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D2.2 PILOT COURSE REPORT SUMMARY

1. Introduction:

This report summarizes three pilot courses aimed at promoting sustainability in different contexts. In Slovenia, the course at Grm Novo Mesto focused on sustainable practices across forestry, beekeeping, and tourism, emphasizing the interconnectedness of these sectors and the role of forests and bees in ecosystem services and food production. At Puntland Technical University in Somalia, the course on sustainability and pollution control addressed environmental challenges specific to the region, combining theoretical and practical approaches to pollution management in sectors like agriculture, energy, and urban development. In Tanzania, the course on Circular Economy and Waste Management tackled waste management issues in urban areas like Dar es Salaam and Zanzibar, teaching students how to manage waste sustainably and apply circular economy principles to reduce waste and improve resource efficiency. Each course integrates both theoretical knowledge and practical skills to address local environmental challenges and promote sustainable practices.

1.1 Background

The background of the pilot courses discussed in the report reflects a growing global need to address environmental challenges through education and practical solutions. In Slovenia, the focus on sustainable management in forestry, beekeeping, and tourism is rooted in the country's rich natural resources, with 58% of the land covered by forests, providing essential ecosystem services. The importance of bees in pollination, which supports global food production, also underpins the need for sustainable agricultural practices. Similarly, in Somalia, environmental degradation and pollution are pressing concerns, particularly in sectors like agriculture, energy, and urban development. With limited infrastructure and growing urbanization, the need for education in sustainable practices and pollution control is crucial for future development. In Tanzania, rapid urbanization, particularly in cities like Dar es Salaam and Zanzibar, has resulted in a waste management crisis, with significant gaps in waste collection and recycling. The introduction of circular economy principles in the courses aims to address these challenges by promoting waste reduction and resource efficiency. These pilot courses were designed to offer both theoretical knowledge and practical skills to address local environmental issues, contributing to global sustainability efforts through tailored, context-specific solutions.

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Report on Circular Economy and Waste Management Courses- CUBE

Introduction

The concept of the circular economy (CE) represents a transformative paradigm aimed at minimizing waste and optimizing resource utilization. In Tanzania, rapid urbanization is particularly evident in major cities such as Dar es Salaam, which has emerged as one of the fastest-growing urban centers in Africa. This unprecedented growth has resulted in a substantial increase in waste generation, with urban areas producing an estimated 6,000 tons of solid waste daily (World Bank, 2020). Unfortunately, the existing waste management infrastructure has not evolved in tandem with this growth. Many municipalities face significant challenges in effectively collecting and disposing of waste, leading to the collection of only approximately 40% of total waste generated. The remaining waste frequently ends up in unauthorized dumpsites, streets, and water bodies, thereby creating unsightly and hazardous environments that pose considerable risks to public health and safety (UNEP, 2018).

The inadequate management of waste in Tanzania has profound implications for both public health and environmental sustainability. Improper disposal of solid waste can facilitate the proliferation of pests and vectors, thereby contributing to the spread of diseases such as malaria, cholera, and dysentery (Moshi, 2017). Furthermore, the accumulation of waste in urban areas can lead to the contamination of soil and water sources, exacerbating health risks. The situation is particularly dire in informal settlements, where residents often lack access to basic sanitation services and effective waste disposal options. Consequently, these communities are disproportionately vulnerable to health issues stemming from poor environmental conditions (Tanzania National Bureau of Statistics, 2020).

In Zanzibar, waste management constitutes a significant environmental challenge, largely attributable to the growth of informal urban areas. Although current statistics are insufficient to accurately estimate the total volume of waste generated in Zanzibar, it is evident that the quantity of solid waste produced is substantial. This issue is exacerbated by the rapid expansion of urban areas and the burgeoning tourism sector. The Zanzibar Municipal Council (ZMC) estimates that the city of Zanzibar, encompassing both Stone Town and Ng'ambo, generates approximately 300 tons of solid waste per day, totaling around 108,000 tons annually, of which 80% is organic. However, due to limited capacity and resources, the ZMC is able to collect only about 20% of this waste.

Residents frequently resort to disposing of solid waste in unauthorized dumps located in streets and on beaches. Moreover, the emergence of electronic and electrical waste (e-waste) presents a growing concern in Zanzibar. The disposal of used items, including computers, refrigerators, stoves, air conditioners, and other electrical appliances, poses significant challenges to the natural environment.

Furthermore, Zanzibar lacks an adequate centralized sewage system, with only Stone Town and select areas of Ng'ambo being served by any form of sewage infrastructure.

In response to these multifaceted challenges, the Tanzanian government has initiated various policies and strategies aimed at enhancing waste management practices. The National Waste Management Strategy delineates a framework for sustainable waste management practices, emphasizing the

critical importance of community involvement and public awareness campaigns (ISWA, 2019). Local governments are increasingly collaborating with non-governmental organizations to implement recycling initiatives and community clean-up projects. However, the success of these efforts is contingent upon raising public awareness regarding the significance of proper waste disposal and fostering a culture of environmental stewardship. By actively engaging communities and investing in infrastructure, Tanzania can progress towards a more sustainable and effective waste management system that safeguards public health and the environment.

This report delineates the framework of courses focused on circular economy and waste management, highlighting the integration of both practical and theoretical components to facilitate comprehensive student learning in these critical areas.

Course Objectives

1. **Understanding Circular Economy Principles**: Equip students with foundational knowledge of CE, encompassing sustainability, resource efficiency, and waste minimization strategies.

2. **Waste Management Techniques**: Provide insights into diverse waste management methodologies, including recycling, composting, and waste-to-energy technologies.

3. **Practical Application**: Engage students in experiential learning activities that enable the application of theoretical concepts in real-world contexts.

Number of Students 10 Woman and 15 Man

Course Structure

1. **Classroom Sessions** - Duration: 8 weeks

- Topics Covered:

- Weeks 1-3: **Introduction to Circular Economy**

- Understand the basic concepts of the circular economy and sustainability.
- Recognize the importance of minimizing waste and maximizing resource efficiency in a circular economy
- Learn and apply the principles of circular economy.

- Weeks 4-5: Waste Management Fundamentals

- Learn and apply waste management basics.
- Materials recovery techniques

- Weeks 6: **Recycling Processes**

- Local Environmental Challenges and Sustainability
- Adaptation Strategies.
- -Overview of global and local waste management policies and frameworks

- Weeks 7-8: **Future of Circular Economy**

- Exploration of emerging trends and technologies

- Activities:

- **Workshops**: Hands-on workshops focused on recycling methods, eco-design initiatives, and waste auditing practices.
- **Group Projects**: Collaborative projects where students develop a waste management plan for a local community or organization, incorporating CE principles.

Assessment

- **Class Participation**: Evaluation based on active engagement in discussions and activities.
- **Practical Project**: Grading based on the group project, emphasizing creativity, feasibility, and the application of CE principles.

WEEK 1

LESSON: CIRCULAR ECONOMY **TOPIC:** INTRODUCTION TO CIRCULAR ECONOMY
TIME: 3 HRS
COMPETENCE:

- Manage waste materials sustainably within the circular economy framework.

MAIN OBJECTIVES:

- Understand the basic concepts of the circular economy and sustainability.
- Recognize the importance of minimizing waste and maximizing resource efficiency in a circular economy.

SPECIFIC OBJECTIVE :

- Define the concepts of circular economy and sustainable development.

STAGE	TIME	TEACHING ACTIVITIES	LEARNING ACTIVITIES	ASSESSMENT
READINESS ACTIVITIES	25 minutes	Brainstorming on the life skills and environment	Responding randomly related to their real life.	Observing if each students is able to engage fully to start new topic

INTRODUCTION	30 minutes	Introducing the new sub topic to the student by asking question like : - What is life? - Where are we living? - What is Nature? - How people make a living?	Responding by answering the questions asked by the teacher.	Observing if each student is able to answer the question correctly.
NEW KNOWLEDGE	70 minutes	Guide students to: - Explain the meaning of economy. - Mention and describe types of economy. - Describe the Importance of circular economy. - Explain the meaning of sustainable development - Describe the importance of circular agriculture	Discussing in groups: - The meaning of economy. - Types and meaning of economy. - Importance of circular economy. - Meaning of circular agriculture. - Importance of circular agriculture	Observing if each student is able to participate in group discussion effectively.
REINFORCEMENT	30 minutes	Collecting and point discussion on groups, present and make more clarification.	Responding by taking notes from teachers clarification	Observing if each student is able to take notes correctly.
REFLECTION	20 minutes	Giving chance to students to give out their opinions concerning knowledge gained, in relation to real life situation.	Giving opinions concerning knowledge gained, in relation to real life situation.	Observing if each student is able to relate the concepts learned with real life situation.
CONSOLIDATION	15minutes	To provide exercise to students	Students will Perform the exercise given.	Observing by marking if each student is able to perform well.

WEEK 2

LESSON: CIRCULA ECONOMY **TOPIC:** PRINCIPLES OF CIRCULA ECONOMY **TIME**: 3 HRS

COMPETENCE: Manage waste materials sustainably within the circular economy framework.

MAIN OBJECTIVES:

- Learn and apply the principles of circular economy.

SPECIFIC OBJECTIVE :

- List the principles of minimizing waste and maximizing resource efficiency.
- Adapt economic activities to sustainable practices within the circular economy framework.

STAGE	TIME	TEACHING ACTIVITIES	LEARNING ACTIVITIES	ASSESSMENT
READINESS ACTIVITIES	20 minutes	Game play, love and pick a leaf game related to leaves.	Responding game play related to their real life.	Observing if each students is able to engage fully to start new topic and their view
INTRODUCTION	25 minutes	Introducing the new sub topic to the student by asking previous question like: What is circular economy? Important of circular economy in their daily life	Responding by answering the questions asked by the teacher.	Observing if each student is able to answer the question correctly.
NEW KNOWLEDGE	60 minutes	Guide students to: - Distinguish between waste and pollution. - Recognize the link between products and materials in use. - Discuss on regenerating natural systems (recycling and recovery Materials)	Discussing in groups: - Waste and pollution. - Products and materials in use. - Regenerating natural systems (recycling and recovery Materials)	Observing if each students is able to participate in group discussion effectively.

REINFORCEMENT	25 minutes	Collecting and point discussion on groups, present and make more clarification.	Responding by taking notes from teachers clarification	Observing if each student is able to take notes correctly.
REFLECTION	20 minutes	Giving chance to students to give out their opinions concerning knowledge gained, in relation to real life situation.	Giving opinions concerning knowledge gained, in relation to real life situation.	Observing if each student is able to relate the concepts learned with real life situation.
CONSOLIDATION	30 minutes	Practical exercise on the field on recycling and re using natural resources.	Performing the exercise given.	Observing by marking if each student is able to perform well.

WEEK 3

LESSON: CIRCULA ECONOMY **TOPIC:** IMPORTANT OF WASTE MANAGEMENT **TIME**: 3 HRS

COMPETENCE: Manage waste materials sustainably within the circular economy framework.

MAIN OBJECTIVES:

- Learn and apply the principles of circular economy.

SPECIFIC OBJECTIVE :

- Discuss on the important of waste management for archiving SDG targets.
- Discuss on the waste management problem and opportunities on our environment

STAGE	TIME	TEACHING ACTIVITIES	LEARNING ACTIVITIES	ASSESSMENT
READINESS ACTIVITIES	20 minutes	Morning warm up circle playing sustainable game on reuse, reduce and recycle.	Responding game play.	Observing if each student is able to engage fully to start new topic and Mingle with class atmosphere.

INTRODUCTION	25 minutes	Introducing the new sub topic to the student by asking previous question like: o What is sustainability? o What is circular economy? o What are the pillars of sustainable economy? o What is waste? o Mention examples of waste.	Responding by answering the questions asked by the teacher.	Observing if each student is able to answer the question correctly.
NEW KNOWLEDGE	60 minutes	Guide students to: - Discuss on SDG. - Discuss on the SDG targets related to waste. - Recognize the link between waste and SDG 3,4,6,7,8,11,12,13,14 and 15. - Discuss on waste management problems and opportunities in the environment.	Discussing in groups: - SDG - SDG target related to waste. - SDG 3,4,6,7,8,11,12,13,14 and 15. - Problems and opportunities.	Observing if each student is able to participate in group discussion effectively.
REINFORCEMENT	25 minutes	Collecting and point discussion on groups, present and make more clarification.	Responding by taking notes from teachers clarification	Observing if each student is able to take notes correctly.
REFLECTION	20 minutes	Giving chance to students to give out their opinions concerning knowledge gained, in relation to real life situation.	Giving opinions concerning knowledge gained, in relation to real life situation.	Observing if each student is able to relate the concepts learned with real life situation.

CONSOLIDATION	30 minutes	Individual exercise explaining on the SGD target that is most related waste management in his environment.	Performing the exercise given.	Observing by marking if each student is able to perform well.

WEEK 4

LESSON: WASTE MANAGEMENT **TOPIC:** TYPES OF WASTE **TIME**: 3 HRS

COMPETENCE:

- Manage waste materials sustainably within the circular economy framework.

MAIN OBJECTIVES:

- Learn and apply waste management basics.

SPECIFIC OBJECTIVE :

- Discuss on the source and type of waste with their examples.
- Familiar with legislation on waste and hazardous substances management.

STAGE	TIME	TEACHING ACTIVITIES	LEARNING ACTIVITIES	ASSESSMENT
READINESS ACTIVITIES	20 minutes	Clean up activities and collecting waste on the campus.	Responding on the activities.	Observing if each student is able to engage fully to start new topic and Mingle with class atmosphere.
INTRODUCTION	25 minutes	Introducing the new sub topic to the students by demonstrate them on grouping waste based on their characteristics.	Responding by grouping wastes as asked by the teacher.	Observing if each student is able to engage correctly.

NEW KNOW LEDGE	60 minutes	Guide students to: - Discuss on source of waste with their examples. - Discuss on the type of waste	Discussing in groups: - Source of waste. - Types of waste.	Observing each student is able to engage actively.
REINF ORCEM ENT	25 minutes	Collecting and point discussion on groups, present and make more clarification.	Responding by taking notes from teachers clarification	Observing if each student is able to take notes correctly.
REFLE CTION	20 minutes	Giving chance to students to give out their opinions concerning knowledge gained, in relation to real life situation.	Giving opinions concerning knowledge gained, in relation to real life situation.	Observing if each student is able to relate the concepts learned with real life situation.
CONSO LIDATI ON	30 minutes	Individual exercise explaining with legislation on waste and hazardous substances management.	Performing the exercise given.	Observing by marking if each student is able to perform well.

WEEK 5

LESSON: WASTE MANAGEMENT **TOPIC:** TYPES OF WASTE **TIME**: 3 HRS

COMPETENCE:

- Manage waste materials sustainably within the circular economy framework.

MAIN OBJECTIVES:

- Learn and apply waste management basics.

SPECIFIC OBJECTIVE :

- Discuss on creative Problem-Solving in Waste Management
- Discuss on organic Matter Recovery Techniques

STAGE	TIME	TEACHING ACTIVITIES	LEARNING ACTIVITIES	ASSESSMENT
READINESS ACTIVITIES	25 minutes	Sustainability Game (Warm-up)	Responding on the activities.	Observing if each student is able to engage fully to start new topic and Mingle with class atmosphere.
INTRODUCTION	35 minutes	Introducing the new sub topic to the students by demonstrate them creative problem solving in waste management	Responding by grouping wastes as asked by the teacher.	Observing if each student is able to engage correctly.
NEW KNOWLEDGE	90 minutes	Guide students to: - Collect wastes and make compost using organic wastes	Students will respond by engaging on the activities.	Observing each student is able to engage actively.
REFLECTION CONSOLIDATION	30 minutes	Giving chance to students to give out their opinions concerning knowledge gained and how they see the study is relating to Agriculture	Student in pairs will discuss and write down how the activities help them know organic matter recovery techniques	Observing if each student engage in the discussion and presentation correctly.

WEEK 6

LESSON: WASTE MANAGEMENT **TOPIC:** TYPES OF WASTE **TIME**: 3 HRS

COMPETENCE:

- Manage waste materials sustainably within the circular economy framework.

MAIN OBJECTIVES:

Innovations and technologies in recycling

SPECIFIC OBJECTIVE :

- Understand the key innovations and technologies in recycling.
- Explore modern techniques and technologies in seed planting.
- Analyze the impact of these innovations on sustainability and the environment

STAGE	TIME	TEACHING ACTIVITIES	LEARNING ACTIVITIES	ASSESSMENT
READINESS ACTIVITIES	20 minutes	Mediation (Warm-up)	Students will engage into the activities.	Observing if each students is able to engage fully to start new topic
INTRODUCTION	20 minutes	Introducing the new sub topic to the students by demonstrate them creative problem solving in waste management	Responding on the activities.	Random questions will be used to assess student understanding
NEW KNOWLEDGE	80 minutes	Teacher will introduce the lesson by discussing Environmental Key Challenges: • Deforestation • Biodiversity Loss • Water Scarcity • Pollution.	Students in groups to research one challenge and present their finding	Observing if each student is able to engage correctly.
		Teacher will present real-life examples of successful waste management projects in Tanzania. • Chako • Barefoot college Zanzibar • Arena recycling industry • Seaweed café • Asili fertilizer	Students will listen to teacher's presentation	One to one questions will be used to assess students motivation

REINFORCEMENT AND REFLECTION	35 minutes	Teacher will give chance to students to respond out their opinions concerning knowledge gained.	Students will then discuss which project can align with their interest and present their reasons	Observing if each student is able to connect their aideas.
CONSOLIDATION	25 minutes	Teacher will recap the challenges and strategies discussed	Students will listen and ask questions.	One to one questions will be used to assess students understanding

WEEK 7

LESSON: WASTE MANAGEMENT **TOPIC:** TYPES OF WASTE **TIME**: 3 HRS

COMPETENCE:

- Manage waste materials sustainably within the circular economy framework.

MAIN OBJECTIVES:

Innovations and technologies in recycling

SPECIFIC OBJECTIVE :

- Understand the key innovations and technologies in recycling.
- Explore modern techniques and technologies in seed planting.
- Analyze the impact of these innovations on sustainability and the environment.

STAGE	TIME	TEACHING ACTIVITIES	LEARNING ACTIVITIES	ASSESSMENT
READILNESS ACTIVITIES	25 minutes	Sustainability Game (Warm-up)	Responding on the activities.	Observing if each student is able to engage fully to start new topic and Mingle with class atmosphere.
INTRODUCTION	35 minutes	Introducing the new sub topic to the students by demonstrating different innovation and technologies in agri recycling	Responding on the activities.	Random questions will be used to assess student understanding.

NEW KNOWLEDGE	90 minutes	Guide students to: - Explore modern techniques and technologies in seed planting	Students will respond by engaging on the activities.	Observing each student is able to engage actively.
REFLECTION CONSOLIDATION	30 minutes	Giving chance to students to give out their opinions concerning impact of these innovations on sustainability and the environment.	Student in pairs will discuss and write down how the activities help them know innovations on sustainability and the environment	Observing if each student engage in the discussion and presentation correctly.

CHALLENGES.

The primary challenge encountered during the sessions was the difficulty in effectively engaging students with the concepts of sustainability and the circular economy, particularly given the limited time allocated to cover the extensive curriculum. This constraint hindered the ability to facilitate meaningful interactions and in-depth discussions, which are essential for fostering a comprehensive understanding of these critical topics.

RECOMMENDATION.

To effectively engage VETA (Vocational Education and Training Authority) students in waste management and the circular economy, increasing the time allocated for activities and practical sessions is essential. Extended time for hands-on learning allows students to immerse themselves in real-world applications of sustainability principles, enabling them to develop practical skills in waste segregation, recycling, and upcycling. By dedicating more time to these activities, students can participate in community clean-up campaigns and workshops that reinforce their understanding of the circular economy and its relevance to their vocational fields.

Moreover, longer sessions can facilitate deeper discussions and reflections on local waste issues, allowing students to analyze challenges and brainstorm innovative solutions collaboratively. This additional time can also accommodate field trips to recycling facilities and marine conservation projects, providing invaluable firsthand experiences that connect theoretical knowledge to practical implementation. By prioritizing extended practical sections, VETA can enhance the educational experience, ensuring that students not only learn about sustainability but also actively contribute to creating a cleaner, more sustainable environment in Zanzibar.

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2.1 Pilot course report: Sustainable management linkages between forestry, beekeeping and hospitality & tourism

Grm Novo mesto – center biotehnike in turizma

Introduction

This report summarizes the pilot course on Sustainable management linkages between forestry, beekeeping and hospitality & tourism. The Pilot course was implemented at Grm Novo mesto – center biotehnike in turizma in Slovenia. The course was prepared to show the students connections between forestry, beekeeping, tourism and hospitality. Course content is designed to promote critical thinking, connect different topics and approaches and also promote sustainability in everyday life. The course gives a strong attention to connecting hospitality services and food with forests and their capacity, not to forget the importance of bees in food production.

Slovenia is a green country; forests cover 58% of Slovenian area. Forests play a great part of the tourism industry, even if it doesn't seem so. Forests provide us not just with wood, but also clean air, forest fruits, and a place for recreation and relaxation. Today's tourism is focusing on experiences and boutique tourism and not massive tourism as in previous times. The other forgotten part of our nature are bees and other wild pollinators. Bees are pollinating more than 170.000 species of plants and every third spoon of food is dependent on pollination. Sustainable management in food production is therefore very important to keep the population of bees.

This report outlines course content, learning objectives, delivery methods, key outcomes, challenges and recommendation for next implementations.

Course content:

This course on Sustainable management linkages between Forestry, Beekeeping, and Hospitality and Tourism provides students with the knowledge and skills needed to implement sustainable practices across these sectors. Grounded in scientific principles and interdisciplinary approaches, the course explores the interconnected nature of environmental, social, and economic sustainability. Students will define sustainability in contemporary contexts, analyse successful case studies, and apply key principles to propose sustainable alternatives. They will learn to

design integration strategies for organizational frameworks, utilize tools to measure sustainability metrics, and collaborate effectively in multidisciplinary teams. Emphasis is placed on evaluating current policies and regulations, advocating for improvements, and implementing practical initiatives to promote sustainable development within local communities and organizations. By the end of the course, students will be equipped to address global sustainability challenges through informed decision-making and proactive engagement in sustainable practices.

Duration: 50 Hours

Objectives

The module aims to link sustainable management practices across forestry, beekeeping, and hospitality and tourism sector. The focus is on biodiversity conservation, efficient use of energy and raw materials, and integrating sustainable management across these sectors.

Skills, competencies, learning outcomes

Students will:

- Understand the interdependence of environmental, economic, and social aspects of sustainable development.
- Develop responsibility for environmental management.
- Learn to predict environmental impacts of various activities.

Professional competencies

- Protect biodiversity and cultural heritage.
- Use energy and resources efficiently.
- Integrate sustainable management practices.

Module 1: Protects Biodiversity, Natural Values and Cultural Heritage

1. Explains the importance of biodiversity and cultural heritage.
2. Understands sustainable land use.
3. Recognizes the economic and ecological value of spaces.

Module 2: Practices Sustainable Management by Integrating Sustainable Practices

1. Understands sustainable management in forestry, beekeeping, and tourism.
2. Applies practical management techniques.

Module 3: Respects the Fundamental Principles of Sustainable Development

1. Explains sustainable development concepts.

2. Identifies ways to apply sustainable practices in daily activities

Module 4: Knows how to Protect the Environment and Act Responsibly Towards the Environment

1. Understands environmental protection regulations.
2. Assesses the impact of activities on ecosystems.

METHODOLOGY

Participants will receive reading materials and a variety of exercises covering topics such as biodiversity, pollution, forest management, beekeeping practices, use of honey in gastronomy, zero waste cooking. The course also includes practical work and workshops.

All course materials, including lecture notes, exercises, self-assessment questionnaires, bibliography, and additional resources, will be provided at the beginning or during each lecture.

This methodology encourages learning while providing structured support for participants to deepen their knowledge and skills in implementing sustainable practices effectively. It aims to foster a thorough understanding of sustainability concepts and their practical application in real-world scenarios, preparing participants to contribute meaningfully to sustainable development initiatives.

COURSE OUTLINE

Opening the course	1 hour	
Practical work	6 hours	Connecting biodiversity, natural values and cultural heritage
Project day	6 hours	Importance of forestry
Project day	6 hours	Connecting sustainability, tourism, gastronomy and beekeeping
Practical work Lectures	3 hours 3 hours	Basic forestry sustainable practices
Lectures	6 hours	Sustainability and sustainable development concepts, Biodiversity
Project day	6 hours	Zero waste cooking, local ingredients cooking
Practical work Lectures	3 hours 3 hours	Water quality analysis, pollution
Lectures	6 hours	Environmental protections regulations
Closing of the course	1 hour	Q&A

CHALLENGES

The challenges faced during the pilot of the course were limitation of resources, contextual differences in knowledge of students and time constraints.

RECOMMENDATIONS

For next implementations, we recommend collaborating with new organizations to secure resources, prepare activities on different knowledge levels to overcome contextual differences and adjust time frame of the activities.

2.2 Pilot Course Report: Sustainable Management, Environmental Solutions, and Pollution Control Puntland Technical University, Somalia

Introduction

This report summarized the pilot course on Sustainable Management, Environmental Solutions, and Pollution Control offered at Puntland Technical University (PTU) in Somalia. The course was designed to equip students with a robust understanding of sustainability, environmental pollution, and practical approaches to mitigating environmental degradation in their local and regional contexts. With a strong emphasis on pollution control, the course also covered other aspects of sustainability, providing students with comprehensive tools to address environmental issues holistically.

As a region that faced considerable environmental challenges, especially in pollution management, PTU recognized the urgent need for education that empowered students to tackle these issues effectively. The course integrated interdisciplinary approaches, offering students not only theoretical knowledge but also practical skills to implement sustainable practices and pollution control strategies across various sectors such as agriculture, energy, transportation, and urban development.

This report outlined the course content, learning objectives, delivery methods, student engagement, key outcomes, challenges, and recommendations for future course iterations.

Course Overview

The Sustainable Management, Environmental Solutions, and Pollution Control course focused on teaching students the interconnectedness of environmental, social, and economic sustainability. It emphasized the importance of addressing pollution, especially in the context of Somalia, where pollution was a growing concern. Students were introduced to a wide range of pollution control mechanisms, from air quality monitoring to waste management practices, while also learning how these strategies intersected with broader sustainability goals.

Key Components of the Course:

1) **Introduction to Sustainability and Pollution**
    a) Definitions and principles of sustainability in environmental management.
    b) Overview of environmental pollution types: air, water, soil, and noise.
    c) The role of pollution in environmental degradation and climate change.
2) **Pollution Control and Management**
    a) Pollution prevention techniques in agriculture, urbanization, and industrial sectors.
    b) Waste management systems: recycling, composting, and waste-to-energy technologies.
    c) Water and air pollution management strategies, including mitigation and adaptation techniques.

3) **Sustainable Solutions and Practices**
    a) Sustainable agricultural practices for reducing land degradation and pollution.
    b) Renewable energy solutions: solar, wind, and bioenergy.
    c) Green transportation solutions and energy-efficient urban planning.
4) **Community Engagement in Pollution Control**
    a) Engaging local communities in pollution monitoring and control initiatives.
    b) Promoting awareness and education on pollution prevention through local campaigns.
    c) Building resilience against pollution in vulnerable communities.
5) **Policy, Regulation, and Advocacy**
    a) Environmental policies and regulations for pollution control.
    b) Case studies of successful national and international pollution control programs.
    c) The role of advocacy in improving environmental regulations.

Course Objectives

The main objectives of the course were:

- To provide students with a comprehensive understanding of sustainability and pollution management.
    - Students gained knowledge of environmental pollution's causes, impacts, and effective control measures.
- To equip students with practical skills in pollution control and sustainable environmental practices.
    - Students learned methods for assessing pollution and developing action plans to reduce its impact on local communities.
- To enhance students' ability to engage with communities and stakeholders in sustainable practices.
    - Students developed communication and advocacy skills to promote sustainability and pollution control at the local level.
- To foster critical thinking and problem-solving abilities in environmental management.
    - Students evaluated environmental policies and strategies, proposing improvements for better pollution control in Somalia.

Course Delivery and Methodology

The pilot course was delivered through a combination of lectures, interactive discussions,

practical fieldwork, and group projects. This mixed delivery method facilitated both theoretical learning and real-world application of sustainable practices and pollution management techniques.

1. **Lectures and Class Discussions**
    - Faculty members and guest speakers delivered in-depth lectures on sustainability, environmental pollution, and effective pollution control strategies.
    - Interactive discussions allowed students to critically analyze case studies and explore potential solutions to local pollution problems.
2. **Case Studies and Group Projects**
    - Students examined local and international case studies on successful pollution control initiatives, analyzing their success factors and applicability in Somalia.
    - Groups developed pollution control plans for specific communities, addressing waste management, water purification, and air quality improvement.
3. **Fieldwork and Community Engagement**
    - Students assessed pollution levels in their local environments through fieldwork, including air and water quality testing and observing waste management practices.
    - Community engagement involved working with local leaders to raise awareness about pollution and sustainable practices.
4. **Workshops and Practical Training**
    - Workshops covered pollution monitoring techniques, waste management practices, and renewable energy solutions.
    - Practical training sessions focused on using environmental monitoring tools and interpreting pollution data.

Student Engagement and Learning Outcomes

Students demonstrated high levels of engagement throughout the course, showing enthusiasm for addressing environmental issues and learning pollution control methods.

Key Outcomes:

1. **Increased Knowledge and Understanding**

    Students gained comprehensive knowledge of environmental pollution, its causes, consequences, and solutions.

2. **Development of Practical Skills**

They learned how to assess pollution levels and implement strategies to manage and mitigate pollution in their communities.

3. **Improved Communication and Advocacy Skills**

   Students enhanced their ability to advocate for environmental policies and communicate sustainability concepts effectively.

4. **Critical Thinking and Problem-Solving Skills**

   They proposed actionable solutions to local pollution challenges and evaluated environmental policies.

Challenges and Recommendations

1. **Resource Limitations**

   The availability of equipment for pollution monitoring and field activities was limited.

   Recommendation- Collaborate with organizations to secure resources like environmental testing kits and renewable energy devices.

2. **Time Constraints**

   Students found it challenging to balance course content with field activities.

   Recommendation- Extend the course duration or adjust the schedule for better time allocation.

3. **Lack of Local Infrastructure for Pollution Control**

   Some communities lacked infrastructure for waste management and pollution control.

Recommendation: Focus on low-cost, community-driven solutions adaptable to existing infrastructure.

4. **Cultural and Contextual Differences**

   Students' knowledge of pollution and sustainability varied.

   Recommendation- Begin with foundational sessions to align students' understanding.

Conclusion

The pilot course successfully provided students with the knowledge and skills to address environmental pollution and promote sustainable development. Through a blend of lectures, fieldwork, and hands-on training, students were empowered to combat environmental degradation. PTU demonstrated its commitment to sustainability and pollution control, paving the way for future leaders in environmental management.

Appendices

- Appendix 1: Student Feedback Survey Results

3. CONCLUSION

The conclusions of the pilot courses highlight the effectiveness of combining theoretical knowledge with practical skills to address environmental challenges in local contexts. In Slovenia, the course successfully demonstrated the interconnectedness of sectors like forestry, beekeeping, and tourism, emphasizing the importance of sustainable management for both economic and ecological benefits. In Somalia, the course on pollution control and sustainability provided students with essential tools to tackle environmental degradation, particularly in sectors such as agriculture, energy, and urban development. Similarly, the Tanzania course on Circular Economy and Waste Management addressed critical waste management issues in rapidly urbanizing areas, equipping students with strategies to reduce waste and increase resource efficiency. Overall, the courses have proven to be valuable in raising awareness and building capacity for sustainable practices in diverse environments. However, challenges such as resource limitations, infrastructure gaps, and the need for continuous stakeholder engagement were noted, with recommendations for future iterations to include more robust support systems, expanded practical applications, and greater community involvement to ensure long-term sustainability outcomes. The courses have laid a strong foundation for furthering sustainability education and practices in these regions.