BIOLOGY
E-WORKSHEET
Integrated with Hands-On and Minds-On Approach

ENVIROMENTAL CHANGE

To Enhance Students 'Critical Thinking Abilities'

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Grade 10

LIVEWORKSHEETS

PREFACE

All praise is due to Allah SWT, who has bestowed His blessings upon all His creations. By His permission, this Electronic Student Worksheet Integrated with a Hands-On and Minds-On Approach on the topic of Environmental Change to Develop Critical Thinking Skills for Grade 10 Senior High School Students has been successfully completed.

This Electronic Student Worksheet is designed in accordance with steps that follow the syntax of problem-solving processes in the Environmental Change topic, including orienting students to the problem, organizing students to learn, guiding individual or group investigations, developing and presenting the results, and analyzing and evaluating the problem-solving process. Through this Electronic Student Worksheet, students are expected to enhance their critical thinking skills, including Interpretation, Analysis, Inference, Evaluation, Explanation, and Self-Regulation.

The successful completion of this Electronic Student Worksheet (E-LKPD) would not have been possible without the guidance and support of Ibu Dra. Herlina Fitrihidajati, M.Si., as the supervising lecturer. The author would like to express sincere gratitude for all the assistance provided in completing this work.

The author is aware that there may still be shortcomings in the preparation of this Electronic Student Worksheet. Therefore, constructive criticism and suggestions are highly welcomed for future improvement, so that this Electronic Student Worksheet can be beneficial for all, especially in helping students to develop their critical thinking skills on the topic of environmental change.

Surabaya, October 12, 2024
Author

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INSTRUCTIONS

1. This E-Worksheet is designed to facilitate your independent learning activities. Say a prayer before you begin studying!
2. Read each instruction in this E-Worksheet carefully and thoroughly.
3. Work on this E-Worksheet in groups, with each group consisting of 4–5 students.
4. Write your names in the space provided.
5. This E-Worksheet is integrated with a Hands-On and Minds-On approach and is designed to develop students' critical thinking skills.
6. The contents of this E-Worksheet include learning materials, videos, images, student activity steps, questions, and a conclusion.
7. First, read the given problem carefully. Then, understand the introductory explanation by reading it thoroughly.
8. Discuss with your group members to conduct the experiment and answer the questions in this E-Worksheet.
9. Ask your teacher for guidance if you encounter any difficulties while completing the tasks.
10. Use your textbook as an additional source of information to help answer the discussion questions.

Bio-Think

Bio-Think is a feature that presents analytical questions to encourage students' critical thinking related to the topic being studied. **(Problem Orientation – Interpretation Indicator)**

Bio-Fact

Bio-Fact is a feature that contains essential information, providing key facts and fundamental concepts related to the topic being studied—in this case, environmental change. **(Organizing Students – Analysis Indicator)**

Bio-Link

Bio-Link is a feature that provides additional information related to the material and issues being studied, in order to deepen students' understanding. **(Inference Indicator)**

Bio-Activity

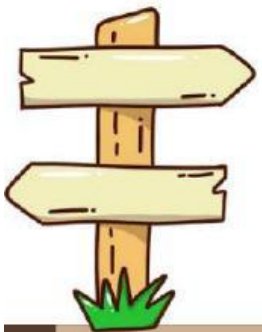
Bio-Activity is a feature that presents activities or experimental designs related to the topic of environmental change. **(Guiding Investigation – Evaluation Indicator)**

Bio-Concept

Bio-Concept is a feature that presents concepts or materials to enhance students' understanding through further exploration activities. **(Explanation Indicator)**

Bio-Exercise

Bio-Exercise is a feature that contains practice questions to assess students' understanding and application of the topic on environmental change. **(Self-Regulation)**



PRE TEST!

To assess your prior understanding of the topic on environmental change, scan the QR code below!

Click here!

Let's Start!

https://unesa.me/PretestPesertaDidik

E-WORKSHEET
ACTIVITY 1

Factors Influencing Environmental Change

Student Identity

Group/Grade : .....

Name/Student ID : .....

1. .....
2. .....
3. .....
4. .....
5. .....

School Identity : Nation Star Academy
Grade/Semester : 10 / Odd Semester
Subject : Biology
Topic : Environmental Change
Time Allocation : 6 × 45 minutes

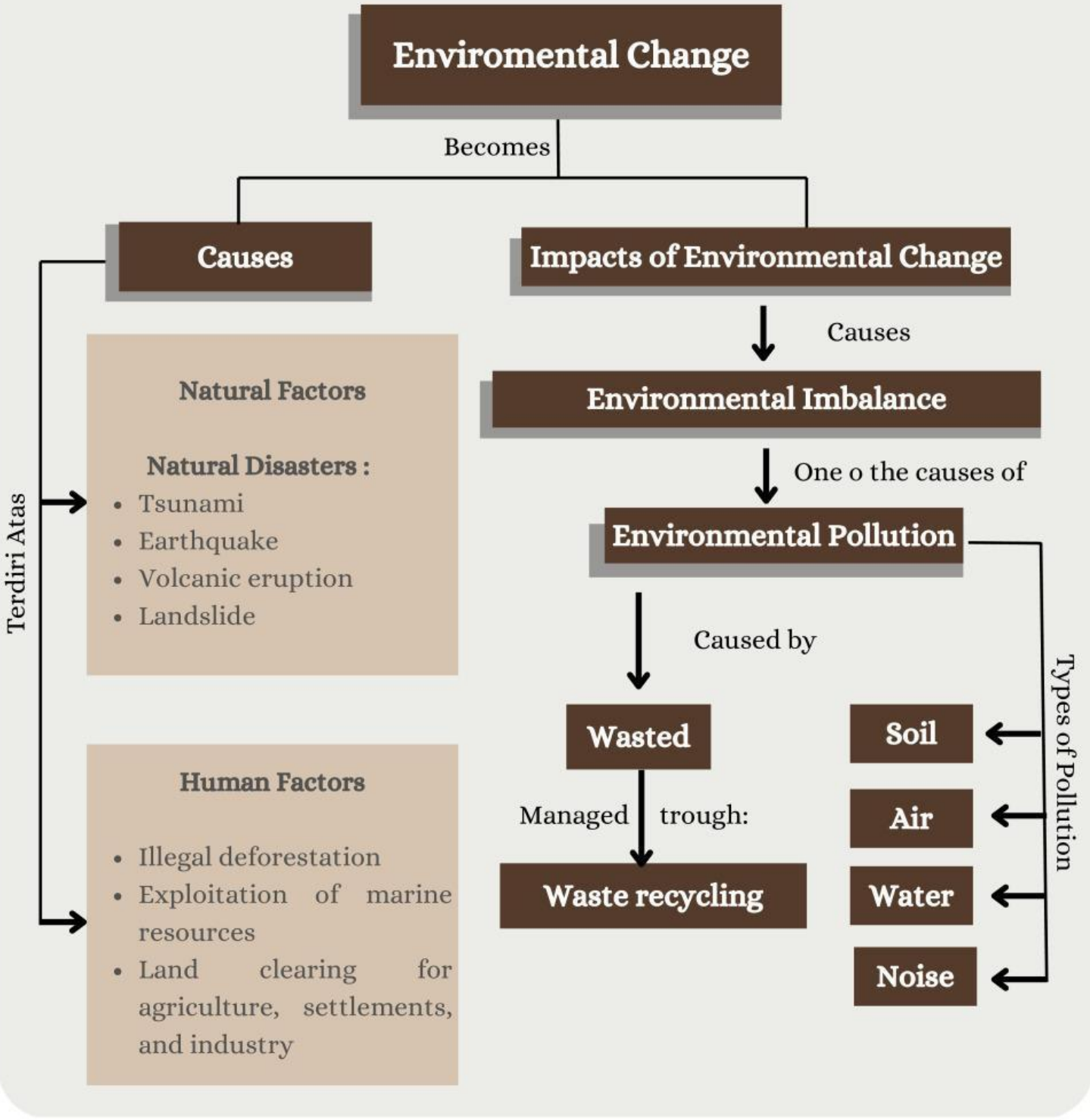
Learning Outcomes

Students are expected to understand the process of classifying living organisms; the roles of viruses, bacteria, and fungi in life; ecosystems and interactions among their components and influencing factors; as well as the application of biotechnology in various fields of life.

Learning Objectives

1. Describe how humans have increased food production
2. Describe the advantaes and disadvantages of large-scale monocultures of crop plants.
3. Describe the advantages and disadvantages of intensive livestock production.

CONCEPT MAP


Enviromental Change
Becomes
Causes
Impacts of Environmental Change
Causes
Environmental Imbalance
One o the causes of
Environmental Pollution
Caused by
Wasted
Managed trough:
Waste recycling
Soil
Air
Water
Noise
Types of Pollution
Terdiri Atas
Natural Factors
Natural Disasters :
Tsunami
Earthquake
Volcanic eruption
Landslide
Human Factors
Illegal deforestation
Exploitation of marine resources
Land clearing for agriculture, settlements, and industry

Learning Activities I

Problem Orientation
Interpretation Indicators

Bio-Think

Indonesia Ranks First in Food Waste Generation Across ASEAN

According to the United Nations Environment Programme (UNEP) in its Food Waste Index 2021, Indonesia ranks as the largest food waste contributor in Southeast Asia, with an estimated 20.93 million tons of food waste generated each year.

Globally, Indonesia is also ranked second in the world as one of the most frequent producers of food waste, based on a 2011 report by The Economist titled Fixing Food: Toward a More Sustainable Food System.

Furthermore, data from the 2022 waste composition chart on the National Waste Management Information System (SIPSN) website reveals that food waste accounts for the largest percentage—41.5%—of total waste. This is followed by waste from wood, twigs, and leaves. These statistics confirm that food waste dominates the types of waste found in our environment.

At its core, food waste refers to discarded food that is no longer edible or suitable for further waste processing because it contains substances harmful to the environment. There are two main categories of food waste:

- Leftovers, caused by over-serving and cultural habits of excess in urban communities.
- Food waste, which results from poor planning and mismanagement, including both edible and inedible food items.

The consequences of food waste are not limited to environmental damage—it also contributes to the global food crisis, especially given how much food is produced but ultimately wasted. Discarding food also means wasting all the resources used throughout its production, including water, energy, and human labor.

LIVEWORKSHEETS

Food waste may seem like a minor issue, but if ignored, the growing piles could lead to catastrophic consequences, including health and safety hazards. Every individual has a responsibility to protect the environment, starting with not contributing to food waste. Be mindful in choosing and preparing food to reduce waste for the sake of our planet and a safer future.

Source :
https://infid.org/indonesia-penyumbang-sampah-makanan-terbanyak-se-asean/

Let's Check Your Knowledge!

Based on the article above, please answer the following questions!

1. Based on the reading, what are the main causes of food waste in Indonesia? Explain why this is a serious environmental issue.

.....
.....
.....

2. Why do people in Indonesia produce so much food waste every year?

.....
.....
.....

3. What are some simple steps that can be taken at home or at school to reduce food waste?

.....
.....
.....

WASTE & RECYCLING

INTRODUCTION

Waste basically refers to materials that are discarded or disposed of, originating from human activities or natural processes, and which have no economic value—or in some cases—even carry a negative economic value.

DEFINITION OF WASTE AND RECYCLING

Waste is the residue or discarded material from an activity or process that is considered to have no use value and is generally disposed of by its owner. Waste can come from various sources, such as households, industry, agriculture, and other commercial activities. Waste has several forms, namely solid, liquid, gas, and hazardous and toxic waste (B3) which can pollute the environment if not managed properly (Ministry of Environment and Forestry, 2020). According to the World Health Organization (WHO), waste is also defined as discarded or wasted material that has the potential to damage the environment and human health if left without proper management.

Recycling is the process of converting waste into new materials or products that can be reused, either in the same form or in another form. The recycling process aims to reduce the amount of waste discharged into the environment, conserve natural resources, and reduce pollution.

TYPES OF WASTE

Based on its form, waste is divided into three categories, i.e.:

1. Solid Waste

Solid waste is the remains of human activities or industrial processes in the form of solids. This waste can be in the form of household garbage (such as plastics, paper, and metals) or industrial waste such as leftover raw materials and unused products. Solid waste often causes problems due to its large volume and difficulty to decompose.

2. Liquid Waste

Liquid waste is discharge in the form of liquids originating from household, industrial, or commercial activities, such as household wastewater, chemical residues, and used washing water. Liquid waste has the potential to pollute groundwater and waters, and endanger living things if not managed properly.

3. Gas Waste

Gaseous wastes are gaseous waste substances released into the air, often from industrial and transportation activities. Gaseous waste can include CO_2, SO_2 and NO_2 emissions that contribute to air pollution and climate change. These wastes are extremely harmful to human health and the environment.

mage Waste plastic beverage bottles
Source:
https://kadujayaperkasa.com/id/blog/detail/id/238

Image Recycling waste plastic beverage bottles
Source:
https://diperpa.badungkab.go.id/Artikel/18039-buat-kreasi-pot-tanaman-hias-dari-botol-bekas-

TYPES OF WASTE

Based on the type of material, waste is divided into 2, including:

1. Organic Waste

Organic waste is waste that comes from natural materials or living organisms, such as food waste, leaves, and wood. Organic waste is generally easily biodegradable, but if the amount is large, it can cause environmental problems such as odor and the formation of methane gas that can pollute the air.

2. Inorganic Waste

Inorganic waste is waste that is difficult to decompose naturally and usually comes from synthetic or mineral materials, such as plastics, glass and metals. This waste takes a very long time to decompose and often contaminates soil and water.

Aluminium

This aluminum includes used beverage or food cans that can be recycled as raw materials for new cans.

Organic Waste

Organic waste, which includes leftover fruits, vegetables, and leaves, can be recycled into compost.

Steel

Steel can be re-constructed or can be recycled by the smelting process to become new steel.

Plastic

Plastic waste, such as packaging bottles, can be recycled into new plastic.

Paper

All paper waste can be recycled. For example, newsprint and cardboard.

Glass

Glass Waste glass including syrup bottles, soy sauce bottles, plates, and broken glasses can be recycled through melting into new glass.

Inference Indicators

Bio-Link

MORE INFO

To facilitate your understanding, here is a video link about environmental pollution and waste management!

SCAN ME

Environmental pollution video
Source: Youtube

SCAN ME

Waste processing video
Source: Youtube