indicators and between countries (Sims, et al., 2019).

**Methodologies:** Since the indicators and sub-indicators for assessing the “proportion of land that is degraded over total land area” were formally recognized, there have been numerous attempts at developing methodologies for assessing these indicators. The information provided by the three sub-indicators is supposed to help countries to better understand the distribution and types of land degradation within their national borders and to support countries to achieve their LDN targets (Sims, et al., 2019). Of particular interest has been the search for methods that can assess and combine the three
sub-indicators in ways that are simple to use and easy to understand. The target in most cases has been national level policymakers and the environmental analysts who support them, with the goal being to ease understanding and reporting of trends in land condition as part of national obligations to key international conventions. To allow comparisons between countries (as is required by some international conventions), the methods for combining the three sub-indicators for SDG indicator 15.3.1 need to account for the variations in conditions that exist over space and time, and potential differences in the representation of degradation among the sub-indicators and between countries (Sims, et al., 2019). One of the key tools for operationalizing the methodologies for computing the SDG 15.3.1 indicator is **Trends.Earth** (see Case 1), which was produced as part of the Global Environment Facility (GEF) funded project: “Enabling the use of global data sources to assess and monitor land degradation at multiple scales” (Trends.Earth, 2018). The implementation of LDN is a deliberate and meticulous process involving many steps, and a clear level of commitment and skillset (see Figure 11).

![Figure 11 Steps towards implementing SDG Target 15.3 on "Land Degradation Neutrality". Source: Wunder et al. (2018). Used with permission.](image)

**Trends.Earth** is a QGIS plugin that allows users to access the best available open-source global datasets, and to combine this data with locally available information. It supports: identifying as well as monitoring land degradation and improvement; tracking impacts of sustainable land management (SLM) activities on land condition; mapping key indicators of land change; and providing reporting to support decision-making at different levels (Trends.Earth, 2018). This tool simplifies the process of data acquisition, pre-processing, analysis, and reporting in support of decision-making at different levels (see Case 1 for details on the application).

One of the sub-indicators of target 15.1 as well as of target 15.2.2 is biomass within forest areas (see Case 2). This is one of three sub-indicators that address the environmental values of forests with the two others being, the extension of forest area, and maintenance of biological diversity. Variations in the above-ground biomass stock in forests indicate the balance between gains in biomass stock due to forest
growth and losses due to wood removals, natural losses, fire, wind, pests and diseases (Division UNS 2020). Capacity was built in the use of two of the Shannon-Weiner Indices, those for calculating species diversity and evenness, as well as in the use of biomass allometric equations to first calculate biomass and then convert the biomass to carbon (see Case 2).

4.4. Module goal, objectives and outcomes

The goals, learning objectives and expected outcomes for measuring SDG 15.1.1, 15.1.2 and 15.3.1 build on the themes, theoretical foundations and tools described above.

**Goal:** The goal of this module will be to enhance the ability to assess and monitor the state of key components in SDG 15 (Life on Land), and to apply the results of such assessments in decision-making for sustainable development. Specifically, participants will enhance their understanding of the assessment of proxies for land condition (degradation, stability, and improvement), and learn how to use these proxies in land-related decision making to understand and propose solutions to local land-related problems (soil fertility decline, biodiversity loss, land degradation, etc.) (see details in Table 1, and see Cases 1 and 2).

**Learning objectives:** (i) participants understand the importance of assessments and monitoring for decision-making in land and land-related SDGs; (ii) participants can distinguish between the models and tools available, and methods for using these tools to assess key proxies of land health and social development; (iii) participants can decide which tools are suitable for specific assessment and monitoring purposes, based on the strengths and weaknesses of their use in respective application areas.

**Expected pedagogic outcomes:** From a pedagogic perspective a number of competences on SDG 15 were developed through the measuring module (see Table 1). These include:

- **Systems thinking competence** which is defined as “the ability to collectively analyse complex systems across different domains (society, environment, economy, etc.) and across different scales (local to global), thereby considering cascading effects, inertia, feedback loops and other systemic features related to sustainability issues and sustainability problem-solving frameworks” (Wiek & Kay, 2015).

- **Normative competence** refers to the ability to “understand and reflect on the norms and values that underlie one’s actions; and to negotiate sustainability values, principles, goals, and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge and contradictions” (UNESCO, 2017).

- **Anticipatory competence** refers to the ability “to understand and evaluate multiple futures – possible, probable and desirable; to create one’s own visions for the future; to apply the precautionary principle; to assess the consequences of actions; and to deal with risks and changes” (UNESCO, 2017).

- **Strategic competence** is the “ability to collectively design and implement interventions, transitions, and transformative governance strategies toward sustainability” (Wiek & Kay, 2015).

- **Integrated problem-solving competence** is the “ability to apply different problem-solving frameworks to complex sustainability problems and develop viable, inclusive and equitable solution options that promote sustainable development, integrating the abovementioned competences” (UNESCO, 2017).
4.5. Interrelation with Knowing and Leading

The measuring module of the capacity building programme is closely related to the other two modules that make up the teaching portfolio – Knowing and Leading. Understanding the measuring and monitoring land condition constitutes an integral part of ‘Knowing’ the state of the land, its condition, and changes operating or affecting the land and associated resources. Knowing the state of the land therefore sets a backdrop in understanding what can be done about the condition observed through measuring and monitoring. This links measuring and monitoring with decision-making to maintain the status quo of healthy ecosystems, or to alter the change towards unhealthy ecosystems. ‘Leading’ therefore benefits from the knowledge and information provided through measuring and monitoring.
<table>
<thead>
<tr>
<th>Pedagogic objective</th>
<th>Broad learning goal</th>
<th>Specific lectures</th>
<th>Associated pedagogic tasks</th>
<th>Competences achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learners have the ability to identify targets from indicators as well as to understand these within the context of SDG 15</td>
<td>Survey of SDG 15 targets, indicators and sub-indicators; the tier concept; and the indicator development framework</td>
<td>• Targets and indicators National goals and targets • Indicator 15.3.1: Proportion of land that is degraded over total land area</td>
<td>Group exercise ➤ National goals and targets Group exercise ➤ Discussion on SDG 15 synergies and trade-offs Individual work ➤ What goals, targets, and trade-offs are relevant for your individual case?</td>
<td>• Systems thinking competence • Integrated problem-solving competence • Normative competence • Strategic competence</td>
</tr>
<tr>
<td>Learners can relate practically to what land degradation is and how it affects the natural environment and human society</td>
<td>An analysis of human-nature interactions and resulting outcomes on land and land resources; on changes in land condition; and related feedbacks</td>
<td>• Background to the case study of forest dynamics in Kakamega • What role do forests and biodiversity play in your individual case and how do you measure changes?</td>
<td>Individual work ➤ Challenges and opportunities to Sustainable land management</td>
<td>• Integrated problem-solving competence • Strategic competence</td>
</tr>
<tr>
<td>Learners experience on-the-ground drivers, manifestation, and impact of land degradation</td>
<td>Fieldwork: relating theoretical understanding of land use changes, land degradation, and human impacts to real world cases</td>
<td>Forest conservation, use and management challenges • Background to the case study of forest dynamics in Kakamega • Introduction to the Kakamega Forest Reserve • Forest characteristics of Kakamega – reflection of forest dynamics in the East African region</td>
<td>Group exercise ➤ Questions and answers with forest managers Group exercise ➤ Forest walk</td>
<td>• Systems thinking competence • Strategic competence • Normative competence</td>
</tr>
</tbody>
</table>

Soil conservation, use and management challenges | Group exercise ➤ Questions and answers with community land user groups |
<table>
<thead>
<tr>
<th>Learners recognize the interrelationship between Earth systems and how the effects of human activity in one component can have unwanted outcomes in other components</th>
<th>Recognizing the interconnectedness of the Earth’s major components and implications of human action in relation to this.</th>
<th>Identifying and assessing implications of land use changes on GHG emissions</th>
<th>Practical exercise  ► Assessment of carbon balance resulting from land use changes using the Ex-Ante Carbon-balance Tool (EX-ACT)</th>
</tr>
</thead>
</table>
| Learners understand that realistic conservation strategies work outside pure nature reserves to also improve legislation, restore degraded habitats and soils, connect wildlife corridors, Maintain sustainable agriculture and forestry, and redress humanity’s relationship with wildlife* | • Understanding dynamic changes in resource conditions (tropical forest); the role of human action (management); and implications for the future of the resource (sustainability of forests). • Implications for the future of the resource condition on human and ecosystem welfare | • Forest and forest biodiversity distribution in East Africa • Importance of forest resources, change trends and implications for sustainable development • Assessing progress toward sustainable forest management • What role do forests and biodiversity play in your individual case and how do you measure changes? | Individual work  ► What role do forests and biodiversity play in your individual case and how do you measure changes? | Systems thinking competence  • Integrated problem-solving competence  • Normative competence
| Learners understand the slow regeneration of soil and the multiple threats that are destroying and removing it much faster than it can replenish itself, such as poor farming or forestry practice.* | Exploring the existence and role of related environmental conditions and assessments within SDG 15 | • Assessing and mapping land-based environmental assets for SDG 15  
• Soil management options for SDG 15 | Practical exercise ► Mapping changes in land environmental assets  
Individual work ► Identify the measurement and mapping tool(s) relevant for your individual case and the data you need to use it/them | • Anticipatory competence  
• Normative competence |
| Learners can measure and report indicators in SDG 15 | Measuring SDG 15 Target 3 - land degradation neutrality (LDN) | • Theoretical foundations to support assessments - LDN  
• Assessing LDN and related proxies – data requirements  
• Assessing LDN and related proxies – implementation method | Demonstration ► Assessing LDN and related proxies  
Practical exercise ► Assessing LDN and related proxies  
Individual work ► How and what data is needed to use LDN and related proxies in your individual case? | • Anticipatory competence  
• Normative competence |
| | Measuring SDG 15 – Target 1, and Target 2 – sustainable forests; and the implementation of sustainable forest management | • Indicator 15.1.1: Forest area as a percentage of total area  
• Indicator 15.2.1: Progress towards sustainable forest management | Practical ► Assessment of forest area as a percentage of total area  
Practical ► Assessing progress toward sustainable forest management | • Normative competence  
• Strategic competence  
• Normative competence |

* These learning objectives were based on UNESCO (2017).
4.6. Case application of methodologies

**Case 1: Assessing land degradation in Kenya**

In order to measure the proportion of land that is degraded over the total land area, known as SDG 15.3, the UNCCD has developed a Good Practice Guidance with recommendations on how to use Earth Observations and field data to that purpose (Sims, et al., 2017). The UNCCD recommends measuring at least three sub-indicators: changes in productivity, changes in land cover, and changes in soil organic carbon. *Trends.Earth* is a tool created to simplify the process of collecting, curating, and analysing datasets in order to perform these assessments in an easy, scientifically robust, and comparable way, so that assessments can be compared over time and assess progress towards land degradation neutrality (Trends.Earth, 2018).

The baseline period for the SDG 15.3 is the period 2001-2015, so we ran the analysis for that period using the default datasets and settings in *Trends.Earth*. Note that the results below are just an example, and do not reflect the official assessment for Kenya. For each of the sub-indicators, *Trends.Earth* provides global datasets which allow for a general understanding of trends in land condition, but default datasets and settings will not work best in every country. For example, in areas where precipitation is known to have changed during the study period, just using NDVI as an indicator may not be enough, and climate corrections may be required to distinguish the effects of climate from those more closely related to land management. Also, datasets which have been locally produced and validated, such as national land cover maps, are always preferred, since they will capture local conditions much more accurately than global ones.

Based on the analysis run, approximately 30% of the land surface in the country degraded between 2001 and 2015, while almost 14% of the country improved its land condition and 55% remained stable. *Trends.Earth* produced maps for each of the sub-indicators, and one final integration for the SDG 15.3 (only the SDG is presented in Figure 10). In green you can see areas which improved, in light yellow areas which remained stable, and in red areas which were identified as degraded by any of the sub-indicators. Remember that if an area is identified as degraded by one of the indicators then, regardless of how that area is characterized in the other two, that area will be flagged as degraded in the SDG 15.3 map. This is the One-Out-All-Out approach agreed on by the UNCCD and country members. When you run the analysis, you will also obtain a tabular output which will present the SDG 15.3.1 indicators in the first tab, but also a breakdown of each of the different sub-indicators which will allow you to understand why areas have been identified as degraded. In some areas forest clearing will be a significant driver, while in others declining agricultural productivity could be the main process degrading the landscape and affecting the livelihood of local communities. Having this information is key in identifying priority areas for intervention, some for active restoration, others for conservation, and others which can serve as examples of good land stewardship, which can be expanded to other areas improving the conditions of the country as a whole.
Figure 12 Assessing land degradation using Trends.Earth in QGIS is relatively simple, while giving the user the options of customizing the analysis. This figure shows the map and tabular results of a land degradation assessment for Kenya for the period 2001-2015 using default dataset and parameters, showing that 13.9% of the country improved its land condition, 55.5% remained stable, and 30.5% is degraded. Locations indicated were used for field work and as data points for the assessment of forest biomass and carbon dynamics. Note: Kakamega forest is a tropical rain forest; Mau forest is a Montane forest; and Baringo has a dryland forest (Wass, 1995).

Case 2: Assessing progress toward sustainable forest management (SDG 15.1.1 and 15.2.1)
Assessing forest degradation using vegetation indices: To understand forest degradation and change using vegetation indices, the training made use of data from different habitats of Kenya (see Figure 11). The two indices are Shannon-Weiner Indices for calculating species diversity and evenness (Gaunle, 2020). Three habitats were compared using data collected from the Kenya Forest Service Forest Inventory. All data used a sub sample of 500 individuals to allow harmony in the number of individuals used. The results of the calculations done in class were as follows:

1. Habitat A in Kakamega forest is an ecosystem that has undergone little or no disturbance in the historic period. The diversity index was 2.0674 and the evenness index was 0.9942
2. Habitat B in Baringo Dryland forests where an invasive species (*Prosopis juliflora*) has colonized resulting in only 3 species. The diversity index was 0.1119 and the evenness index was 0.1019
3. Habitat C in Mau forest where a commercial forest of *Cupressus lusitanica* has slightly been encroached by three colonizing species (*Eucalyptus saligna, Acacia melanoxylon and Dombeya torrida*). The diversity index was 0.2921 and the evenness index was 0.2107

The students learnt that a higher diversity index indicates a more stable and less degraded ecosystem, and in addition, a higher evenness index (tending towards 1) shows that the species in the ecosystem are equally distributed with none overshadowing the other. Causes of low diversity were identified as effects of invasive species that totally eliminate the indigenous vegetation as illustrated in Habitat B but could also be due to management where commercial plantation forests prefer mono-cropping. The
students identified management actions that would enhance diversity and evenness as mitigation actions in degraded forests and ecosystems.

Assessing forest degradation using above ground carbon content: inventory data from the Mau forest complex (Kinyanjui, et al., 2014) was used to assess above-ground carbon content. Due to lack of data on soil carbon, below-ground carbon, dead wood carbon, and litter carbon, Kenya has opted to report its carbon using only the above ground pool and, in some cases, has used default methods provided by IPCC to estimate Carbon from the other pools. The students learnt basic data collection methods including measurements of diameter (diameter at chest height measured at 1.3m from the ground is commonly used) and height. The measured data calculated per tree were then applied to existing biomass allometric equations to first calculate Biomass and then convert the biomass to Carbon. The students learnt how to collate the tree data on a per hectare basis and to use remote sensing methods to generate forest carbon based on forest strata.
5. Leading SDG 15

5.1. Leading under complexity and uncertainty towards global sustainable development

Throughout history, we can identify many different leaders, e.g. Martin Luther King, Charles de Gaulle, Abraham Lincoln, Mahatma Ghandi, Nelson Mandela, Fidel Castro, Alexander the Great and Warren Buffet. Some of these we may sympathise with and some we may not. Leaders can be found in many different contexts: politics, business, civil society, academia and not least in various non-profit organisations. Today, we are in the middle of a transformation era. There is an urgent need to promote a global sustainable development. To succeed with this, we need to transform our nations, organisations, and make them more sustainable.

This transformation process is characterised by great uncertainty and complex urgent societal challenges. The present climate crisis calls for immediate attention where drastic reductions of CO₂ emission can only be achieved through sustainable consumption and production. Better structures for sustainable land management and governance of land resources are at the heart of the fight against poverty, food insecurity, inequality, unemployment and environmental degradation. Social injustice and inequality need prompt and lasting solutions to promote a fair balance between the Global South and the Global North.

To tackle these societal challenges and navigate towards vital changes, a certain type of leader is required (Mumford, et al., 2007; Vinger, G., & Cilliers, F., 2006). We define this type of leader as a transformative sustainable leader (see e.g. McCann, J. T., & Holt, R. A (2010) for a discussion on defining sustainable leadership). In order to fulfil the UN Sustainable Development Goals (SDGs), attain Agenda 2030 and honour the Paris Agreement, this type of leader is critical.

One of the participants of the LiL capacity building programme 2019 summarised how the Leading Module challenged his views on what role he wants to play in leading towards change.

“The Leadership course challenged me to see myself playing a different role as someone who can lead the, you know, the change that I long to see and not just to take a back seat and be part of something that is already existing.”

LiL alumnus Simon Peter Mwesigye, working as Land Specialist for Programme Management at the United Nations Human Settlements Programme in the Land and Global Land Tool Network Unit

Before we focus on what characterises a transformative sustainable leader, we must understand who becomes a leader, what defines a leader, different leadership styles, what competences they have/need and whether these can be developed. Not everyone needs to adopt the transformative sustainable leadership style to make a positive impact. Good leadership is vital in every project with potential of promoting a global sustainable development.

5.2. Perspectives on leadership

Let us first reflect on who is a leader? Figure 13 includes photos of four people often defined as a leader: President Donald Trump from politics, Greta Thunberg from the climate movement, Superman from the world of cartoons and finally Cristiano Ronaldo from the world of sport.
Even if we agree that these four people can all be defined as leaders, it is important to acknowledge that they are leaders in different contexts: politics, climate movement, cartoons and football. They may also exemplify different leadership styles, e.g. autocratic leader, visionary leader and coaching leader (see section 5.4 Different leadership styles).

Leadership can be defined as the art of motivating a group of people to act towards a common goal. If we again review Figure 13, it is clear that these leaders motivate different groups of people (e.g. Republican voters, climate activists, superhero enthusiasts and football players) even though there might be some overlaps (a Republican voter might also be a climate activist cheering on Cristiano Ronaldo’s football team). These leaders also represent different kinds of goals (making America great again (MAGA), fighting the climate crisis, defeating Lex Luthor and winning ‘Serie A’).

A fundamental question is: whether you are born a leader or if leadership skills are developed through experience and training (see Figure 14). Regardless of which of these categories we might see ourselves in, there are several empirical studies indicating that leadership skills can be developed and enhanced through experience and active training/education in various forms (Elmuti, et al., 2005; Conger, 2004; Preece, 2003). If we agree that anyone can become a leader, it is important to acknowledge that not everyone is prepared to shoulder the role of leader. To become a leader of a group, we not only need to be able to inspire others, we also need to be willing to do so.

**5.3. What defines leadership and leadership competences?**

In this section, we will start by looking more closely at what defines leadership or, maybe better, what competences we expect to find in a leader. Then we will discuss how these leadership competences can best be developed. The section ends by presenting what kind of pedagogical methods and approaches are best suited to enhancing and developing these competences.

Being a true leader sometimes does not require that an individual be officially appointed as leader. Rather it depends on what competences that person holds and how he/she uses them in a certain situation
or project. We can take it one step further by proposing that it is the people around us who really decide whether we are a real leader or just a leader on paper. In order to be able to act as a leader, it is important to gain the trust of our team. Trust is often related to how well a leader succeeds in supporting the team with guidance, inspiration and motivation. The need for active and constructive communication as well as feedback is equally important for a leader to acknowledge throughout the project. To succeed with a project, a leader must also have the ability to make priorities, define goals and sub-goals, structure the teamwork and assign tasks and responsibilities between team members. Along these “management or executive” competences a leader also needs to have ethical, empathic and psychological competences in order to be able to successfully solve conflicts, handle criticisms and other interpersonal matters that might occur during the project. Thus, acknowledging the importance of interpersonal relations is also a leadership competence.

In the section above, we have reviewed the broad spectrum of competences that we, at least in an idealistic world, expect a leader to have. Intuitively, few are born with all these competences. Instead they need to be enhanced and developed. Some competences are acquired through years of experience by being involved either as leader or team member in different projects. If you have been appointed as leader then you probably have reflected during the way on which of your competences you feel satisfied with and which you would like to develop further. In many projects, we are involved as team members. Being a team member provides us with numerous situations when we can reflect at close hand on what leadership competences the leaders around us have or, in our opinion, should have. All these experiences not only mould our view of what great leadership competences are, but also influence which leadership competences we emphasise when we shoulder the role as leader.

When it comes to enhancing and/or developing leadership competences, we will use the framework by Lozano et al. (2017) in which they argue how different types of competences are best developed by the adoption of different pedagogical approaches. Reviewing Table 2, it is apparent that many of the competences that Lozano et al. (2017) include in the first row are similar to the leadership competences that are discussed earlier in this section. The authors choose to refer to them as SD competences, which would make them more applicable to competences required by transformative sustainable leaders which are the focus of section 5.5. However, due to the competences in Table 2 coinciding with some general leadership competences, it is useful to adopt the framework by Lozano et al (2017) when the focus is to develop competences other than for SD leadership.

To better illuminate how the framework can be applied, let us view some examples that relate to the leadership competences mentioned above. Interpersonal relations and communication, as we discussed above, are examples of competences that Lozano et al (2017) argue are best developed with a pedagogical focus on community and justice in general and on community service learning and jigsaw/interrelated teams in specific. It is also argued that strategic action (close to what we defined above as management and executive competences) is developed with this focus, as well as by engaging in project and/or problem-based learning and participatory action research.
5.4. Different leadership styles

In the sections above, we have touched upon how there are different types of leadership styles. In this section, we will focus on nine different leadership styles and what characterises them (see e.g. Carless et al. (2000), Foster (2002), Goleman (2000)). This section will help you better understand what type of leadership style is required or appropriate in a certain kind of situation or project. Furthermore, you will most certainly start to reflect on what type of leadership style(s) you or those around you usually adopt. Maybe you even can start identifying what type of leadership style you would need to develop to succeed in leading towards a certain goal.

**Coaching leadership**

A coaching leader tries to identify their team members’ strengths and weaknesses. The coaching leader uses this information to motivate the team members in a way that makes them flourish. Feedback is something that this type of leader prioritises. Overall, a coaching leader actively tries to create a positive and constructive working environment where team members feel included. Even though this type of leadership style has clear advantages, it is also quite time-consuming, which means it is adopted less frequently.

**Visionary leadership**

A visionary leader is often powerful in his/her ability to navigate change and strive towards visions. The strength of this leadership style is the ability to inspire others and to earn trust for new ideas. Therefore, this type of leadership style is advantageous in periods of transformation where there is a need for challenging old mindsets and bounded rationales.

**Servant leadership**

A servant leader is very much focused on appreciating and acknowledging all team members and the work they put into a project. Highest on the agenda of this type of leader is that team members are supported, satisfied and that a constructive collaboration is safeguarded throughout the project. A servant leader believes that satisfied team members will be effective and show great job results.

**Autocratic leadership**

Contrary to the servant leader, an autocratic leader is very much focused on results and efficiency. This type of leader is often not interested in inviting other team members into the decision-making process.
Instead he/she prefers to make decisions on his/her own. Although, we might be opposed to this type of leadership style it might be advantageous in projects where quick results are needed or where the project is guided by strict rules and regulations.

Laissez-faire or hands-off leadership

The laissez-faire leader is quite different to the autocratic leader. While the autocratic leader seeks to have control over all the different steps of the whole project, the laissez-faire leader is quite keen on delegating much to the team members. This type of leadership style is advantageous in projects where the team members are skilled and experienced. This means that they will need less supervision and guidance from their team leader.

Democratic leadership or participative leadership

A democratic leader is a combination of the two previous, e.g. the autocratic leader and the laissez-faire leader. Even though the democratic leader makes the decisions, he/she is very much focused on receiving input and feedback from all team members before decisions are made. This makes team members feel included in the decision-making process.

Pacesetter leadership

A pacesetter leader is acknowledged for being good at showing fast results. This type of leader is focused on performance. Decisions are made in a fast pace and ambitious goals are often set. This is a leadership style that requires that team members deliver on the ambitious goals.

Transactional leadership

A transactional leader is, like the pacesetter, very much focused on performance. One difference is that the transactional leader motivates his/her team members to perform by offering rewards when goals are met. However, the transactional leader works with both carrots and sticks. Thus, when goals not are met then disciplinary actions are imposed. The transactional leader wants the team members to perform well and be rewarded, therefore, he/she provides mentorship, guidance and training to help team members meet their goals.

Bureaucratic leadership

A bureaucratic leader shares many similarities with the autocratic leader. Under this leadership style, team members are expected to follow orders, rules and routines exactly. All team members have detailed duties and their responsibilities are clearly communicated.

Transformative leadership

A transformative leader (see e.g. Caldwell et al. (2012)) is similar to a coaching leader. This leadership style is also focused on a clear communication and on creating a motivating employee atmosphere benefiting the project. A difference to the coaching leader is, however, that the transformative leader does not focus so much on helping the team members fulfil their individual goals. Instead this type of leader is energetically driven by the commitment to organizational goals. In the case of LiL to integrate with Agenda 2030. In the next section (5.5), the focus is on transformative sustainable leaders, who lead in different projects aiming at promoting a global sustainable development.

Summing-up

After having familiarised ourselves with the leadership styles above, you might have come to the conclusion that many leadership styles resemble each other in one or several ways. This is an observant reflection. It is often not possible to present a definite description of a leadership style. Often one
leadership style includes features from other leadership styles. In certain situations, and faced with a specific goal, it might even be most successful to adopt a mixed leadership style. Certain projects might call for a flexible leadership style, where the leader adopts different features in their leadership style, depending on which stage the project is in.

Even though each of us might be close to a certain leadership style, empirical studies (e.g. Elmuti et al (2005), Conger (2004)) show that we can develop and adopt our leadership styles to better fit the project we are involved in. So, what should we reflect on when embarking on a new project in the role as leader?

First, it is important to understand the nature of the project? Is this a new project or a repetitive one? Is the project guided by firm regulations and fixed instructions or is the project best defined as explorative and innovative? Reflecting on this is valuable input when deciding on what type of leadership style fits the project at hand (see e.g. Mumford et al. (2007)).

Secondly, it is vital to consider the goal(s) of the project and SDGs. What is a successful outcome of the project? Is the success of the project easily observed? What are the goal conflicts between certain SDGs? Can you assess the outcome against predetermined indicators or is the success more related to obscure and qualitative features? Along with reflecting on the nature of the project, it is valuable to also understand how the goals of the project might influence the decision of adopted leadership style.

Thirdly, it is crucial to identify which types of team members are involved in the project. Are the team members used to working with these tasks and also structuring their own work or are the tasks unfamiliar to them and are they relying on supervision and strong coordination from the leader? The type of team members will affect what type of leadership style is most constructive in a certain project. However, it is always important to clearly communicate what expectations the leader has for his/her team members. This is crucial for the success of any project regardless of what leadership style is adopted.

5.5. Achieving the Agenda 2030 requires certain types of leadership competences

In the previous section, we have discussed different types of leadership styles and what characterises them. In this section, the focus is on transformative sustainable leadership and more specifically what types of leadership competences are required to fulfil the UN SDGs, achieve Agenda 2030 and honour the Paris Agreement. To successfully tackle these complex societal challenges requires certain leadership competences.

Navigating change towards a global sustainable development is at the top of the agendas of transformative sustainable leaders. A key feature of transformative eras is uncertainty. Leading in these times means making decisions under greater uncertainty than usual. Mindsets need to be changed. New knowledge has to be created. Routines, processes, models and praxis that have worked before are now required to be developed in order to be appropriate in this new sustainable world. A stronger focus must be directed at explorative and innovative solutions (see e.g. Bossink (2007) on leadership for sustainable innovation). Goal conflicts (e.g. environmental/social/economic; short term vs. long term, Global North/Global South) need to be identified and handled. For succeeding with all of the above, a key challenge for a leader of a sustainable development (SD) project is to be able to not only support and motivate his/her team members but also to inspire them to take active part in the actions towards promoting a global sustainable development and to cooperate in partnerships (SDG 17).

Shouldering the role of transformative sustainable leader involves quite a few “missions”:

- Embarking on new paths
- Leading under great uncertainty, and mediating between different views on SDGs
- Navigating change, navigating interdisciplinary teams and tensions
- Integrating sustainability, responsibility, justice, empathy and ethics in leadership
- Changing mindsets
- Pushing for the development of new applicable routines, processes, models, praxis etc.
- Initiating the search for explorative and innovative solutions
- Supporting, motivating and inspiring team members to take part in the action
- Earning trust from team members and external stakeholders

The “missions” above can feel intimidating even to the most experienced leader. Undoubtedly, some individuals are better suited than others for leading challenging SD projects. Reviewing history, we might even come to the conclusion that some people appear to have been born to be a transformative sustainable leader (e.g. Wangari Muta Maathai). However, in the present transformative era we cannot only rely on those who were born to become transformative sustainable leaders. If we do so we will not achieve the Agenda 2030. We need to focus our resources on developing leaders with competences applicable for transformative sustainable leadership. The framework by Lozano et al. (2017) (see Table 2) reveals many relevant competences that are needed in order to be able to succeed with the “missions” above. Reviewing their framework provides us with excellent input related to what pedagogical approaches we should rely on when developing competences fit for transformative sustainable leadership.

Let us end this section by reviewing what the participants in the LiL Capacity Building Programme 2019 put forward as key competences for leading change thorough different SD projects. Figure 15 verifies that a transformative sustainable leader is expected to have many different competences to be successful in leading SD projects.

![Figure 15 Examples of key competences for transformative sustainable leaders in the land use sector according to participants of the LiL Capacity Building Programme 2019.](image)

### 5.6. Interrelation with Knowing and Measuring

In this section, the focus is on illuminating how the module Leading interrelates with the other two modules Knowing and Measuring. Regardless of whether you define yourself as or aim at becoming a general leader or a transformative sustainable leader, you need to build your leadership on knowledge relevant to the project and identify measures to assess the progress of your project. Thus, in order to succeed with your leadership, it is not sufficient to focus only on developing the leadership competences discussed in this chapter. You also need to reflect on how to identify, access and evaluate relevant knowledge as well as how to identify, develop and interpret relevant measures. We will exemplify the interrelations with Knowing and Measuring from the perspective of a transformative sustainable leader.

**Interrelations with Knowing**

It cannot be emphasised enough that we live in uncertain times and today’s leaders, more than ever before, need to adapt to making decisions under great uncertainty. Many of the societal challenges that stand in front of us are daunting in various ways. Solving them calls for new approaches and new mindsets. Leading in this transformational era means pushing for explorative and innovative solutions fit to promote a global sustainable development.

With all this in mind, it is easy to understand that identifying relevant knowledge needed to navigate change is vital for transformative sustainable leaders. Due to the complexity of the societal challenges related to SD in combination with the multitude of views, scenarios and statistics pointing in various directions, it is indeed complicated to identify what is relevant knowledge. Not only identifying what is
relevant and less relevant knowledge is troublesome. Also gaining access to knowledge identified as relevant is coupled with difficulties.

Likewise, it is linked with difficulties in actually evaluating the relevance of different types of knowledge. In the role of leader it is your responsibility to decide and communicate to your team members and external stakeholders on which knowledge your decisions are based. This task is even more complicated when leading SD projects where views of what knowledge is relevant to base decisions on is rather fragmented among team members and external parties (materiality analysis can be one efficient approach to gaining information on how stakeholders assess different SD related topics). Overall, this section illustrates the central role knowledge plays in transformative sustainable leadership. The approaches and methods discussed in chapter 3 Knowing SDG15 are, therefore, critical to reflect on when focusing on how to develop and prepare oneself to lead towards promoting a global sustainable development.

*Interrelations with Measuring*

It is vital for a leader to be able to assess the progress of a project or organisation and align these with the interrelations between the SDGs. It is also important to connect these goals to the values of individual leaders. As learned in the LiL programme SDG 15 intersects with other SDGs in important and complex ways. Navigating these interrelations can be a challenge. The more explorative and innovative a project is, the more difficult it is to decide on what is a successful outcome of the project. When this is decided, relevant measures to capture the progress need to be identified. If it is a repetitive project then various methods and measures for assessment often already exist. However, assessing the progress of SD projects is often more complex.

A transformative sustainable leader often has difficulties in identifying relevant measures among already existing measures. Therefore, this type of leader usually must push for the development of new measures applicable for assessing the progress of a specific SD project. The development of new measures is, however, not a straightforward process. Developing measures that capture progress in certain SD dimensions (anti-corruption, equality, human rights, water stewardship, land management etc.) are tricky. This also has consequences for the interpretation of progress since interpreting the outcome related to a newly developed measure is problematic. The measure might not be able to capture the progress of the project or it might be too time consuming to gather data, which means that the measure is not reliable to assess progress from. Overall, this section illustrates the central role measures play in transformative sustainable leadership. The approaches and methods discussed in chapter 4 Measuring SDG 15 are, therefore, critical to reflect on when focusing on how to develop and prepare oneself to lead towards change promoting a global sustainable development.
6. Impact

In order to analyse the potential impact of the new teaching framework, we use the evaluation of the LiL pilot programme that was structured according to the three modules Knowing, Measuring and Leading.

6.1. ‘Land is Life’ programme evaluation

The activities of the LiL programme aimed at developing competences of the individual participants and their organizations that will lead to a greater understanding and capacity to implement the SDG 15. To interlink the land questions to other SDGs with an improved knowledge base, tools for measurements and new leadership skills. The key competences were set out in Chapter 2 of the guidebook, and specific learning outcomes for each of the modules set out in Chapters 3-5.

In order to assess the impact of the programme the following evaluations have been made:

1) Online course evaluations by the participants immediately after the programme
2) Personal interviews with 8 participants, in the months after completing the programme

The personal interviews took place in February 2020 at a follow-up workshop and stakeholder forum held at ICRAF in Nairobi, Kenya. Researchers from Lund University interviewed the LiL participants about the impact of the programme.

In the following, we will focus on 2) the personal interviews, because these statements about the impact are more relevant than the immediate standard course evaluation, since they are substantiated by the participants’ work experiences in the months following the LiL programme.

6.2. Evaluation approach

The online evaluation was structured according to the 3 modules and measured to what extent the learning objectives of each modules had been met.

In chapter 2 we discussed the meaning of transformation to sustainability and the connection to ESD. We chose to test the impact of the project through a transformation lens. We evaluated the impact through the lens of the theoretical framework of the “The Tree Spheres of Transformation” by O’Brien and Sygna (2013).

We made a link between the three spheres of transformations, the three modules and the interview questions to assess which impact the LiL programme had on the individuals (personal) and on their organizations (practical).

According to the “The Tree Spheres of Transformation”, transformative change happens across three embedded and interlinked spheres; personal, practical and political (Figure 16). The practical sphere is
at the core of transformations, where measurable outcomes take place e.g. strategies, practices and behaviours. The changes that occur in this sphere are often influenced by changes in the other spheres. The political sphere represents the systems (economic, political, legal, social and cultural systems) and structures that define the constraints and possibilities under which practical transformations take place. Changes on the personal sphere include change of beliefs, values and worldviews and have influence on how people see and interact with the world.

Transformations to sustainability need to take place on all three spheres and need to come from both from outside-in and inside-out in order to be effective.

The learning objectives of the 3 modules can be categorized according to the three spheres of transformations. This shows that the LiL programme with its 3 modules has the potential to create impact on all three spheres.

Table 3 Modules, learning objectives and the sphere of transformation

<table>
<thead>
<tr>
<th>Module</th>
<th>Learning objectives</th>
<th>Sphere of Transformation</th>
</tr>
</thead>
<tbody>
<tr>
<td>KNOWING</td>
<td>To strengthen <em>knowledge and understanding</em> about SDG 15 and its synergies and trade-offs to achieve other SDGs.</td>
<td>Personal sphere</td>
</tr>
<tr>
<td>MEASURING</td>
<td>To build skills in how to <em>make use of measuring tools</em> to identify the scale of certain land problem(s) and keep track of and predict the progress and effectiveness of specific measures.</td>
<td>Practical sphere</td>
</tr>
<tr>
<td>LEADING</td>
<td>To <em>enhance leadership</em> to initiate change towards achieving SDG 15. Leadership skills of individuals and within their organizations, but also leadership in a wider sense, by strengthening a network of land-related organizations that – in the long run- will develop capacities to actively influence and push sustainable policy-making and implementation on the system level.</td>
<td>Political sphere</td>
</tr>
</tbody>
</table>

In order to assess the impact of the LiL programme, the interview questions were formulated and structured according to the three spheres of transformation.

Table 4 Interview questions relating to the three spheres of transformation

<table>
<thead>
<tr>
<th>Interview questions</th>
<th>Sphere of Transformation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) What are the measurable outcomes of your participation in LiL, in terms of changes in your organization’s strategies, technical responses, behaviours and partnerships?</td>
<td>Practical sphere</td>
</tr>
<tr>
<td>2) Do you perceive the land challenge you work on in a different way after participating in LiL? In what way has your beliefs, values or world view changed? What triggered that change?</td>
<td>Personal sphere</td>
</tr>
<tr>
<td>3) Has your participation in the LiL programme changed the way your institution defines and addresses the land problem your organization target? What enable or facilitated that transformation or impeded the transformation?</td>
<td>Political sphere</td>
</tr>
</tbody>
</table>
6.3. Impact analysis of the LiL programme

The online course evaluation showed a great satisfaction with the course. All participants reported immediately after the course that the modules Knowing, Measuring and Leading worked well and that they gained new knowledge and skills and changed their way of dealing with land related issues.

The personal interviews corroborate these findings. Interestingly, the reported impact is different for each participant. This can be explained through the various backgrounds of the participants, their different challenges and foci.

In the following the LiL programme’s impact will be analysed according to the three spheres of transformation.

6.3.1. The practical sphere

To question 1, the participants reported that the programme resulted in a stronger focus on partnerships and stakeholder involvement, improved data quality and availability, improved the measuring to be more holistic, had a positive effect on project planning and resulted in a higher focus on environmental aspects. Two of the participants reported to have more influence and responsibility at work.

“And now I’m now applying these tools more and more tools like problem tree analysis. These have the future everywhere in my work. The DIPSIR. Whenever I’m writing project concepts, which is a big part of my work.” (Simon Peter)

“The tools that I was taught definitely helped me to integrate all parameters. I learned on how to address it in a holistic manner.” (Robert)

“A new dimension in terms of thinking. We have incorporated new stakeholders that we’re left out initially.” (Andrew)

It can be concluded that all participants acquired skills and tools throughout the course that led to some new working practices, strategies and behaviours, and thus have contributed to changes in the practical sphere.

6.3.2. The personal sphere

As regards question 2, the participants report that attending the programme changed their perceptions of the importance of gender issues, of the involvement of stakeholders, of bottom-up approaches and of the interlinkage of the social sciences with the natural sciences.

“It’s enriched my perspective a lot. I look at things differently now. I use an environmental lens now when I’m looking at land issues.” (Tawonga)

“The Leadership module challenged me to see myself playing a different role as someone who can lead the, you know, the change that I long to see not just to take a back seat and be part of something that is already existing.” (Simon Peter)

“It has really energized me to move from my comfort zone and see things differently. It is not business as usual.” (Anne)

“But now I see myself as someone who should champion the gender balance cause. So more and more, I am trying to find ways of how to be gender responsive in documents that I write, in meetings, how I interact with different stakeholders, how I organize different events where I am involved. And I’m now also very particular about measuring and monitoring gender aspects more and more, much more than I was doing before.” (Simon Peter)

We conclude that by attending the programme the participants changed their ways of seeing systems and perceptions, which means the programme led to changes in the personal sphere.
6.3.3. The political sphere

As answers to question 3 participants describe effects of the LiL programme on their organizations in form of collaboration between sections that did not collaborate before, in form of the involvement of stakeholders that have not been involved before, in form of a higher focus on environmental aspects and in form of an inclusion of gender issues. Only one participant (Eugene) reports only little effects on his organization because he feels that changes in this organization are difficult to reach and take a long time. Nevertheless, he points out that the director of his organization is supportive and sees the need for changing practices.

“So with the training programme that we had on Land is Life that new direction is that we incorporate SDGs in the planning process.” (Andrew)

“I can see some positive change where the sections are now collaborating to achieve a common goal.” (Carolyn)

“So definitely our organization is now looking into those areas [environmental issues] and seeing how we can integrate that into our strategic planning and our project planning and just designing interventions in general.” (Tawonga)

Replies on question 3 show that the LiL programme with its three modules had some effect on the participants’ organizations. However, the impact of an individual on its organisation in order to change systems and structures is of course limited. At this point we would like to point out important design principles of the programme, that we believe were critical for reaching theses positive effects.

6.4. Crucial programme design elements

In order to reach a high impact on the organizational/ systems level, the selection of participants is crucial. In the LiL programme participants were strategically selected to be in the early stages of their careers and still connected to the realities on the ground, but having a mandate with time allocation to put knowledge into action to implement the SDGs. Moreover, it is important the participants cover a broad range of land-related organisations. This is especially critical for the peer-learning, another important design element of the programme. Along the lines of ESD, the participatory learning approach of the programme enabled the participants to make their own student centered-learning experiences (moving away from teaching to learning) towards a holistic and transformational education (UNESCO, 2017, p. 7) with learning that allow for dynamic student-centered teaching and learning environments.

The active exchange with the peers played a pivotal role, and was mentioned by several participants in the interviews.

“I think what triggered that change is the networking. Also with my colleagues from different countries, different professionals, because they came with different ideas. And that triggered a change.” (Robert)

“So it was it was a trigger. Just having those conversations and understanding how our actions are negatively impacting the environment on an individual basis. Even for me individually and how I can change my lifestyle and design projects differently to contribute to environmental sustainability.” (Tawonga)

“First and foremost, there way we were participating, it was active but special. It triggered us to think a lot.” (Carolyn)

In order to continue the peer exchange even after the course, the LiL programme build up an alumni network with the purpose of continuously exchanging knowledge between the land-related organizations in East Africa. The long-term objective of such a growing network is to strengthen
capacities and leadership of the network partners and prepare the ground for bigger changes in the political sphere.

Another important design element that contributed to the participant’s learning experience were the field trips. Some of the participants reported that being exposed to real-life sustainability issues and getting in contact with the actors involved during field trips triggered their change of mind-set.

“And also then they field visits [to a certain area in Kisumu]. What we had in class and what we saw there, that really matched. So then it was seeing and believing.” (Andrew)

6.5. Connect teaching and ESD impact (broadly)

In chapter 2 we set out the structure and theoretical ideas on ESD and the links to the SDGs. We identified a set of core competences that relate to the three modules Knowing, Measuring, Leading. Within the LiL programme we found that the in the context of Knowing the competences were relevant and quite successful outcome. Participants expressed their views had changed with regards to a better understanding of systems thinking, normative skills and critical thinking, as well as advanced empathy. Overall, we can say that the Knowing module has achieved its ambitions within the LiL programme. On the Measuring module we see that three core competences have been met which are critical integrated problem solving and assessment skills, along with decision making and anticipation of the future. These are quite aligned with the module close focus on data and tools relevant to managing land use change in the region. Interestingly, the aspects of systems thinking or tolerance for ambiguity, such as where there are gaps in data, what kinds of actions or learning to we engage with instead? Given that there are vast gaps in data on land use change in Africa these skills are important. Another set of skills that were not present in the interview responses were normative skills, which reflects the values of whose targets count and why, as well as critical thinking on data – for instance who decides what to measure in sets targets? These are potentially more political considerations and still are important to the overall competences for managing the SDGs. Finally, in terms of the module Leading, we noted the skills most developed included soft skills in interpersonal, communication, empathy, strategic and advanced problem solving. There was less development on systems thinking, normative skills (which goal counts most), critical thinking such as reflections on who wins and who loses, and anticipatory competence on future skills.

6.6. Potential impact of the new teaching framework

In the following Table 5 we are looking at the LiL programme impact analysis, and will make a connection to the ESD competences the participants in this programme have acquired. Even though the interviews with the students were not designed to answer the question per se of which competences were acquired, we use the LiL participants’ statements in order to show that the framework of Knowing, Measuring and Leading has the potential to cover a broad set of ESD competences.
Table 5 The connection of ESD competences and LiL programme impact

<table>
<thead>
<tr>
<th>Competences</th>
<th>Short term to Medium term Impact</th>
<th>Citations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Knowing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systems thinking</td>
<td>- improved the measuring to be more holistic.</td>
<td>“So the tools, the knowledge has had a very big impact on the way we have framed our pilot” (Simon Peter)</td>
</tr>
<tr>
<td></td>
<td>- has framed the objectives of projects</td>
<td>“the way I just synthesize information, this is me, personal, the way how I synthesize information, just not only for the land challenge or a LiL programme, but just generally in life in everything” (William)</td>
</tr>
<tr>
<td></td>
<td>- resulted in a higher focus on environmental aspects.</td>
<td></td>
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<tr>
<td></td>
<td>- change the way of synthesizing information and complexity.</td>
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<td></td>
<td>“So the tools, the knowledge has had a very big impact on the way we have framed our pilot” (Simon Peter)</td>
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<td></td>
<td>“the way I just synthesize information, this is me, personal, the way how I synthesize information, just not only for the land challenge or a LiL programme, but just generally in life in everything” (William)</td>
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<td></td>
<td>“So the tools, the knowledge has had a very big impact on the way we have framed our pilot” (Simon Peter)</td>
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<tr>
<td></td>
<td>“the way I just synthesize information, this is me, personal, the way how I synthesize information, just not only for the land challenge or a LiL programme, but just generally in life in everything” (William)</td>
<td></td>
</tr>
<tr>
<td>Normative skills</td>
<td>- changed the perception of the importance and value to integrate social sciences and natural sciences.</td>
<td>“Yes, even especially integrating social science into the natural science. Yes. The way you can combine the two.” (Eugene)</td>
</tr>
<tr>
<td>Critical thinking</td>
<td>- changed the perception of the importance of gender issues in who counts</td>
<td>“But now I see myself as someone who should champion the gender balance cause. So more and more, I am trying to find ways of how to be gender responsive in documents that I write, in meetings, how I interact with different stakeholders, how I organize different events where I am involved. And I’m now also very particular about measuring and monitoring gender aspects more and more, much more than I was doing before.” (Simon Peter)</td>
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<tr>
<td></td>
<td>- changed the perception of the own leadership role</td>
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<tr>
<td></td>
<td>“But now I see myself as someone who should champion the gender balance cause. So more and more, I am trying to find ways of how to be gender responsive in documents that I write, in meetings, how I interact with different stakeholders, how I organize different events where I am involved. And I’m now also very particular about measuring and monitoring gender aspects more and more, much more than I was doing before.” (Simon Peter)</td>
<td></td>
</tr>
<tr>
<td>Empathy and perspectives</td>
<td>- Sharing perspectives and integrating stakeholders.</td>
<td>“A new dimension in terms of thinking. We have incorporated new stakeholders that we’re left out initially.” (Andrew)</td>
</tr>
<tr>
<td>Measuring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated problem solving/Assessment and evaluation</td>
<td>- less resources required because she knows where and how to source free data</td>
<td>“Actually, in the previous year we were discussing much about land degradation, but we had not the proper tool or approach on how we can map it. And now we can get that data, at least the baseline information where we can get the maps. “ (Eugene)</td>
</tr>
<tr>
<td></td>
<td>- legitimized the method of measuring</td>
<td>“Actually, in the previous year we were discussing much about land degradation, but we had not the proper tool or approach on how we can map it. And now we can get that data, at least the baseline information where we can get the maps. “ (Eugene)</td>
</tr>
<tr>
<td>Decision-making under uncertainty</td>
<td>- improved how we prioritize our projects</td>
<td>“After going through the programme, it improved our project planning, then it also improved how we prioritize our projects” (Anne)</td>
</tr>
<tr>
<td>Anticipatory competence</td>
<td>- Future perspective, somewhat strategic</td>
<td>“it easily convinces a potential donor or other stakeholders to easily fund our programmes because they are able to do look or to envision the future over intervention” (Andrew)</td>
</tr>
<tr>
<td>Tolerance for ambiguity and uncertainty</td>
<td>-No results</td>
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<tr>
<td>Systems thinking</td>
<td>- No results</td>
<td></td>
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<tr>
<td>Normative skills</td>
<td>- No results</td>
<td></td>
</tr>
<tr>
<td>Critical thinking</td>
<td>- No results</td>
<td></td>
</tr>
<tr>
<td>Leading</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated problem-solving</td>
<td>- Provided useful tools</td>
<td>“But now my understanding of how powerful it is was enhanced. And now I'm now applying these tools more and more tools like problem tree analysis. These have the future everywhere in my work. The DIPSIR. Whenever I'm writing project concepts, which is a big part of my work.” (Simon Peter)</td>
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<tr>
<td>solving competence</td>
<td></td>
<td></td>
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<tr>
<td>Interpersonal relations and</td>
<td>- has improved the ability to</td>
<td>“Now I'm able to articulate issues on how I can link land resources management to freshwater conservation.” (Carolyn)</td>
</tr>
<tr>
<td>communication</td>
<td>communicate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- opened up opportunities for</td>
<td>“It also helps when we are dealing with the public. Because I am in the national government, when you are dealing with the public, it improved my technical bit how I deal with the public in terms of responses to their questions here.” (Anne)</td>
</tr>
<tr>
<td></td>
<td>collaborations and networking</td>
<td></td>
</tr>
<tr>
<td>Empathy and perspectives and</td>
<td>- changed the perspective of</td>
<td>“It does not only require the higher level, especially the government…. Even people at the lower levels, even those who would think of what they can contribute to something.” (Eugene)</td>
</tr>
<tr>
<td>collaboration competence</td>
<td>whose contribution is important</td>
<td></td>
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<tr>
<td></td>
<td>(bottom-up approaches)</td>
<td></td>
</tr>
<tr>
<td>Strategic competence</td>
<td></td>
<td>“So we’ve had different workshops with, we formed technical working groups with different sectors representative of all the sectors and NGO civil society organisations. So there’s been a lot of capacity building on the need to share whatever activities they’re doing.” (William)</td>
</tr>
<tr>
<td>Decision making under</td>
<td>- adjust planning processes to</td>
<td>“So with the training programme that we had on Land is life that new direction that we incorporate SDGs on the planning process.” (Andrew)</td>
</tr>
<tr>
<td>uncertainty</td>
<td>a broader set of goals</td>
<td>“The Leadership course challenged me to see myself playing a different role as someone who can lead the, you know, the change that I long to see and not just to take a back seat and be part of something that is already existing.” (Simon Peter)</td>
</tr>
<tr>
<td>Justice, responsibility and</td>
<td>- Awareness of individual</td>
<td>“...And that it's not just about policy makers and duty bearers actually being at the forefront in addressing those issues. It's an individual responsibility as well.” (Tawonga)</td>
</tr>
<tr>
<td>ethics</td>
<td>responsibility</td>
<td></td>
</tr>
<tr>
<td>Systems thinking</td>
<td>- No results</td>
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<td>Normative thinking</td>
<td>- No results</td>
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</tr>
<tr>
<td>Critical thinking</td>
<td>- No results</td>
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<tr>
<td>Anticipatory competence</td>
<td>- No results</td>
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</tr>
</tbody>
</table>


Table 5 shows that the LiL participants most likely have acquired a broad set of ESD competences in the LiL programme that was structured in the interlinked modules Knowing, Measuring and Leading.

It is important to mention here, that not only there structure of the course with its three modules were crucial for the impact, but also the programme design elements: peer learning, participatory learning and experiential learning through field trips.

6.7. Programme improvements

During the LiL pilot programme, we have learnt and improved the programme and reached a higher understanding of the target group’s needs and what institutional capacities need strengthening in the respective countries. The programme's further development, will put more weight on local partners such as Vi Agroforestry, the inclusion of our alumni to strengthen ownership in the region, contested topics, like the inclusion of local based knowledge, gender and power relations, the impacts of climate change and tools to enact change for action.

6.8. Conclusions

Having evaluated the LiL pilot programme, we can conclude that the new learning framework paired with a collaborative and participatory learning environment approached SDG-related problems and solutions in an innovative way. As noted by (Kioupi & Voulvoulis, 2019) education for sustainability requires systems thinking and participatory approaches to implement the SDGs in an integrated way. In LiL programme through the holistic approach and its systems perspective participants understood understand the multi-sectoral aspects of a problem e.g. land and its synergies and trade-offs with other SDG goals, and deepened and strengthened their understanding of complexity. Together with the emphasis on leadership and sustainable decision-making skills in the module measuring, the programme linked theory with action. Such training activities paired with networking activities can develop leadership capacity not only for the involved participants, but also for a wider platform of organizations.
7. Conclusion

7.1. Key insights for ESD and teaching impact
The LiL programme set out to learn about how to advance knowledge and action on the SDGs, with a specific focus on SDG 15 (Life on Land). The programme brought a group of early career future leaders from Africa together into a novel and innovative setting in the LiL programme. The programme was built on years of Lund University experience in Africa and lead by teachers with significant experience in sustainability science and leadership. Participants were practitioners from across the land use sector.

The LiL programme provides critical new insights. Firstly, into how the SDGs absolutely need to be understood in an integrated matter. Secondly, the participatory approaches, systems thinking among other new skills underpin SDG learning. The complexity of the problems mirrors the complexity of the ways that we need to understand and act. Thirdly, LiL demonstrates that in much of Education for Sustainable Development (ESD) there remain gaps in how we can assess learning on SDGs. As ESD develops as a pedagogical discipline it has the potential to underpin capacity development and education on SDGs further. In particular, it offers insights into important competences for advancing learning on sustainability. Still, there is room for improvement toward more systematically integrated systems thinking and innovative participatory approaches for to engage learners on the SDGs.

7.2. Critical reflection of the module structure
The LiL programme set up the structure to include three key modules Knowing, Measuring and Leading. The aim of having the three modules was to connect to the learning objectives and competences in in ESD frameworks including cognitive, social and behavioural competences. Gaps in our learning about SDGs includes the lack of clear interlinkages between the SDGs, importance of data and measurement and how we can advance action on SDGs. The module structure in LiL was created to be able to interlink learning between modules and in terms of advancing the transformative potential of the SDGs. The module structure was considered coherent and logical by participants. It was also considered well integrated and coherent. This facilitated the positive learning outcomes and developments among participants identified in the impact assessment captured at the end of the LiL programme.

7.3. Application to other sectors
The LiL programme offers new lessons learned to other SDGs, across the board including SDG 3 (Health) and SDG 13 (Action on Climate Change) and SDG 6 (Clear water and sanitation).

7.4. Future direction
Future work on the LiL model will take place with a focus on how ESD is evolving along with new understanding of the importance of systems thinking to solve complexity and change. Here further exploration of critical, normative and anticipatory perspectives can advance the relevance of ESD in future SDG learning. The approach will be tested further in online teaching on Agenda 2030 and scaled up into an online training module on the SDGs for teachers at Lund University. There are potential plan to develop the structure into an online MOOC with Corsera. The leadership module will be developed further for online activities and for future courses and teaching at Lund University. There will be a honed in focus on the systems, complexity and anticipatory elements of the module. The training will hopefully continue with a future scaled up programme across Africa. There is huge potential in the wake of Covid-19 to develop the programme and use the same model to develop learning on the interlinkages between health and climate change, and sanitation questions to build resilience and dynamic among vulnerability communities coping and recovering from multiple global crises.
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9. Appendix