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| Activity plan | | | | |
| ACTIVITY PLAN | | | | |
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| **Theme** | **Subtopic** | **Activity Title** |
| 1. Environmental Awareness and Conservation | 1.1. Biodiversity and Ecosystems | Math models for biodiversity and ecosystems |

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| Introduction part (or activity overview) |
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| **Introduction part (or activity overview)** | The purpose of this activity with its tasks is for students to get familiar with the mathematical models and formulas that provide an analysis of the diversity index and the relationships in an ecosystem. Based on the calculations of abundance, species richness and diversity, as well as the interpretation of diversity indices (several types), students should draw conclusions about particular ecosystem(s) or communities. Main idea is to understand the meaning of biodiversity on this planet, and to be more aware of endangered species. |
| **SETTING** | Classroom |

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| Materials Needed |
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| **Materials Needed** | * Computer (phone or tablet can be used to watch the videos, to do some calculations), notebooks, pens, calculators, A3 format of paper, paints or markers, stickers, styrofoam, different objects, push pins in different colours. |

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| **Learning Outcomes** | * Develop a greater awareness for disrupting diversity by disrupting ecology in an environment. * Learn about the different formulas for calculating diversity indices. * Make calculations and interpret different scenarios for different ecosystems. * Acquisition of computer skills for statistical data processing. |  |
| **Activity Contents** | **Activity: Math models for biodiversity and ecosystems**  **Theoretical Part** **(Duration: 45 minutes)**: What is biodiversity? Can you explain how one ecosystem is more diverse than other? Share opinion about examples of more and less diverse ecosystems? Instructions for work in MS Excel to do the calculations easier and faster. Information about math models and formulas for these diversity indices.        Short videos on this topic:  <https://www.youtube.com/watch?v=GK_vRtHJZu4> (Duration: 4:18)  <https://www.youtube.com/watch?v=ghhZClDRK_g> (Duration: 3:37 - 4:22)  Overview: Why is this topic important?  **Task 1 (Duration: 30 minutes)**  The students are given task of making two ecosystems in which they will use various objects as species or on 2 A3 sheet they will draw species of plants or animals, or even more creatively they will use stickers or styrofoam push pins as substitution for different species.  Students can work individually or in pairs.  (If they work in pairs one students will create Ecosystem A and the other Ecosystem B and after that compare the indices for each ecosystem and make short discussion about it)  **Task 2 (Duration: 40 minutes)**  In MS Excel students enter the data from the A3 paper or styrofoam models and they calculate the indices. After that make conclusions about the ecosystems and compare the calculated values with the theory. Presentation of each task activity.  Short videos for this task:  <https://www.youtube.com/watch?v=7DOuku8876I> (Duration: 2:08 – 4:07)  Overview: Calculations for the Simpson’s Reciprocal Indices.  <https://www.youtube.com/watch?v=esBAg3Hu4WE> (Duration: 4:15 – 5:50)  Overview: Calculations for the Simpson’s Diversity Indices.  <https://www.youtube.com/watch?v=fjxWGZGzePk> (Duration: 16:45 – 22:00)  Overview: Calculations for Similarity Indices.  <https://www.youtube.com/watch?v=ghhZClDRK_g> (Duration: 1:36 - 2:42)  Overview: Calculations for Shannon Diversity Indices. |  |
| **Assessments** | The teacher evaluates the students' work and achievements through:   * Verbal feedback during class; * Conversation with/among students; * Monitoring of students during individual work; * Observation the individual contribution of each student when working in groups; * Evaluation of students' work and creation of an ecosystem with calculated diversity index;   The final score is evaluated with a grade. It is possible to involve all students in the class in the assessment. Each student self-assesses his contribution to the work. |  |
| **Key Competences** | * Cognitive competence * IT competence |  |
| **Connections with Eco STEAM** | **Eco:** Understanding that ecology directly affects all species, especially endemic ones.  **S**cience: Knowledge of biology and ecology in biology for rate of biodiversity in an ecosystem.  **T**echnology: Use of MS Excel to calculate the indices.  **E**ngineering: Through ecosystem engineering and new applied concepts to improve the management in one community.  **A**rt: Creation of two models of ecosystem with the same number of organisms (at least 10) on paper using drawings or illustrations (maybe some stickers), a styrofoam model on which are placed more of the same or different objects.  **M**ath: Mathematical calculations and statistical tables for evaluating the diversity indices. |  |
| **References** | <https://www.khanacademy.org/science/ap-biology/ecology-ap/community-ecology/v/simpsons-index-of-diversity>  <https://www.youtube.com/watch?v=8dYSvo8EqFE>  <https://www.youtube.com/watch?v=GEsGTzOedXw> |  |
| **Notes** | •The activity should be adaptable to different local ecosystems and communities.  • Encouraging students to be more aware about the diversity in their surrouning. |  |

**Assessment Table for Web Quest Reports:**

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| Assessment Criteria | Points | Comments |
| Creativity for the model of ecosystem | \_\_/5 |  |
| Reliability of numerical data | \_\_/5 |  |
| Interpretation of the obtained results | \_\_/5 |  |