E-LEARNING: MODULE 1 OUTLINE AND CONTENT

THE STRUCTURE OF THE BLENDED LEARNING PROGRAMME ON MAINSTREAMING BIODIVERSITY ACROSS AGRICULTURAL SECTORS

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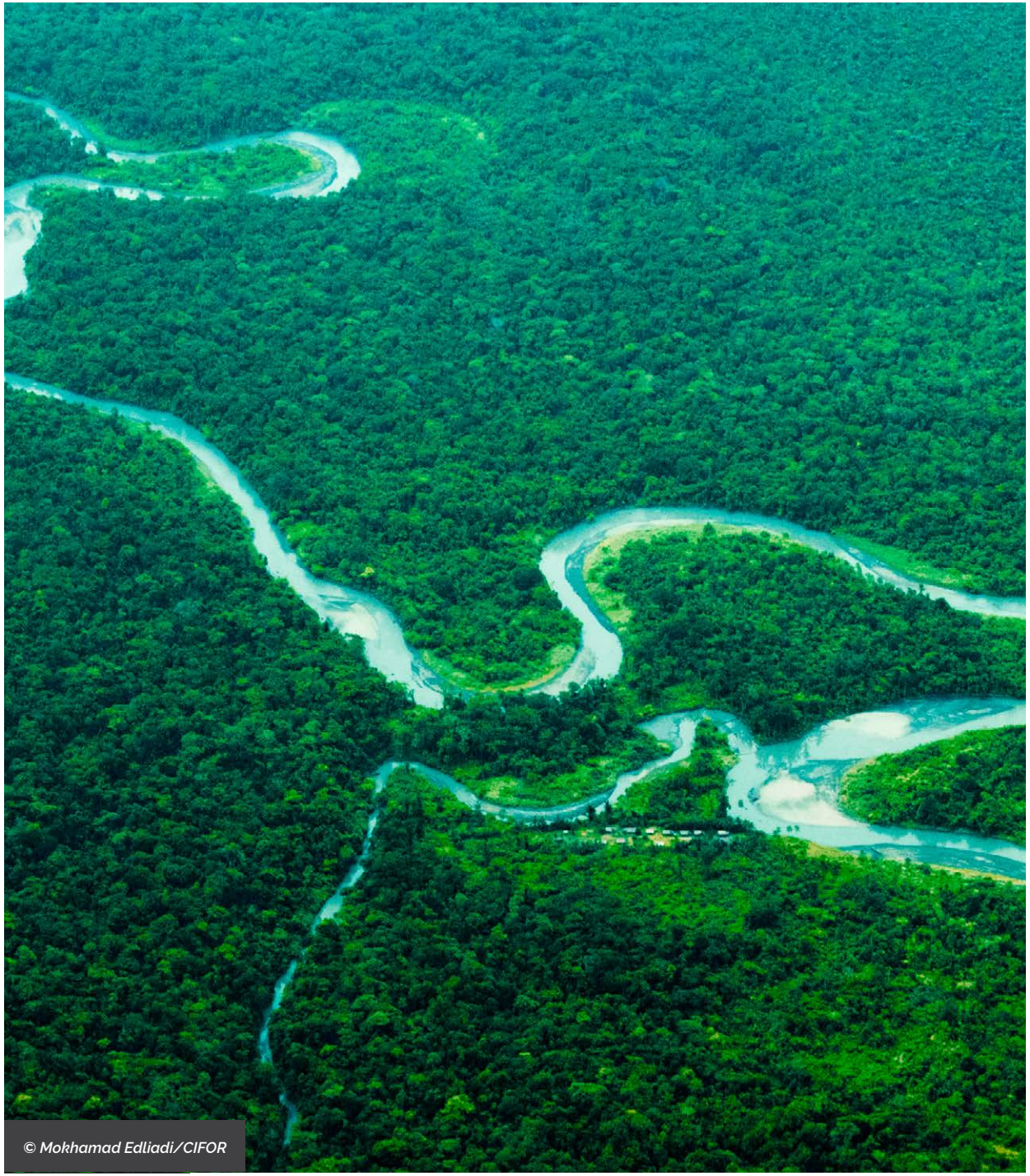
MODULE OUTLINE: AN INTRODUCTION

A module outline describes all the course elements included in your learning content. It includes asynchronous content and synchronous content.

Here you can find a breakdown of the topics, as well as any asynchronous work and reading suggested.

The content of each topic within a learning objective will follow the outline of each learning objective.



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MODULE BLUEPRINT

KEY QUESTIONS:

- How are agriculture, biodiversity and livelihood inter-dependent with larger landscape processes and functions?
- What are the major drivers of biodiversity loss, and how can agriculture reverse those negative trends?
- How do global frameworks integrate biodiversity-friendly agricultural commitments?

BIODIVERSE AGRICULTURE IN LANDSCAPES

Learning Objective Title	Learning Objective	Key Topics
Connecting biodiversity and agriculture	**LO 1.1:** Adopt a systemic lens to understand the deeply interdependent role of biodiversity, agriculture and livelihoods in landscapes.	**1.1.1:** Systemic thinking and the landscape approach (processes and functions) for agriculture.
Challenges and opportunities for sustainable food and agriculture	**LO 1.2:** Holistically understand the challenges and opportunities of agriculture and biodiversity.	**1.2.1:** Drivers of biodiversity loss in agriculture. **1.2.2:** Pathways to sustainable food and agriculture.
Agriculture and biodiversity in global policy arenas	**LO 1.3:** Evaluate the importance of the global policy arena and integrate the changing position of global priorities towards food production and biodiversity.	**1.3.1:** International positions of agriculture. **1.3.2:** From agriculture as a driver of biodiversity loss to a partner and creator of value. • Goals of the CBD's Post-2020 GBF, and understanding global conventions: FA-BFA, UNFCCC, CBD, UNCCD, SDGs & key policy concepts and terminology between different frameworks

LEARNING OBJECTIVE 1 - TOPIC 1

CONNECTING BIODIVERSITY AND AGRICULTURE

1.1: Adopt a systemic lens to understand the deeply interdependent role of biodiversity, agriculture and livelihoods in landscapes.

1.1.1: Systemic thinking and the landscape approach (processes and functions) for agriculture.

SYNCHRONOUS CONTENT

TOPIC BREAKDOWN:

1. System Relationships: Biodiversity and Agriculture
2. Landscape Approaches and Biodiversity
3. Understanding the Landscape Approach
4. 10 Landscape Principles
5. Landscape Processes and Function
6. Ecosystem Approaches
7. Biodiversity and Agriculture
8. Landscape Mapping for Biodiversity

ASYNCHRONOUS CONTENT

VIDEOS:

- Pre-Session: The Landscape Approach: A Case Study

ASYNCHRONOUS READING:

- The social-ecological system concept
- Integrating Social Science into the Long-Term Ecological Research (LTER) Network: Social Dimensions of Ecological Change and Ecological Dimensions of Social Change
- Ten principles for a landscape approach to reconciling agriculture, conservation, and other competing land uses.
- Making the post-2020 global biodiversity framework a successful tool for building biodiverse, inclusive, resilient and safe food systems for all

IMAGES:

- Ocean Multi-Use Action Plan (from MUSES)
- Tools of a system thinker (from Posthumus et al., 2021: pg. 12)

ASSIGNMENT

Assignment that starts in group work (synchronous) - complete the landscape mapping exercise, and begin thinking about agriculture as a driver of biodiversity loss within your landscape (for following session).

1.1: Adopt a systemic lens to understand the deeply interdependent role of biodiversity, agriculture and livelihoods in landscapes.

1.1.1: Systemic thinking and the landscape approach (processes and functions) for agriculture.

System Relationships: Biodiversity and Agriculture - (TEEB, 2018)

- Landscapes are complex and interconnected systems, and when discussing the relationships between and within systems like a landscape, one must be ready to anticipate the intended, unintended, and interconnected effects which can be created by any particular intervention, whether anthropogenic, or naturally occurring.
- To this end, there are numerous features to think of when mapping system relationships, with each one offering insight into the interdependencies which exist within landscapes, such as: non-linear relationships, feedback loops, delayed responses, rebound effects, and cumulative effects.
- Non-linear relationships are those where components of a system are not linked in a linear manner, but rather interact dynamically, and are complex and difficult to predict.
- Feedback loops refer to phenomena where an intervention into a system can produce impact elsewhere - so action in one area can produce an effect across temporal and spatial scales. There are two types of loops, positive (amplify change) and negative (counter change)
- Rebound effects are those caused by feedback loops.
- Delayed responses are those where effects can take a much longer time to manifest, such as social and ecological changes - which can sometimes take decades to become apparent. It's important to consider that systems are dynamic, and aspects should not be overlooked based on a lack of instant effect.
- Cumulative effects are situations where multiple small, sometimes insignificant, decisions can accumulate to either desirable or undesirable outcomes.
- Biodiversity, agriculture, and more holistically, landscapes, mustn't be thought of in a linear cause-effect manner or as something that exists within a silo. Instead, they must be considered as a complex network of elements, from ecosystems to human settlements, industrial mining, forestry to cities and beyond. The systems relationships and effects that each aspect has on one another must be considered, so one can better understand biodiversity and agriculture and their interconnections at a larger level.

Landscape Approaches and Biodiversity - (FAO 2020; Borah et al., 2020; Asnar-Sanchez et al., 2019; Reed et al., 2015; TEEB, 2018)

- The first goal of the FAO strategy on mainstreaming biodiversity across agricultural sectors is to "Promote sustainable use and management of biodiversity with special focus on landscape and ecosystem approaches in agricultural sectors" (FAO, 2020)
- "Agricultural production systems should try to limit the negative impacts on biodiversity. Food and agricultural production, in particular, depends on a wide range of ecosystem services derived from the biodiversity present in landscapes/seascapes and ecosystems surrounding production systems." (FAO 2022)
- From an ecological perspective, landscapes can be seen as a mosaic of interacting ecosystems - the greater diversity between the ecosystems the greater the landscape heterogeneity. However, its character is the result of the actions and interactions of natural and/or human factors.

1.1: Adopt a systemic lens to understand the deeply interdependent role of biodiversity, agriculture and livelihoods in landscapes.

1.1.1: Systemic thinking and the landscape approach (processes and functions) for agriculture.

- Biodiversity underpins the functions and services that together form a landscape. These are critical to agriculture, boosting its resilience in the face of pests, diseases and climate change.
- For example, the loss of biodiversity can impact the function of an ecosystem, and threaten human well-being, conversely, the changing land-use patterns leading to deforestation can present a major threat to biodiversity.
- 42% of the world's population depends on agriculture, and agriculture drives the economies of the majority of developing countries.
- Global biodiversity loss is an immense challenge with over one million plant and animal species being threatened by extinction.
- Because landscapes are inherently connected, and each set of interactions within a landscape can drive change, it is important to recognise that biodiversity, and biodiversity loss doesn't prescribe to linear-cause and effect, and instead is composed of and affected by interactions between drivers, ecosystems, and elements across scales and regions.
- For example, agricultural run-off and water pollution upstream can trigger harmful algal blooms, dead zones and fish kills downstream.
- Landscape approaches are an ideal framework to ensure equitable and sustainable land-use, and thus biodiversity conservation not only because they have roots in conservation and landscape ecology, but they identify root causes and focus strongly on reconciling tradeoffs between conservation and development by integrating policy and practice across landscapes.

Understanding the Landscape Approach - (Sayer et al., 2013; Reed et al., 2015; Freeman et al., 2015)

- A landscape approach looks holistically at areas or landscapes and the people that exist within them.
- For the purposes of this course, a "landscape" is described simply as "an area delineated by an actor for a specific set of objectives." This means that a landscape can span numerous ecosystems and even sovereign boundaries.
- Landscape approaches, in their holistic perspective, seek to address the fact that sectoral approaches are no longer viable to address complex, interconnected system-level issues such as biodiversity loss.
- Landscape approaches look for solutions to reconcile conservation and development trade-offs
- Landscape approaches provide social-ecological system frameworks that can be applied to complex situations to align the interests of people that exist within a landscape and the conservation of these landscapes.

10 Landscape Principles - (Sayer et al., 2013)

- Landscape approaches are based on a number of principles based on resilience, rights, responsibility, and landscape governance. These have been developed based on an intergovernmental and inter-institutional process and are as follows:

1.1: Adopt a systemic lens to understand the deeply interdependent role of biodiversity, agriculture and livelihoods in landscapes.

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Landscape Processes & Functions - (Sayer et al., 2013; Reed et al., 2021a; Reed et al., 2015; Kremsa, 2021).

- Landscape processes are dynamic, and landscape approaches place focus on process-oriented activities rather than project-oriented activities..
- Landscape approaches adopt a systems approach, which means they can prioritize processes rather than simply viewing landscape level interventions as a success or a failure.
- This means change must happen at all levels, and involve all stakeholders in an iterative process rather than focussing on a top-down solution.
- Landscapes are multifunctional, and each function holds different values for their different stakeholders.
- Landscape approaches recognise that the provision of value, goods, and services from within a landscape comes with certain trade-offs, and is geared to address them using ecosystem-forward thinking.
- Here, it should be noted that knowledge of the ecological dimensions inherent within landscape management is essential in order to develop appropriate, evidence-based governance responses that better balance often-competing economic priorities while mitigating environmental degradation.
- It is also important to understand the ecological characteristics of landscapes, ranging from the relationship among the different ecosystems, the interactions between the elements and those present within, and how these interactions drive change.
- Because a landscape approach embraces a broader spatial and disciplinary focus that better considers real-world complexity across a wider range of sectors and stakeholders, system threats, thresholds and feedback can be better understood.

1. Continuous Learning and Adaptive Management,
2. Common concern entry point,
3. Multiple scales,
4. Multifunctionality,
5. Multiple stakeholders,
6. Negotiated and transparent change logic,
7. Clarification of rights and responsibilities,
8. Participatory and user-friendly monitoring,
9. Resilience, and
10. Strengthened Stakeholder capacity.

Ecosystem Approaches - (FAO, 2022)

- The ecosystem approach is “a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way, reaching a balance between conservation; sustainable use; and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.”
- Ecosystem approaches do not see nature as a collection of resources to be manipulated and harvested by humans at will. Instead, nature is treated as a complex system requiring responsible stewardship of biological diversity to ensure its sustainability for future generations.

Introduction

1.1.1 Content

Learning Objective 2

Learning Objective 3

- As such, ecosystem approaches offer a more holistic perspective, emphasizing a movement away from single-area land protection toward integrated land-use planning.
- More specific approaches have been developed for individual sectors of food and agriculture, notably for fisheries and aquaculture.
    - The ecosystem approach to fisheries can be defined as one which "strives to balance diverse societal objectives by taking into account the knowledge and uncertainties about biotic, abiotic, and human components of ecosystems and their interactions." Using this as a foundation, applying an integrated approach to fisheries within ecologically meaningful boundaries.
    - So fisheries should be planned, developed, and managed in a manner that addresses the multiple needs and desires of societies without jeopardizing the options for future generations to benefit from the full range of goods and services provided by marine ecosystems.
- Ecosystem approaches to aquaculture are defined as "a strategy for the integration of the activity within the wider ecosystem such that it promotes sustainable development, equity, and resilience of interlinked social-ecological systems." As such, ecosystem approaches to aquaculture aim to overcome the sectoral and intergovernmental fragmentation of resources management efforts and instead develop institutional mechanisms for effective coordination among various sectors and between the various levels of government, leading to an environmentally, economically, and socially sustainable aquaculture sector, and a change in the public's attitude and perception of aquaculture.

Biodiversity and Agriculture - (FAO, 2017; FAO, 2019; Gassner et al., 2021; Gassner et al., 2020)

- For the purposes of this course, the term "agriculture" will be defined as: "the cultivation and breeding of animals, plants, and fungi for food, fiber, biofuel, medicinal plants, and other products used to sustain and enhance human life. Here, the term "agriculture" includes crop and livestock production, forestry, fisheries and aquaculture
- Biodiversity can contribute to agriculture in numerous ways, aside from domesticated crops and the like, there are a number of species which contribute vital services to food production.
- The CBD, which has traditionally seen agriculture as a major threat to biodiversity, must understand that agricultural systems must not be discarded, but instead harnessed as a tool for biodiversity conservation.
- Diversified food and agricultural production systems have huge potential to improve on the outcomes of industrial agriculture.

1.1: Adopt a systemic lens to understand the deeply interdependent role of biodiversity, agriculture and livelihoods in landscapes.

1.1.1: Systemic thinking and the landscape approach (processes and functions) for agriculture.

Landscape Mapping for Biodiversity - (Brouwer & Brouwer, 2017)

- Landscape Mapping is a way to illustrate the main elements, relationships, and processes that exist within a landscape. This includes:
  - the stakeholders which exist within the landscape,
  - social, ecological, economic, and political activities
  - key landscape businesses
  - key landscape features,
  - and more…
- The easiest way to carry this out is to graphically represent these elements using pictures, symbols, icons, and text.
- By carrying out a landscape mapping exercise, you are able to understand different perspectives, and the complexity of issues that exist within your landscape, thus building a "rich picture" through a holistic view.
- This process will not only allow you to grasp existing processes, but eventually help you to determine the elements which can/cannot play a role in driving a more circular regenerative model.

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LEARNING OBJECTIVE 2 - TOPIC 1

CHALLENGES AND OPPORTUNITIES FOR SUSTAINABLE FOOD AND AGRICULTURE

1.2: Holistically understand the challenges and opportunities of agriculture and biodiversity.

1.2.1: Drivers of biodiversity loss.

SYNCHRONOUS CONTENT

TOPIC BREAKDOWN:

1. Biodiversity Loss Across Scales
2. Agriculture as a Driver of Biodiversity Loss
3. Agriculture as a Cause and Victim
4. Climate Change, Agriculture, and Biodiversity Loss
5. Land-Use Change, Agriculture, and Biodiversity Loss
6. Biodiversity Loss, Livelihoods, and Adaptation
7. Socio-Politics of Biodiversity

ASYNCHRONOUS CONTENT

VIDEOS:

- Pre-Session: Why is Biodiversity so Important
- Pre-Session: Can we create the "perfect" farm - Brent Loken
- Synchronous: Untangled Biodiversity Loss

ASYNCHRONOUS READING:

- Measuring what matters in agriculture and food systems
- Food system impacts on biodiversity loss: Three levers for food system transformation in support of nature
- Biodiversity and Climate Change: Making use of the findings of the IPCC's Fifth Assessment Report
- Beyond Carbon: Covering Food Systems, Climate, And Greenwashing At Cop27
- Our food system isn't ready for the climate crisis
- Let's put an end to the 'feed the world narrative'
- Human food vs. animal feed debate. A thorough analysis of environmental footprints

IMAGES:

- Living Planet Indices for each IPBES Region (from WWF: pg.12)
- Global Land Footprint (from Chatham House: pg.8)
- The 'cheaper food' paradigm (from Chatham House: pg.14)
- Food system impacts on biodiversity (from Chatham House: pg.16)
- Mapping food system interactions (from TEEB: pg39)
- Categories of ecosystems and their importance for agriculture (from Pimbert: pg.14)
- Definition of Landscape Structure (from Lecoq et al., 2021: pg.2)

Biodiversity Loss across Scales - (WWF, 2022; IPBES, 2019; Westveer et al., 2022)

- "Data gathered from almost 32,000 populations of 5,230 species across the planet leaves no doubt that the UN Decade on Biodiversity, meant to implement broad-based action to transform society's relationship with nature, has fallen far short of what is needed." (WWF, 2022)
- There are numerous drivers of biodiversity loss, both direct and indirect, including not only degradation of land, climate change, increasing demands for food, rapid economic growth, and invasive alien species.
- IPBES notes that drivers of biodiversity loss can be split into planetary and human drivers - including not only climate change, but also the lack of value given to nature, and people's disconnect with nature.
- At a global scale, the Biodiversity Intactness Index stands at 77%, showing that ecosystems will function less reliably, while the global Living Planet Index, which shows the state of biodiversity, indicates that there has been a 69% decline in the relative abundance of global animal populations since 1970.
- The Living Planet index for other IPBES regions can be seen in the image.

Agriculture as a Driver of Biodiversity Loss - (Benton et al. 2021; IPBES, 2019; FAO 2017; Pimbert, 2009; IPES-Food, 2016; WHO and CBD, 2015; FAO, 2022b; FAO, 2018)

- "Today's food and agricultural systems have succeeded in supplying large volumes of food to global markets. However, high-external input, resource-intensive agricultural systems have cause massive deforestation, water scarcities, biodiversity loss, soil depletion and high levels of greenhouse gas emissions. Despite significant progress in recent times, hunger and extreme poverty persist as critical global challenges. Even where poverty has been reduced, pervasive inequalities remain, hindering poverty eradication." (FAO, 2018)
- Though the vast majority of today's prevailing and popular agricultural practices are vastly successful in supplying large volumes of food to cater to ever growing global markets, they also generate numerous negative effects across scales.
- Agriculture drives biodiversity loss through:
    - land-use conversion through the expansion of field into natural habitat, with the subsequent loss of natural habitat
    - pollution
    - environmental degradation, erosion, compaction and loss of ecosystem services
    - intensification within agriculture, with the subsequent loss of agrobiodiversity and genetic variety
- These problems are by and large linked to "industrial agriculture" - which IPES terms as "the input-intensive crop monocultures and industrial-scale feedlots that now dominate farming landscapes."
- The continuous reliance on such systems are defined by numerous global 'lock-ins' from short term thinking to "feed the world narratives."
- The global food system is the primary driver of the loss of biodiversity, with the conversion of natural ecosystems for crop production or pasture the principal cause of habitat loss.
- Current agriculture depends heavily on inputs such as fertilizer, and on unsustainable practices such as monoculture.
- As a major contributor to global GHG emissions, agricultural systems are also driving climate change.
- Loss of habitat at such scales also causes the dispersal of species to new locations, further driving competition, and also creates new ecosystem dynamics, which can sometimes cause things like emergence of infectious disease.

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Learning Objective 1

1.2.1 Content

Learning Objective 3

- Agriculture itself accounts for 70% of water withdrawals worldwide, and the use of agrochemicals, drug residues, and organic matter which drain into the water bodies further cause water pollution.
    - "It was found that eutrophication occurs in approximately 54% of Asia-Pacific, 53% of European, 48% of North American, 41% of South American, and 28% of African lakes."
- Food production from wild fisheries has been affected by habitat degradation, overexploitation and pollution to a point where most of these resources are not sustainable without external interventions designed to enhance the abundance of fish stocks.
    - The fraction of fishery stocks within biologically sustainable levels decreased to 64.6 percent in 2019, 1.2 percent lower than in 2017.
    - It's worth remembering that many ecosystems are affected by cumulative impacts. Though changes may not be individually catastrophic, the combined effect of pressures can result in loss or fragmentation of habitats. Furthermore, it can result in ecosystem changes and shifts in biodiversity, associated with the removal of habitat-specific or functional important species.
- Fishing down the food web does not only affect target fish species. The increasing effort needed by the industrialized fisheries to catch something of commercial value often means that dolphins and other marine mammals, sharks, sea birds, non-commercially viable fish species and marine biodiversity are overexploited, killed as bycatch and discarded.
- Aquaculture can have severe negative impacts to local ecosystems through habitat conversion (clearing mangrove forest for prawn fisheries), genetic contamination from farmed to wild populations and environmental pollution from farms. In addition, some fish farming species are driving further overfishing of natural fish stocks.

Agriculture as Cause and Victim - (FAO, 2019)

- Bring back systems thinking, and remember that agriculture is not only a driver of biodiversity loss, but also a victim of.
- Agriculture systems depend on biodiversity, and species that support food systems, and sustain the people who provide our food are disappearing.
- In acting as a driver of biodiversity loss, consider the positive feedback loop that agricultural systems can face, and the rebound effect that the biodiversity loss it drives, may have.

Climate Change, Agriculture, and Biodiversity Loss - (CBD, 2022; Secretariat of the Convention on Biological Diversity, 2009; IPCC, 2022; Benton et al., 2021; IDDRI, 2019)

- Almost 15 years have passed since a synthesis of knowledge was published on the global state of biodiversity, namely the Millennium Ecosystem Assessment in 2005. Global biodiversity governance is reaching the end of two decades of very ambitious commitments to preserve biodiversity, taken at the level of the Convention on Biological Diversity (CBD). The IPBES report underlines once again that global trends remain alarming, while some are deteriorating.
- The Global Assessment shows that biodiversity collapse on the continents is primarily due to land use changes related to agriculture, particularly linked to the increased consumption of animal products. Regarding oceans, pressure from fisheries is the main cause of the decline.
- Ongoing biodiversity loss has many causes, including pollution, urbanization (which today accounts for a land area of 3% at most, but is expected to triple by 2030, see Chapter 2, 2.1.4.3), resource overexploitation (illegal in particular), climate change, and the influx of invasive alien species. But most analyses show that the main cause is land use change, which tops the list in all regions and habitats.

- Land use change refers either to the changing way that land and natural resources are used (for example, an intensive crop replacing a humid grassland, a planted forest replacing a primary forest), and/or the replacement of natural habitat with a radically different habitat (e.g. replacing a forest with cropland). Today, more than half of land is heavily modified in this way. The Global Assessment shows clearly that agriculture, which has grown considerably in terms of area and intensification, and is continuing to grow, is the main sector driving these changes.
- Though biodiversity has long been noted to adapt to the changing climates which occurred over extended periods of time in the past, anthropogenic climate change has drastically changed the situation.
- Habitat fragmentation, causing many species to be confined to small areas has resulted in reduced genetic variability, and rapid global climatic change places increased stress on ecosystems and their biodiversity.
- According to the Millennium Ecosystem Assessment, climate change is likely to become one of the most significant drivers of biodiversity loss by the end of the century. Climate change is already forcing biodiversity to adapt either through shifting habitat, changing life cycles, or the development of new physical traits.
- Ecosystems not only play a key role in the global carbon cycle, but biodiversity can help support efforts to reduce the negative effects of climate change.
- Global agriculture also contributes to climate change. It is estimated to account for about one-third of total anthropogenic emissions of greenhouse gasses.
    - Synthetic fertilizers: production and use of synthetic Nitrogen fertilizer causes widespread harm. They require high energy inputs and large amounts of fossil fuels to make and cause a cascade of harms to ecosystems (killing vital soil microorganisms, impacting animal/insect species, polluting waterways, toxicity to humans). They also drive most Nitrous Oxide emissions (a GHG 273 times more potent than CO_2 over a 20 year timescale), over 50% of U.S. agricultural emissions are from Nitrous Oxide.
    - Methane: Large-scale conventional agriculture (primarily livestock and rice monocrops) drives 37% of all anthropogenic methane emissions.
- Because of the vast amount of land used for food production, climate change can have a great impact on agricultural biodiversity.
- It is vital to conserve and adopt biodiversity-friendly practices, not only because agricultural soils have potential to mitigate climate change through carbon sequestration, but also because over 30% of the world's crop production depends on pollinators.

Land-Use Change, Agriculture, and Biodiversity Loss - (Lecoq et al., 2021; Benton et al., 2021; FAO, 2022a)

- The Global Assessment shows that biodiversity collapse on the continents is primarily due to land use changes related to agriculture, particularly linked to the increased consumption of animal products. Regarding oceans, pressure from fisheries is the main cause of the decline. This suggests the adoption of commitments relating to food and agricultural systems.
- Agriculture accounts for approximately 80% of land-use change globally.
- This includes the conversion of land for crop production, grazing, etc.
- 42 million hectares of tropical forest in Latin America has been lost between 1980 and 2000 due to cattle ranching.
- Cropland expansion, grazing, and urban development have been identified as the main driver of deforestation.
- "Land-use change from natural to managed habitats always creates a cost to biodiversity because crops or farmed animals dominate the space and use up resources, leaving less of both for wildlife."
- Agricultural intensification not only results in habitat loss and fragmentation but in the simplification of land-use at the landscape level, reducing

Introduction

Learning Objective 1

1.2.1 Content

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compositional heterogeneity (habitat diversity) and/or configurational heterogeneity (complexity of the spatial pattern).

- Increased agricultural intensification has also caused ecological and social outcomes, with increased cattle and chicken density, and increased water withdrawals and pesticide use.
- Since the ratification of the Convention on Biological Diversity in 1992, more than a quarter of the tropical forests that were standing then have been cut; many experts predict that there will be no substantial stands of tropical forest remaining by the end of this century.
- Beyond our efforts to preserve natural areas, to restore them, and to design ways to combine them with agriculture sustainably, we will need to deploy additional strategies to achieve the greatest amount of biodiversity conservation possible.

Biodiversity Loss, Livelihoods and Adaptation - (Pimbert, 2009; WHO and CBD, 2015; Kotschi, 2007)

- The majority of local food systems are located geographically within complex, risk-prone, and diverse environments, where many of the world's rural poor live.
- These areas and its people are also the most vulnerable to the effects of human-induced climate change; rise in temperature, extreme weather events and changes in water supply. Climate change reduces the biodiversity in agricultural landscapes - while agrobiodiversity is crucial for communities of producers to cope and adapt to a changing climate. It is becoming increasingly clear that genetic resources in agriculture are vital for adaptation.
- These environments are home to a vast array of different ecosystems, from undisturbed semi-natural forests, to food-producing landscapes, to ecosystems modified entirely to be managed by humans.
- Numerous dynamic and complex livelihoods associated with such ecosystems, and their reliant agricultural systems, rely on plant and animal biodiversity.
- It is estimated that across history, approximately 7000 plant species have been used by humans at one time or another, and further, approximately 82 crop species provide 90% of the energy currently consumed by humans.
- In contrast, only around 40 livestock species in total contribute to today's agriculture and food production and only five species provide 95% of the total.
- In terms of aquaculture, it has been estimated that over 230 species of finfish, molluscs and crustaceans are utilized but 31 species are responsible for 95% of production
- Fish, especially small indigenous species such as hilsa and mola, are an irreplaceable rich source of food in the diets of millions. They contain essential, highly bioavailable nutrients, including high-quality protein, essential fatty acids and micronutrients.
- Moreover, it is widely accepted that water purification services provided by biodiverse ecosystems underpin water quality, which is a universal requirement for maintaining human health.
- Biodiversity is a key source of food diversity and provides a natural richness of nutrients (both in the form of macronutrients such as carbohydrates, and micronutrients such as vitamins)] and bioactive non-nutrients for healthy human diets.

1.2: Holistically understand the challenges and opportunities of agriculture and biodiversity.

1.2.1: Drivers of biodiversity loss.

Socio-Politics of Biodiversity - (FAO, 2019; Bullock et al., 2008)

- Social, Economic, Political, and Cultural aspects have a huge role to play in biodiversity loss and biodiversity conservation.
- Cultural changes associated with issues such as urbanization and out-migration are also deeply linked to changing agriculture practices, and in turn to biodiversity.
- Biodiversity related policy, and social behaviour change must be encouraged which can drive an increase in its value, not only economically, but also as a service across sectors.
- By considering biodiversity loss through a landscape lens, it becomes easy to understand how intrinsically connected it is with all processes and functions that exist within a landscape - making it intrinsically linked not only to food production, but also to social, economic, and political spheres that make up our way of life.

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LEARNING OBJECTIVE 2 - TOPIC 2

CHALLENGES AND OPPORTUNITIES FOR SUSTAINABLE FOOD AND AGRICULTURE

1.2: Holistically understand the challenges and opportunities of agriculture and biodiversity.

1.2.2: Pathways to sustainable food and agriculture.

SYNCHRONOUS CONTENT

TOPIC BREAKDOWN:

1. Sustainable Agriculture
2. Diversified Agricultural Landscape
3. Synergies in Agriculture and Biodiversity
4. Food Sovereignty
5. Restructuring Global Agriculture
6. Linear Value Extraction to Circular Value Regeneration
7. Issues with Circularity
8. New Approaches to Global Agriculture

ASYNCHRONOUS CONTENT

ASYNCHRONOUS READING:

- Agroecological principles and elements and their implications for transitioning to sustainable food systems: a review
- Valuing nature's contributions to people: the IPBES approach
- Circularity is not Sustainability
- Big Farms Don't Feed the World
- Food sovereignty
- Why We Can't Achieve Sustainability Without Addressing Power
- Regenerative Agriculture: An agronomic perspective
- Smoke & Mirror: Examining competing framings of food system sustainability

IMAGES:

- Different Starting Points (from IPES: pg. 12)
- Virtuous Circles Of Ecosystem Health In Diversified Agroecological Systems (from IPES: pg. 36)
- Power Imbalances in Food Systems (from IPES: pg. 59)
- Virtuous Circles for Agroecological Systems (from IPES: pg. 75)
- Relationships between Agroecological elements (from FAO: pg. 12)
- The Butterfly Circular Economy Systems Diagram (from Ellen MacArthur Foundation)
- The food and agriculture sector makes the greatest contribution to biodiversity recovery (from SITRA: pg. 7)

ASSIGNMENT

Update landscape mapping, begin to think of areas where industrial agriculture still exists, how it is driving the biodiversity loss in your landscape, and how agricultural zones can best be transformed into diversified and integrated agroecological systems.

Sustainable Agriculture - (FAO 1988; FAO 2017; FAO 2016; CBD, 2022)

- FAO defines sustainable agriculture as "the management and conservation of the natural resource base, and the orientation of technological change in such a manner as to ensure the attainment of continued satisfaction of human needs for present and future generations. Sustainable agriculture conserves land, water, and plant and animal genetic resources, and is environmentally non-degrading, technically appropriate, economically viable and socially acceptable.
- There are five elements of sustainability in food and agriculture:
    - Improving efficiency in the use of resources;
    - Conserving, protecting and enhancing natural ecosystems;
    - Protecting and improving rural livelihoods, equity and social well-being;
    - Enhancing the resilience of people, communities and ecosystems;
    - Promoting responsible and effective governance mechanisms across natural and human systems
- Transitioning to sustainable agriculture should recognize the role of biodiversity, including pollinators, pest and disease control organisms, soil biodiversity and genetic diversity, as well as diversity in the landscape, for productive and resilient agriculture that makes efficient use of land, water and other resources.

Diversified Agricultural Landscapes - (European Union, 2012; IPES-Food, 2016)

- As we learned in the previous session: though the vast majority of today's prevailing and popular agricultural practices are vastly successful in supplying large volumes of food to cater to ever growing global markets, they also generate numerous negative effects across scales.
- These issues are by and large linked to "industrial agriculture" - which IPES terms as "the input-intensive crop monocultures and industrial-scale feedlots that now dominate farming landscapes."
- What is required is a diversification of agricultural landscapes, ones which serve many purposes, but especially act as a holistic strategy to:
    - Ensure food system resilience,
    - Reduce waste,
    - Promote sustainable land use,
    - Optimize biodiversity,
    - Promote healthy agro-ecosystems, and
    - Secure livelihoods and food sovereignty.

Synergies in Agriculture and Biodiversity - (Gassner and Dobie, 2022; FAO, 2020)

- In agricultural policy, 'sustainability' implies more efficient production, resulting in higher yields with less use of land, water and fertilizer. However, such policies often do not recognise the sustained productivity of land.
- As discussed in the section about Agriculture as a Cause and Victim, agricultural systems depend on biodiversity, and the interaction of various plants, animals and other organisms that form a complex web of biological activity and services in the agroecosystem; driving its sustainable functioning.

Introduction

Learning Objective 1

1.2.2 Content

Learning Objective 3

- The second goal of the FAO strategy on mainstreaming biodiversity across agricultural sectors is to conserve, enhance and restore biodiversity and ensure the continued provision of ecosystem services
- "Biodiversity conservation is a critical means to ensure future productive use and the resilience of production systems. Biodiversity needs to be restored where ecosystems have lost their functionality and ability to provide services due to unsustainable practices. The continued provision of ecosystem services will require the agricultural sectors to curb activities affecting biodiversity." (FAO, 2020)
- The way we use and work agricultural land matters, both for the sustainability of food production and for its contribution to biodiversity conservation at the landscape scale.
- There are numerous examples of practices and techniques that are friendly to biodiversity and in-turn, beneficial to agriculture.
- For example, reducing the disturbance of the soil during cultivation benefits the structure and health of the soil while also conserving organisms that benefit crops.
    - Soil organisms play a key role in recycling nutrients, regulating carbon sequestration and greenhouse gas emissions, modifying soil structure and water flow, and keeping plants healthy.
- Diversifying crops contributes to biodiversity conservation by creating niches for different animals and plants.
    - Adding trees enhances this effect even more, because they help reduce soil erosion and maintain the water cycle and can also supplement farm families' income.
- Farmers can also enhance biodiversity by leaving uncultivated strips between crops and riverbanks or other natural areas, and by planting border hedgerows.

Food Sovereignty - (FAO, 2013; Patel, 2009; Pimbert, 2009; Sampson et al., 2021; IPES-Food, 2016; Nyéléni, 2007; La Via Campesina, 2006)

- Having introduced not only the concept of diversified and integrated agroecosystems, as well as how they complement synergies in agriculture and biodiversity, it is important not to forget that unlike when driven by industrial agriculture, food must primarily be made for people, not for profit.
- The concept of food sovereignty starts precisely by noting the asymmetry of power in the various markets involved and the various areas of power, such as in multilateral trade negotiations. It means access to food, and also access to land, water, genetic resources, as well as the people's rights to know and decide food policies which impact them.
- Six pillars of food sovereignty were outlined at the Nyéléni Forum for Food Sovereignty in 2007. They are as follows:
    - **Focuses on food for the people**: By placing people's need for food at the center of policies and insisting that food is not a commodity.
    - **Value food providers**: By supporting sustainable livelihoods and respecting the work of all food providers.
    - **Localise Food Systems**: By reducing the distance between suppliers and consumers, rejecting dumping and inappropriate food aid, and resisting dependance on remote and unaccountable cooperations.
    - **Places control at a local level:** By placing control in the hands of local food suppliers, recognising the need to inhabit and share territories, and rejecting privatization of natural resources.
    - **Promoting knowledge and skills**: By building on traditional knowledge, using research to support and pass on this knowledge, and rejecting technologies that undermine local food systems.
    - **Works with nature**: By maximizing the contributions of ecosystems, improving resilience, and rejecting energy intensive, monocultural, industrialized, and destructive production methods.

- Till date, the common perception has followed the logic that increasing agricultural production is the solution to ending global hunger and ensuring food sovereignty.
- Though this may be the case, progress has been highly uneven across regions of the world, and more recently, especially through the COVID-19 pandemic, reductions in global malnutrition have slowed, and progress towards ending hunger on a global scale has stopped, with the number of people today suffering from hunger and malnutrition increasing.
- It should be considered that by focussing only on agricultural production, the rights-based approaches that are ingrained in the discussion are discounted, because famine may not necessarily be caused by a lack of food, but by a lack of social, economic, and political means to acquire sufficient food.
- Though one key outcome of industrialized agriculture is high yield, there are numerous ways that it does indeed contribute to this problem, not least through export orientation, large-scale income oriented farming which is unviable for small-scale farmers, and a steady reduction in farm employment in favour of other labour-saving technologies (many of whom do not find decent alternative employment outside the agriculture sector, exacerbating their economic situation).
- Diversified and integrated agroecological systems however are crucial for livelihood resilience. Not only do diversified systems help reduce risks that come with variable yields and seasonal advantages, they also offer strategies such as crop diversification, which have been proven to be effective in areas prone to natural disasters and extreme weather events.
- "It is the reintegration of agriculture with healthy ecosystems and sustainable land management that holds the key to a range of other positive outcomes, from strong and stable outputs to secure farm livelihoods."
- "A growing body of evidence is demonstrating the capacity of these systems to intensify production (e.g. in densely inter-cropped farming systems) in ways that nurture, rather than degrade, ecosystems. There is also extensive evidence regarding the capacity of diversified systems to deliver resilience in the face of environmental stresses."

Restructuring Global Agriculture - (TEEB, 2018; A Growing Culture, 2021; 2020; Payne and Becheva, 2017)

- The path to a food secure world however rests not only in agroecosystems that are in practice diversified and integrated, but in a restructuring of agri-food systems and value chains to invest in these practices.
- Common assessment metrics, such as yield per hectare, ignore a wide and significant range of social, human, and environmental costs and benefits of eco-agri-food systems.
- To truly restructure the global agricultural systems, we must understand that because of the inherently unjust nature of our food systems, industrial agriculture and the associated drive to increase yield and production will not solve the world's hunger problem.
- Instead, we must address agricultural and food systems holistically, and focus on redistributing power out of the hands of the few corporations who have monopolized the global food trade.
- The existing structures of power are driven by economic gain, and in pursuit of profit, runs on a system which disconnects consumers from producers, and in doing so, undermines the livelihoods of farmers and producers.
- By shifting the seats of power back to farmworkers, we ensure not only that we value our food providers and localize control of food systems, but also that we shape a system which is free of exploitation of those who grow the food that feeds us.

Linear Value Extraction to Circular Value Regeneration - (United Nations Environment Programme, 2021a; 2021b; World Economic Forum, 2014; Ellen MacArthur Foundation, 2021; Wageningen University & Research, 2018; SITRA, 2022)

- Another aspect to this is circularity. Today, global systems driven in part by the need to sustain rapidly growing populations and rising living standards, operate very much on an environmentally unsustainable "take, make, waste" approach. Whereas these approaches see resource extraction rapidly rising, and in turn drive air, water, and plastic pollution - circularity is:
    - A system that is restorative and regenerative by design.
    - A system where there is reduced use of raw materials, and instead, the reuse, repair, redesign, remanufacturing, and recycling of resources.
- Circular value regenerative models have no waste - as every material, biological or technical is designed to be reused or recycled.
- There are numerous sources of value creation from within a circular system.
- Circular models offer complete systems level approaches to producing food, and ensure that food production processes are regenerative.
- By "closing the loop" of materials and substances, consumption of raw materials, and related emissions can be reduced.
- "A shift to a circular economy minimises pollution and food loss and waste across the supply chain, increases the efficiency of production to reduce input requirements, particularly for proteins, sparing more land for natural ecosystems, and uses regenerative agriculture to reduce agriculture's impact to reverse biodiversity loss in and around cultivated areas, through a selective application of no-till methods, crop rotation and polyculture, biochar, precision agriculture, and organic and agroecology principles." (SITRA: pg.46)

Issues with Circularity - (Giampetro, 2022; Kopnina, 2022; Bosschaert, 2022)

- Recycling efficiencies of waste are variable, and depend heavily on materials being recycled.
- Solutions to tackle packaging and transport are not scalable in a way that promotes economic growth, and are as such not carried through.
- Circularity does not consider the vast other issues that exist within the present agricultural systems ranging from social justice to regeneration of biodiversity which are integral to transformation of systems towards true sustainability.
- "Complex adaptive systems (e.g., living systems and social systems) require a continuous process of energy and material conversions to preserve their identity and express their functions."
- Food and organic materials is not something that can always be shared between species, except in rare occasions.
- Circular systems are often prescribed as a solution that enables continuous production, and in turn encourages further economic growth.
- Circularity demands a holistic transformation of entire food chains, and considerations made regarding waste are not always applicable across species who consume food products.
- Tools and solutions associated with circularity are too often considered within a "vacuum", but is not a holistic solution within itself to transform the nature of systems into sustainability.

1.2: Holistically understand the challenges and opportunities of agriculture and biodiversity.

1.2.2: Rooting agriculture in people and nature - pathways to diverse agroecological systems.

New Approaches to Global Agriculture - (IPES-Food, 2016; FAO, 2019)

- Unfortunately, despite the benefits that aforementioned systems could offer, there are numerous forces that drive the continuous growth of industrial agricultural systems, from the expectation of cheap food, to the demand for short-term success, fuelled by short-term thinking, without consideration of the impact on wider systems.
- There are opportunities to truly embrace new approaches to global agriculture which not only understand the importance of biodiversity, but also embrace the synergistic relationship that biodiversity shares with agriculture.
- Agroecological systems help deliver contextualized solutions to local problems, and aim to combine science with tradition, practical, and local knowledge - thus empowering a holistic and sustainable transformation of the entire existing agricultural system including social and economic elements which are often forgotten.

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LEARNING OBJECTIVE 3 - TOPIC 1

AGRICULTURE AND BIODIVERSITY IN GLOBAL POLICY ARENAS

1.3: Evaluate the importance of the global policy arena and integrate the changing position of global priorities towards agriculture and biodiversity.

1.3.1: International positions of agriculture.

SYNCHRONOUS CONTENT

TOPIC BREAKDOWN:

1. Changing positions of agriculture
2. Agriculture and forestry in sustainability agenda
3. International Treaty on Plant Genetic Resources for Food and Agriculture

ASYNCHRONOUS CONTENT

VIDEOS:

- Pre-Session: Goals of the CBD, The Post-2020 Global Biodiversity Framework

ASYNCHRONOUS READING:

- The operations of the Convention on Biological Diversity
- Cartagena protocol
- Nagoya protocol

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1.3: Evaluate the importance of the global policy arena and integrate the changing position of global priorities towards agriculture and biodiversity.

1.3.1: International positions of agriculture.

Changing positions on functions of agriculture - (Byerlee et al., 2009; Braun & Birner, 2017; FAO, 2022)

- Agriculture as a sector has multiple indirect functions and the importance and emphasis on these functions has changed over time. These include the contributions to poverty alleviation, household food security, the provision of environmental services, out-migration control, buffer in times of economic crisis and national cultural identity.
- This recognition of agriculture's broader roles for development started in the 1970s with the focus on equity and employment, and the growing evidence that productivity growth across millions of smallholders was strongly pro-poor. During the 1990s, the development community explicitly recognized poverty reduction as the major objective of development programs and a burgeoning literature started to demonstrate the links between agriculture and poverty reduction.
- In the early 2000, the agricultural sector also became a major energy provided, through biofuels and wood pellets, following the European Union effort to set regulatory measures to tackle climate change and EU dependency on fossil fuels, via minimum biofuel targets, which allowed the development of a biofuel sector not only in Europe, but also globally.
- Forests are a source of fibre, fuel, food and fodder, and they provide livelihoods for millions of people, including many of the world's poorest. Some 2.4 billion people use wood-based energy for cooking. Forests help mitigate climate change and improve soil, air and water quality. If sustainably managed, forests are also a source of renewable raw materials, making a crucial contribution to building circular economies.
- Extractive forest use was especially challenged in the early 90's when policy makers, scientists and the public became increasingly concerned about tropical deforestation, the conversion of forest to other land uses, and its negative consequences such as climate change, biodiversity loss, reduced timber supply, flooding, siltation, and soil degradation.
- The issue-attention cycle, describes the different stages of public perception of the importance of environmental concerns, such as deforestation, pollution, overfishing or loss of species following a systematic cycle of heightening public interest and increasing boredom with major issues.
    - **Stage 1**: Perception by 'pioneers' (if they are ultimately judged by society to be correct) or 'crackpots' (if they are shown to be wrong) of a particular environmental issue, but no broader awareness either by society at large or by the authorities.
    - **Stage 2**: Lobbying by 'action groups', denial of effects by some groups of stakeholders, and incipient awareness but no action by authorities.
    - **Stage 3**: Widening acceptance of existence of (potential or actual) environmental impacts, with mounting awareness and pressure for action by authorities.
    - **Stage 4**: Debate on evidence of 'cause and effect' and attribution of 'blame'.
    - **Stage 5**: Inventory and assessment of prevention and mitigation options and their environmental, economic,and administrative costs and benefits.
    - Stage 6: Negotiations on prevention or mitigation of impacts.
    - **Stage 7**: Implementation, monitoring, and enforcement of prevention or mitigation actions.
- The course of these events obviously depends on the particulars of culture, society, polity, and economy.

Agriculture and forestry in sustainability agendas

- In 1945 The Food and Agriculture Organization (FAO), a specialized agency of the United Nations was established to lead the international efforts to defeat hunger. The goal was to achieve food security for all and make sure that people have regular access to enough high-quality food to lead active,

Introduction

Learning Objective 1

Learning Objective 2

1.3.1 Content

healthy lives. With 195 members - 194 countries and the European Union, FAO works in over 130 countries worldwide.

- The basic reasoning behind FAO, the linking of agriculture to food and nutrition, was the result of the interwar economic crises and needs to be understood as a response to a specific international constellation. FAO was founded in the middle of the Second World War, a time when the Allied governments were engaging in agricultural as well as nutritional planning, when the rationing of foodstuff was commonplace and the maintenance or growth of agricultural output was paramount. These wartime policies gave the architects of the post-war world order a taste of the potential of international governance. Steeped in the hopes of the Allies, FAO was supposed to bring about nothing less than the alleviation of hunger, the worldwide improvement of nutritional standards through the modernization of agricultural production as well as social and economic development and higher standards of living.
- In 1992 the United Nations Conference on Environment and Development (UNCED), also known as the 'Earth Summit', was held in Rio de Janeiro, Brazil, from 3-14 June 1992. This global conference, held on the occasion of the 20th anniversary of the first Human Environment Conference in Stockholm, Sweden, in 1972, brought together political leaders, diplomats, scientists, representatives of the media and non-governmental organizations (NGOs) from 179 countries for a massive effort to focus on the impact of human socio-economic activities on the environment
- The Rio de Janeiro conference highlighted how different social, economic and environmental factors are interdependent and evolve together, and how success in one sector requires action in other sectors to be sustained over time. The primary objective of the Rio 'Earth Summit' was to produce a broad agenda and a new blueprint for international action on environmental and development issues that would help guide international cooperation and development policy in the twenty-first century.
- The 'Earth Summit' had many great achievements: the Rio Declaration and its 27 universal principles, the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD); and the Declaration on the principles of forest management.
- Agriculture and forestry were to a great extent left out of convention mandates to be handled by existing international agencies, such as the FAO; this led to a focus of the CBD on biodiversity protection versus sustainable use and lack of a broader appreciation for the importance of agricultural biodiversity and a focus on preventing of land-use change rather than sustainable management of agroecosystems.

International Treaty on Plant Genetic Resources for Food and Agriculture

- Established in 2001, The International Treaty is the major international agreement between member countries to conserve, use and manage plant genetic resources for food and agriculture around the world for the benefit of people everywhere. The Treaty ensures that farmers and plant breeders access, easily, the raw genetic material needed to develop new crop varieties, including those with higher yields and those that are resilient to climate change.
- The treaty recognises farmers' rights, subject to national laws to: a) the protection of traditional knowledge relevant to plant genetic resources for food and agriculture; b) the right to equitably participate in sharing benefits arising from the utilization of plant genetic resources for food and agriculture; and c) the right to participate in making decisions, at the national level, on matters related to the conservation and sustainable use of plant genetic resources for food and agriculture. The Treaty establishes the Multilateral System of Access and Benefit-sharing to facilitate plant germplasm exchanges and benefit sharing through Standard Material Transfer Agreement (SMTA).
- It provides a global solution to the challenges of crop diversity loss and climate change adaptation through mechanisms such as the Multilateral System and Benefit-sharing Fund. To date, its Multilateral System on Access and Benefit-sharing covers 64 of the world's major crops, accounting for about 80% of our food derived from plants.

AGRICULTURE AND BIODIVERSITY IN GLOBAL POLICY ARENAS

1.3: Evaluate the importance of the global policy arena and integrate the changing position of global priorities towards agriculture and biodiversity.

1.3.1: International positions of agriculture.

- The genetic resources of our most important food crops – the "life insurance policy" for our food production – are managed and exchanged by member countries and other stakeholders according to the provisions of the International Treaty.
- The International Treaty created and administers a unique global system that enables countries to exchange much-needed plant genetic material with one another through a Multilateral System of Access and Benefit-sharing.
- Crops grown in different environments develop differently and genetic material from food plants in one country can be essential in another country that is trying to increase food production, fight plants pests, diseases and the effects of climate change. This is made possible through the MLS of the International Treaty.
- As of January 2021, the International Treaty has facilitated the transfer of over 5.6 million samples of germplasm through its MLS, rendering it the largest pool and exchange mechanism in the world.
- The information attached to each seed or genetic material is immensely valuable and is made available to Contracting Parties through the International Treaties Global Information System.
- The benefits derived from the world's plant genetic resources are to be shared equitably, to ensure food security for all.

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1.3: Evaluate the importance of the global policy arena and integrate the changing position of global priorities towards agriculture and biodiversity.

1.3.1: International positions of agriculture.

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LEARNING OBJECTIVE 3 - TOPIC 2

AGRICULTURE AND BIODIVERSITY IN GLOBAL POLICY ARENAS

1.3: Evaluate the importance of the global policy arena and integrate the changing position of global priorities towards agriculture and biodiversity.

1.3.2: From agriculture as a driver of biodiversity loss to a partner and a creator of value.

SYNCHRONOUS CONTENT

TOPIC BREAKDOWN:

1. The Decade of biodiversity and the attention to sustainable land-use and agrobiodiversity
2. Opportunities: Diversified and Multi-functional Agriculture
3. The FAO Response: Mainstreaming Biodiversity Across Agricultural Sectors
4. The Post-2020 GBF Response
5. The role of the NBSAPS

ASYNCHRONOUS CONTENT

ASYNCHRONOUS READING:

- Implementing forest landscape restoration under the Bonn Challenge: a systematic approach
- FAO Strategy on Mainstreaming Biodiversity Across Agricultural Sectors
-

- 2021-23 Action Plan for the Implementation of the FAO Strategy on Mainstreaming Biodiversity across Agricultural Sectors
- Mainstreaming Biodiversity in Forestry

ASSIGNMENT

Prepare presentations on your own national commitments, evaluate gaps and alignments with global agricultural, developmental and environmental policies, goals and agendas. Including those from the Food and Agriculture Organization of the United Nations (FAO), the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Biological Diversity (CBD), the United Nations Convention to Combat Desertification (UNCCD), and the Sustainable Development Goals (SDGs).

1.3: Evaluate the importance of the global policy arena and integrate the changing position of global priorities towards agriculture and biodiversity.

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The Decade of biodiversity and the attention to sustainable land-use and agrobiodiversity - (Gassner et al., 2020; Secretariat of the Convention on Biological Diversity, 2020; Willett et al., 2019; IPBES, 2019)

- In 2011 the CBD announced the decade of biodiversity, supported by the Strategic Plan for Biodiversity, 2011-2020, sub-divided into 20 targets, for protecting and conserving natural systems. The plan includes two targets specifically addressing agriculture.
  - **Target 7:** "By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity."
  - **Target 13:** "By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity"
- In 2016 the CBD declared a biodiversity mainstreaming agenda that layed out specific guidance for mainstreaming conservation and sustainable use of biodiversity in the Agriculture, Forestry, Fisheries and Tourism Sectors.
- In 2019 three major global assessments exposed society to the truth that our current agricultural system is threatening both human wellbeing and our societies:
  - The Global Assessment showed that biodiversity collapse on the continents is primarily due to land use changes related to agriculture, particularly linked to the increased consumption of animal products. Regarding oceans, pressure from fisheries is the main cause of the decline.
  - The Lancet report on food in the Anthropocene warned that unhealthy diets pose a greater risk to morbidity and mortality than does unsafe sex, and alcohol, drug, and tobacco use combined. Although global food production of calories has kept pace with population growth, more than 820 million people have insufficient food and many more consume low-quality diets that cause micronutrient deficiencies and contribute to a substantial rise in the incidence of diet-related obesity and diet-related non-communicable diseases, including coronary heart disease, stroke, and diabetes.
  - The special report on Global Warming of 1.5 °C of the Intergovernmental Panel on Climate Change (IPCC 2018) found that agriculture, forestry, and other land uses are responsible for nearly a quarter of all man-made greenhouse gas emissions. But forests are also one of our planet's biggest carbon sinks and can contribute to carbon removal, thus constituting a key piece of the land and climate puzzle.
- In 2020 the global biodiversity outlook reported on the achievements of the strategic plan for biodiversity
  - AT 13: Genetic diversity of cultivated plants, farmed and domesticated animals, and wild relatives, continues to be eroded. The wild relatives of important food crops are poorly represented in ex situ seed banks that help guarantee their conservation, important for future food security. The proportion of livestock breeds that are at risk or extinct is increasing, although at a slower rate than in earlier years, suggesting some progress in preventing the decline of traditional breeds. Wild relatives of farmed birds and mammals are moving closer to extinction. The target has not been achieved
  - AT7: There has been a substantial expansion of efforts to promote sustainable agriculture, forestry and aquaculture over recent years, including through farmer-led agroecological approaches. The use of fertilizers and pesticides has stabilized globally, though at high levels. Despite such progress, biodiversity continues to decline in landscapes used to produce food and timber; and food and agricultural production remains among the main drivers of global biodiversity loss. The target has not been achieved.
- A new Global Biodiversity Framework, also know as post-2020 GBF is currently under negotiation and will supersede the Aichi Biodiversity Targets that expire at the end of 2020.

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Opportunities: Diversified and Multi-functional Agriculture

- Reforming value chains to tackle food insecurity and enable food sovereignty : Favouring investments in local production and marketing capacity leads to replacing global importation and over-extended value-chains. Focusing on local producers, and shifting power structures allows the provision permanent and reliable access to adequate, safe, local, diversified, fair, healthy and nutrient-rich food for all.
- Creating livelihoods : Localising agriculture leads to the creation of rural jobs and income, mitigating income inequality. Few sectors link job creation so closely to sustainable green production as the food sector. It is the largest source of employment in many countries of the global South.
- Environmental benefits : Agricultural landscapes can contribute three dimensions of biodiversity: in situ conservation, landscape connectivity and ecosystem services. Diverse, mixed agroecological systems, adapted to the local biophysical needs, conserve and enhance biodiversity as well as reduce greenhouse gas emission, protect water supply and soil. They also function as habitat for species and varieties, cultivated or otherwise. This includes agrobiodiversity used by humans (agricultural and beneficial species). This creates resilience not only for the ecosystems, but also for agriculture, where crops are more adapted against climate impacts and diversity reduces risks from pests and diseases.
    - Opposite case : Unsustainable agricultural production affects biodiversity along three dimensions: (a) land cover change whereby agriculture replaces natural ecosystems such as forests (agricultural expansion); (b) diminishing ecosystem services, including water, soil and climate; and, (c) intensification where monoculture replace mixed cropping systems
- This will require a shift from policies and financial incentives that favour mostly simplified, monocultural, conventional agriculture to policies that actively promote biodiversity-friendly mixed farming.

The FAO Response: Mainstreaming Biodiversity Across Agricultural Sectors - (FAO 2020; FAO 2021)

- FAO Strategy on Mainstreaming Biodiversity Across Agricultural Sectors
- Aim: "The Strategy aims to mainstream biodiversity across agricultural sectors at national, regional and international levels in a structured and coherent manner, taking into account national priorities, needs, regulations and policies and country programming frameworks."
- The expected result of the application of the Strategy would be to reduce the negative impacts of agricultural practices on biodiversity, to promote sustainable agricultural practices and to conserve, enhance, preserve and restore biodiversity as a whole.
- Goals:
    1. Promote sustainable use and management of biodiversity with special focus on landscape and ecosystem approaches in agricultural sectors
    2. Conserve, enhance and restore biodiversity and ensure the continued provision of ecosystem services
    3. Conserve, enhance and restore biodiversity and ensure the continued provision of ecosystem services
    4. Promote sustainable agriculture and food systems that integrate the conservation, recognition and promotion of biodiversity throughout value chains
    5. Safeguard the livelihoods of small-scale producers and indigenous peoples and local communities as custodians of biodiversity, and emphasize the role of all relevant stakeholders as custodians of biodiversity
- The 2021-23 Action Plan for the Implementation of the FAO Strategy on Mainstreaming Biodiversity across Agricultural Sectors (Action Plan) was approved by the FAO council at its 166th Session.

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The Post-2020 GBF Response - (CBD, 2021)

- The Post-2020 Framework is an opportunity that must not be lost for
  - Including an influential sector of the international community
  - Going beyond simply advocating sustainability in agriculture: while many measures to achieve sustainability are friendly to biodiversity, sustainability in itself will not assure biodiversity conservation
  - Deciding how future food systems should be designed, in order to conserve biodiversity and the vital farm-friendly services that biodiversity provides, by shifting from simplified, monocultural, conventional systems to ones that promote biodiversity-friendly mixed farming at a landscape scale.
  - Recognizing the 'landscape approach' as a means of managing biodiversity that includes both 'natural' landscapes (which must be protected) but also multi-use mosaic landscapes that blend many forms of productive use with conservation, including agriculture, woodland, grassland, waterbodies and wilderness. Agricultural land within these landscapes should be managed in a manner that optimises biodiversity conservation and links protected areas to permit the movement of species.
  - Challenging the heavy subsidies of unsustainable food production practices by national governments. If similar investment were put into biodiversity-friendly mixed farming systems, many of the current failures could be rectified and productivity greatly increased
  - Challenging the Aichi Indicators, where the actual protection of species was limited to indicators such as the Wild Bird Index for farmland species and the Living Planet Index for farmland specialist species, as these indicators do not capture information on biodiversity beyond a few species that live on farms, whereas it is the effects of agriculture on broader wild biodiversity within a landscape that is most important
  - Re-constructing regional and local agri-food systems to create jobs and viable local agribusinesses through governmental interventions such as:
    - investments in farmers' cooperatives to help farmers shift from being only growers to becoming producers;
    - linking farmers directly to consumers in cities through technology;
    - initiating markets for diverse 'food baskets' through government procurement for schools, hospitals, creches and day-care centres;
    - diversifying food production to meet increasing demand for healthy and diverse diets
  - To link to other international agreements:
    - The use of tree species in agricultural landscapes would link effectively with the Paris Agreement.
    - The United Nations Convention to Combat Desertification aspires to achieve land degradation neutrality; a CBD target including soil biodiversity conservation would support that
- The original target on agriculture: "Conserve and enhance the sustainable use of biodiversity in agricultural and other managed ecosystems to support the productivity, sustainability and resilience of such systems, reducing by 2030 related productivity gaps by at least [50%]"
  - **Problem:** This proposed target refers to the use of biodiversity in food and agricultural systems, acknowledging the importance of diversity of crop varieties and livestock breeds and their wild relatives for food production, but does not refer to wild biodiversity that exists on and uses farms to move between protected areas. It did not recognise that the habitat and the connectivity function of landscapes is only provided by mixed farming systems.
  - **Revisited version in Post-2020 GBF**: Target 10. Ensure all areas under agriculture, aquaculture and forestry are managed sustainably, in particular through the conservation and sustainable use of biodiversity, increasing the productivity and resilience of these production systems

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The role of the NBSAPS

- NBSAPs are the main instruments to implement the Post-2020 global biodiversity framework. To strengthen and accelerate their implementation to achieve a transformational change of the agricultural sector a proposed first step is that countries assess the readiness of their NBSAPs to deliver agricultural biodiversity targets in the Post-2020 framework.
- National policies often are very ambitious but contain little in terms of actual actions and plans. An analysis of five countries in diverse regions shows that only 13 percent of their national biodiversity policies were related to on-the-ground implementation.

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Global Landscapes Forum

The Global Landscapes Forum (GLF) is the world's largest knowledge-led platform on integrated land use, dedicated to achieving the Sustainable Development Goals and Paris Climate Agreement. The Forum takes a holistic approach to create sustainable landscapes that are productive, prosperous, equitable and resilient and considers five cohesive themes of food and livelihoods, landscape restoration, rights, finance and measuring progress. It is led by the Center for International Forestry Research and World Agroforestry (CIFOR-ICRAF), in collaboration with its co-founders UNEP and the World Bank and Charter Members.

Charter members: CIAT, CIFOR-ICRAF, CIRAD, Climate Focus, Conservation International, Crop Trust, Ecoagriculture Partners, The European Forest Institute, Evergreen Agriculture, FAO, FSC, GEF, GIZ, ICIMOD, IFOAM - Organics International, The International Livestock Research Institute, INBAR, IPMG, IUFRO, Rainforest Alliance, Rare, Rights and Resources Initiative, SAN, TMG-Think Tank for Sustainability, UNCCD, UNEP, Wageningen Centre for Development Innovation part of Wageningen Research, World Farmer Organization, World Bank Group, World Resources Institute, WWF International, Youth in Landscapes Initiative (YIL)

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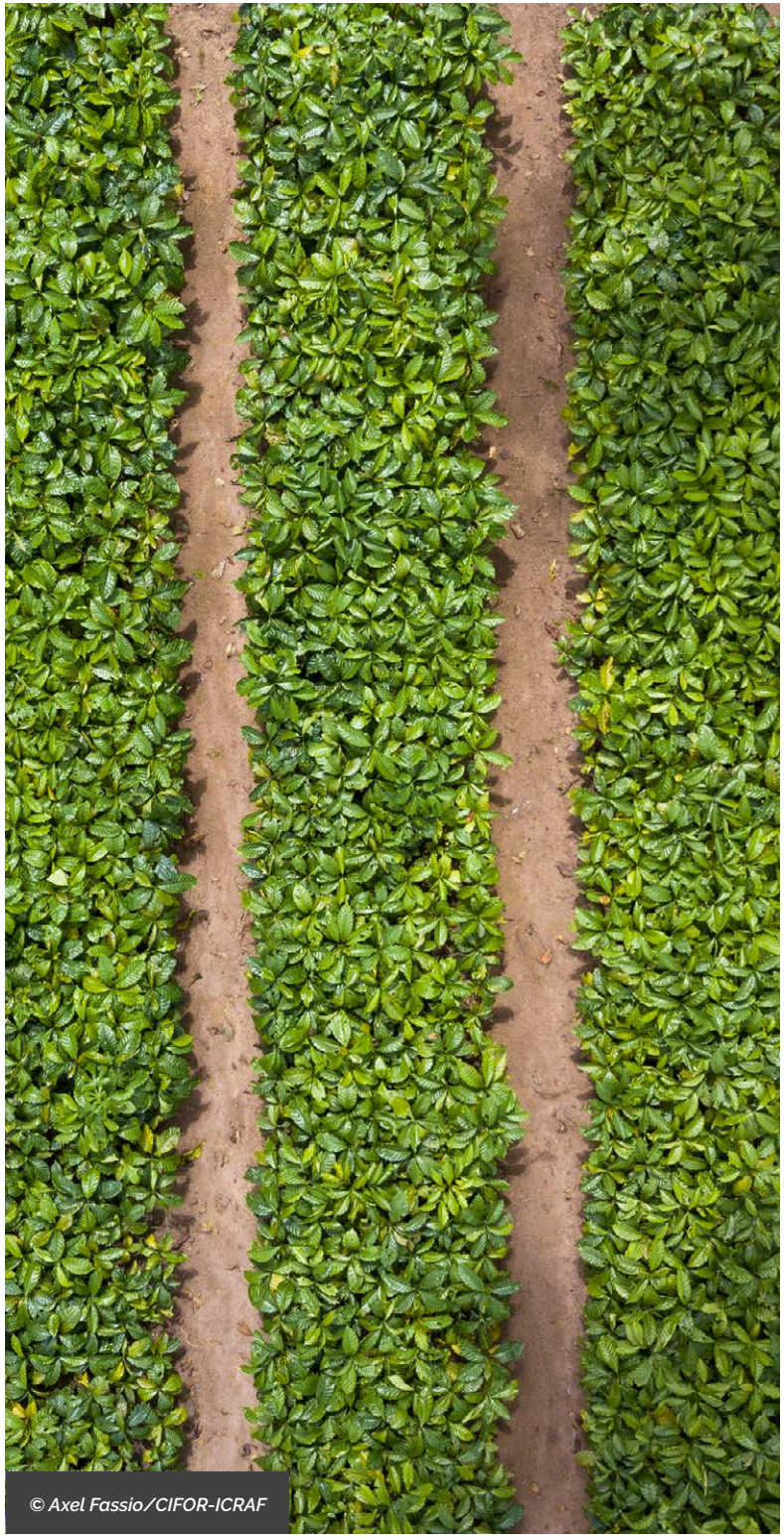

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