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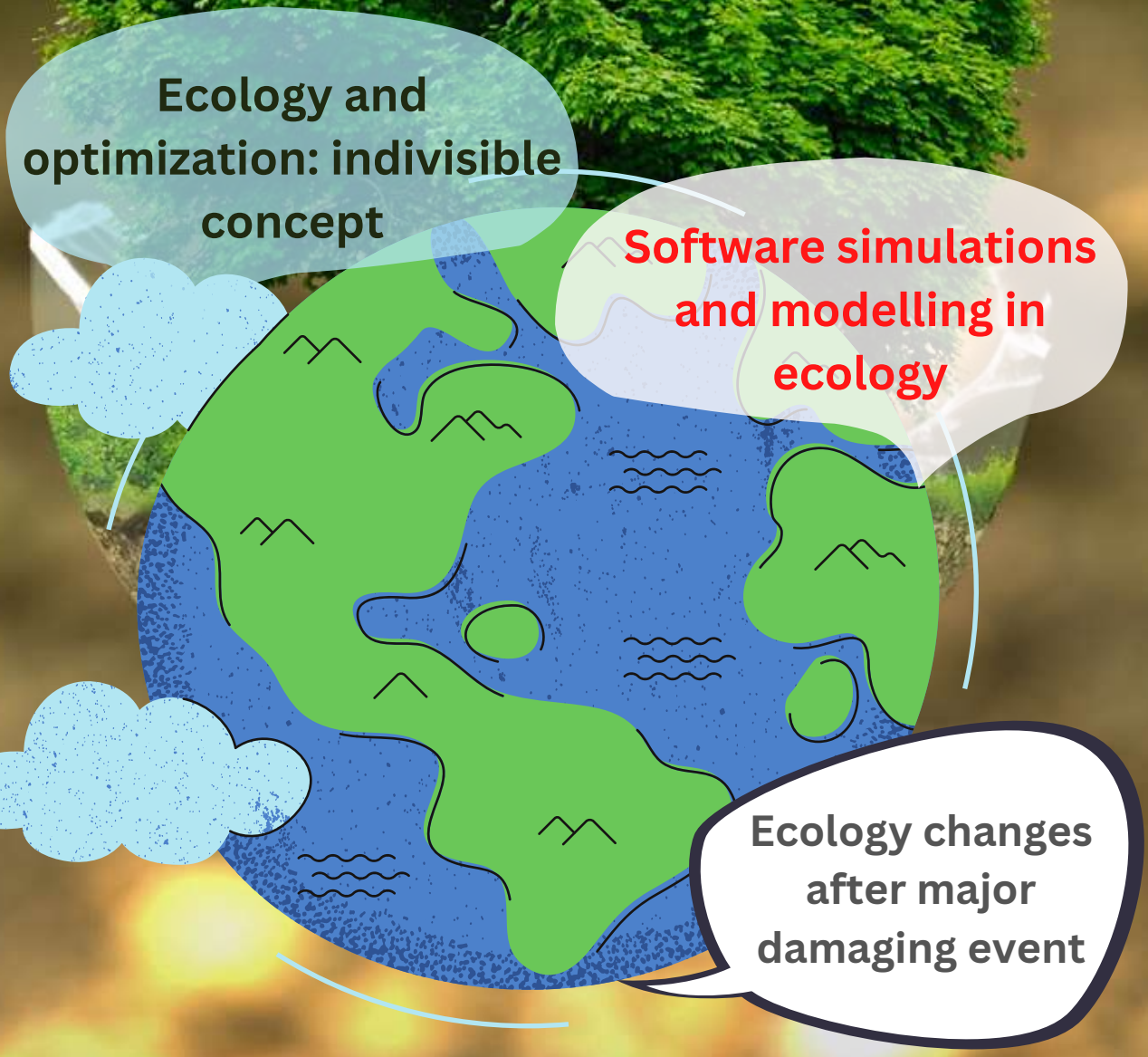
EARTH ROOT



About E-magazine

“Earth Root” is an open access e-magazine in the discipline of Environmental sciences published by Earth Root Foundation. The aim of the e-magazine is to provide information and upgradation of knowledge about environmental issues on wider scale and to share ideas and resources to the readers. Using essential knowledge people can lead a healthy life, which is more sustainable and can connect with ongoing efforts for stopping catastrophically the climate change. E-magazine caters to all related environmental aspects ranging from big issues like climate change, renewable energy and pollutants in the atmosphere to the health of human and living beings on Earth. We also take topics of water resources and efforts and measurement to provide optimum use of it; including large scale atmospheric circulation linked with oceans and ecology.

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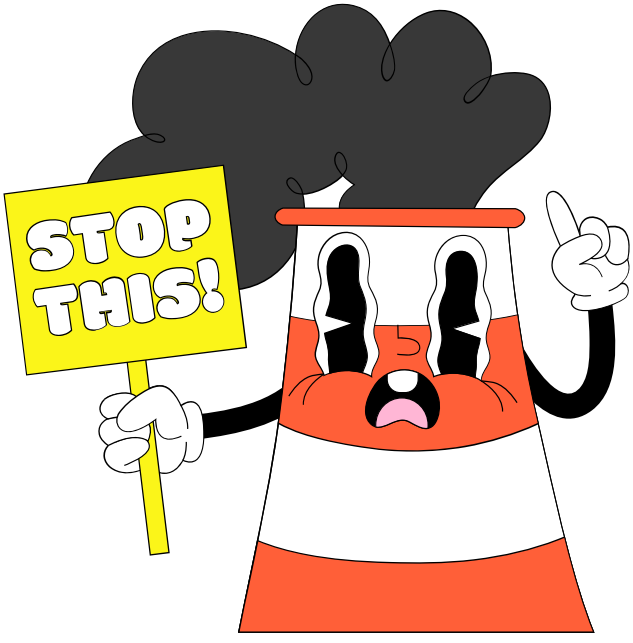

ENERGY CRISIS AND ECOLOGY

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The energy crisis means that the world's demands on the limited natural resources like water, electricity that are used to power industrial society are diminishing or reducing day by day as the demand rises in the world. These natural resources are in limited supply to the world. While they do occur naturally but it can take hundreds of thousands of years to form or regenerate and replenish the stores.

The environmental problems are directly related to the energy production and consumption include water pollution, air pollution, climate change, noise pollution, thermal pollution, and solid waste disposal like plastic waste , kitchen and factory waste and do you know the emission of air pollutants from fossil fuels is the major cause of urban air pollution.

Source: clipartmax.com

What is the impact of energy crisis?

An energy crisis is any significant bottleneck in the supply of energy resources to an economy. In literature, it often refers to one of the energy sources used at a certain time and place, in particular those that supply national electricity grids or those used as fuel in vehicles.

All in all, the energy crisis has three main impacts on the economy, such as the increase of oil prices, petrol prices, financial downturns and it offers the opportunity to develop renewable energies and other things. Oil reserves are decreasing day by day which has the effect that the oil prices rise steadily.

The conclusion of energy crisis & ecology is energy crisis and environmental concerns raised the necessity for the new biofuels. Biodiesel is a clean alternative to fossil fuel. A green approach for biodiesel production through enzymatic biodiesel production has gained a lot of attention due to the drawbacks of chemical methods.

SOFTWARE SIMULATIONS AND MODELING IN ECOLOGY

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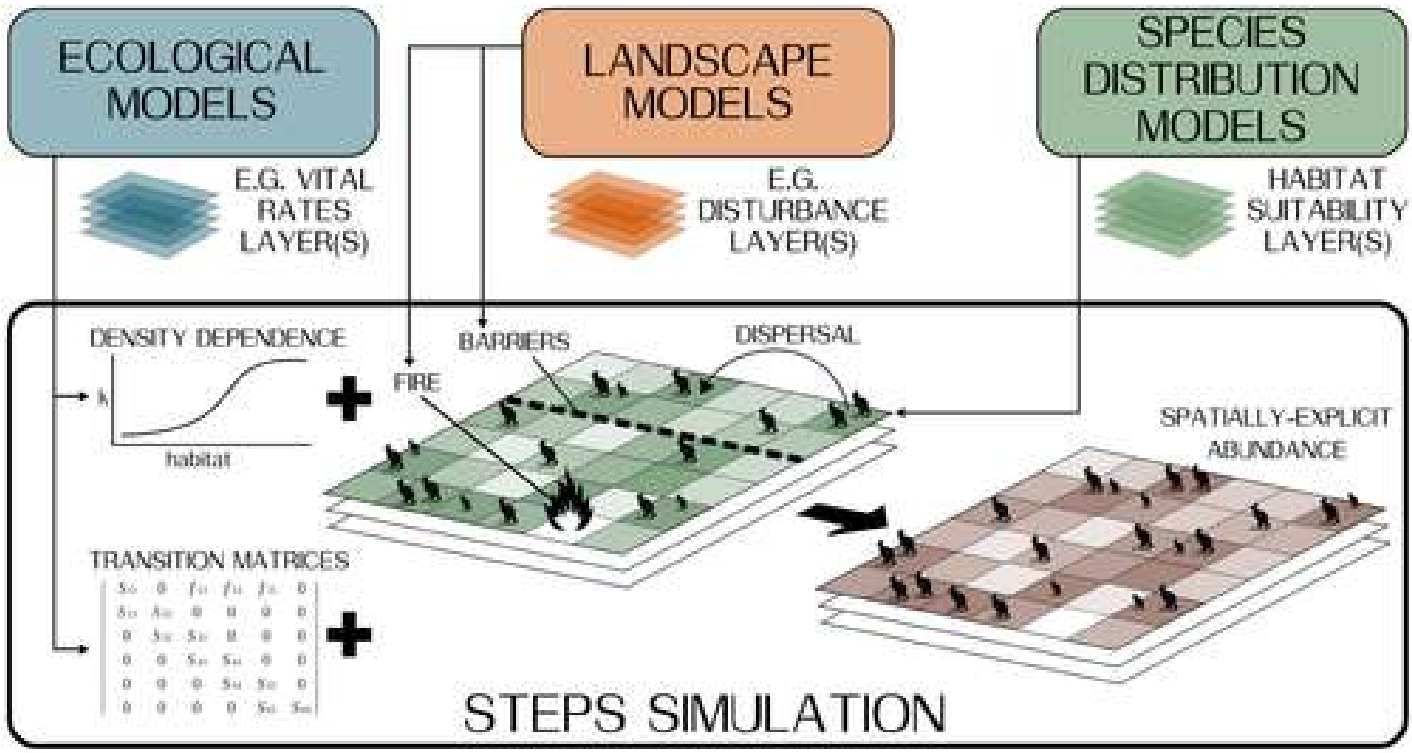
The earth consists of three spheres, the hydrosphere, lithosphere, and atmosphere. The combination and the interaction of these three spheres lead to the formation of the biosphere. The biosphere is the region of the Earth where life exists. All the ecosystems are present in the biosphere. Ecology is "the branch of biology that deals with the relations of organisms to one another and their physical surroundings." Ecologists are required to maintain large amounts of statistical records, such as sampling the number of species in a given area. Statistical ecology deals with the creation of new methodologies for analyzing ecological data.

Models of the geographic distributions of species have wide applications in ecology. But the nonspatial, single-level, regression models that ecologists have used frequently do not deal with obstacles of irregular sampling intensity or spatial dependence and do not sufficiently quantify uncertainty. Adding hierarchical levels to the models has many benefits in allowing the human transformation of the landscape to be taken into account, as well as additional parameters of the sampling process. Many software utilized are namely Vortex, Rama, GIS, and so on.



Utilization of such advanced helps ecologists in research but also know the condition of an ecosystem and the problems that may arise. It in itself is not a solution but it certainly leads us closer to it.

CARBON MODELLING

Manisha Mani
Packaging technologist

Carbon is the principal building block for the organic and inorganic compounds that make up life. Carbon dioxide plays a significant role in trapping heat in Earth's atmosphere. The gas is released by exertion and exhaustion of fuels and the concentration of carbon dioxide moves and changes through the seasons. A carbon footprint is a total amount of greenhouse gases (CO2 and CH4) that are generated by our actions. Limestone, occurring as calcium carbonate is one of the carbon forms that is abundantly found on the earth. It is dissolved in fresh water and is present in the atmosphere as carbon dioxide. It is the second most greenhouse gas which is present on the planet leading to the environmental threat of climate change.

The flow of carbon throughout the biosphere, atmosphere, hydrosphere, and geosphere is one of the most complex, interesting, and important of the global cycles. Using the tools of information from biology, chemistry, oceanography, and geology the flow of carbon through various spheres can be studied and a global carbon cycle can be interpreted.

Importance of carbon in Ecology

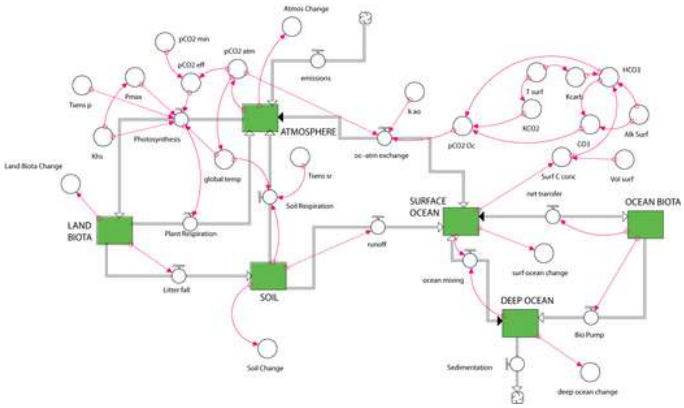
- It is the chemical backbone of life on Earth
- To regulate the Earth's temperature
- make up the food that sustains human life.
- provide energy that fuels our global economy

The Nobel Prize-winning Swedish chemist, Svante Arrhenius, 1896 studied the potential effects of human activities on the carbon cycle and the implications for climate change. He realized that CO2 in the atmosphere was an important greenhouse gas and that it was a by-product of burning fossil fuels (coal, gas, oil). Using the global 3-D climate models of supercomputers he calculated the doubling of CO2 in the atmosphere that would lead to a temperature rise of 4-5°C

A carbon model shows the quantity of each material used in a project and multiplies that by that materials emission factor to calculate a carbon footprint. Scientists can use models to understand and predict the fluctuations in the concentration of carbon dioxide activity. Carbon modelling is the future of the industrial revolution in building robust and efficient production cycles. Potential pitfalls that can arise will be avoided with the effective integration of the right data combinations.

The carbon model is used to simulate and sequester the fate of the carbon in the atmosphere. It is the tool used to interpret and evaluate the carbon addition to the atmosphere after fossil fuel burning and tract records of heat and Ph generated. It is also used to evaluate how permafrost melting amplifies warming under the different emission scenarios.

STELLA model is one of the Global carbon cycle models that is being used for carbon interpretation. This model incorporates the processes of carbon transfer in the terrestrial and oceanic realms. It also includes the history dating from 1880 to 2010 of human impacts on the carbon cycle in the form of emissions from burning fossil fuels, burning forests, and disrupting the soil. The reservoir controls and maintains the flow of the fuel with a valve system. The atmosphere reservoir is connected to a converter called pCO2 atm — this is the concentration of CO2 in the atmosphere and the units are in parts per million or ppm, the same units that CO2 concentrations are typically given in.



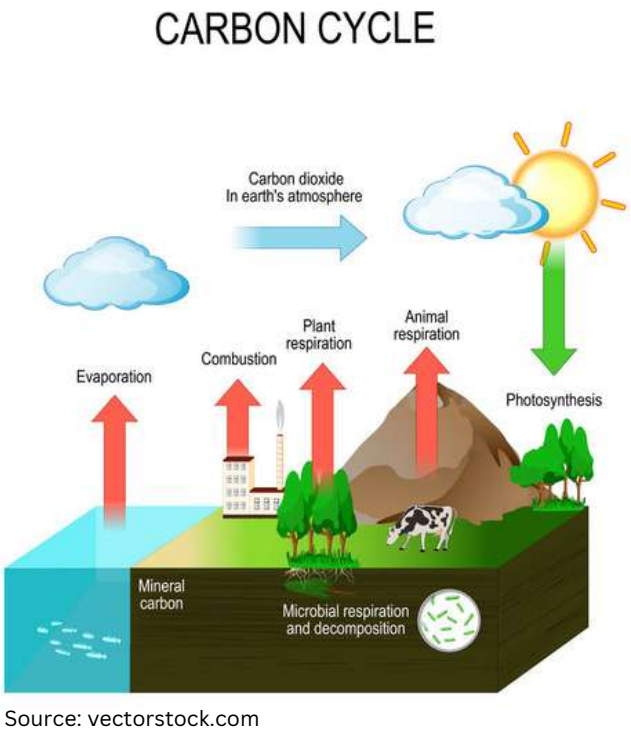
Source: personal.ems.psu.edu

In this model, the initial amount of carbon in the atmosphere gives a pCO2 value of 280 ppm (and by now, it is just over 400 ppm). The pCO2 atm converter is in turn connected to the same climate model here it determines the strength of the greenhouse effect. The climate model calculates the temperature at each moment in time and then passes that information back to the carbon cycle model in the form of a converter called global temp change, which is the change in global temperature relative to the starting temperature is like a temperature anomaly.

The global temp change converter is connected to a couple of other converters that attach to the photosynthesis and soil respiration flow. Both flows are intuitive to temperature and the temperature combines with something called temperature sensitivity. The Tsens sr records the temperature sensitivity for soil respiration. Both photosynthesis and soil respiration are sensitive to temperature as they increase with temperature.

Global temp change is also connected to the surface temperature of the oceans (T surf) via a "ghosted" version of the converter — a dashed line version that helps eliminate so many long connecting arrows running all over the diagram. These converters assess the parameters like temperature, atmospheric CO2, and PH acidity. At the very top right of the model, there is a converter called Observed Atm CO2 that contains the observed history of atmospheric CO2 concentration from 1880.

The efficiency of the model is continuously monitored. If our carbon cycle model is efficient, then it should calculate a pCO2 that closely matches the observed record. The model includes the historical records of carbon emissions from burning fossil fuels and a history of land use changes that impact the carbon cycle. These land use changes are segmented into burning that accompanies deforestation and soil disruption related to farming in addition to the flow of carbon from the land biota and soil back into the atmosphere. These human alterations effeminate the carbon cycle and are shown in the model by clicking on the graph icons and land use changes on the right side of the model.



Source: vectorstock.com

Source: dreamstime.com

It is often difficult to be precise, but consideration of the materials, labour, fuel and other resources required can produce reasonably indicative estimates. Having built a carbon model for one product, draw insights, and integrate all the other products' carbon footprint with its parameters and process boundaries. This can be used for enabling the identification of carbon 'hotspots' across programmes, and for continuous improvement and is an important aspect of any model

The carbon model can be established by system boundaries for both capital and operational model.The necessary trackable parameters can be set accordingly. Once the parameters are set, the next step would be to identify the materials and products the system operation will use. Suppliers can help with the carbon spent for each material and the process controls. Validate the raw data provided to the system standards. Other carbon data is available from the government and industrial sources. Perform your emissions calculations as required, based on your knowledge of the quantities required and the building's likely energy consumption.

ECOLOGY AND OPTIMIZATION: INDIVISIBLE CONCEPTS

Ritika Sen

Freelance content writer

The branch of science comprising of human science, ecosystem, biosphere, population, and community. It is the study of organisms, how they interact with each other and how they interact with the environment around them. Ecology is studied at various levels such as organisms, populations, communities, biosphere, and ecosystems.

An important emphasis is given to understanding the distribution of biotic and abiotic factors of organisms.

Biotic components of ecology are defined as the living factors of any ecosystem. Example- Bacteria, fungi, animals, birds, etc. On the other hand, abiotic components are non-living, chemical, and physical factors of any ecosystem. Example- Soil, air, and Sunlight.

Optimization is described as the action taken to make the best use of any resource or situation. Optimization in old methods is required to reach new methods for increasing the convenience of users. As technology is reaching new milestones and is improving day by day. This has to have an impact on ecology in a friendly yet for way. By optimization in ecology new ways can be found to conserve it but with optimization comes new challenges also. To meet human requirements, it is the utmost necessity of the time to look over the flaws to optimize them well. For various types of ecology different optimizations are required. So on a whole ecology and its optimization are like two peas in a pod.

Importance of Ecology

- To conserve the environment
- For resource allocation
- For energy conservation

Source: entri.app

MOVIE RECOMMENDATION: THE BEAUTY (2019)

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When was the last time you were moved by a film or documentary? Can you think of any which have made you reconsider your beliefs, or change your behavior? What about environmental films- when you think of an impactful environmental film, what do you think of it? Why do you think it made an impact? What is the impact? One answer would be change- a beautiful, moving film is distributed to a wide and diverse audience who will duly be inspired and care enough about the cause to take action. One such movie is "The beauty" which was released in 2019.

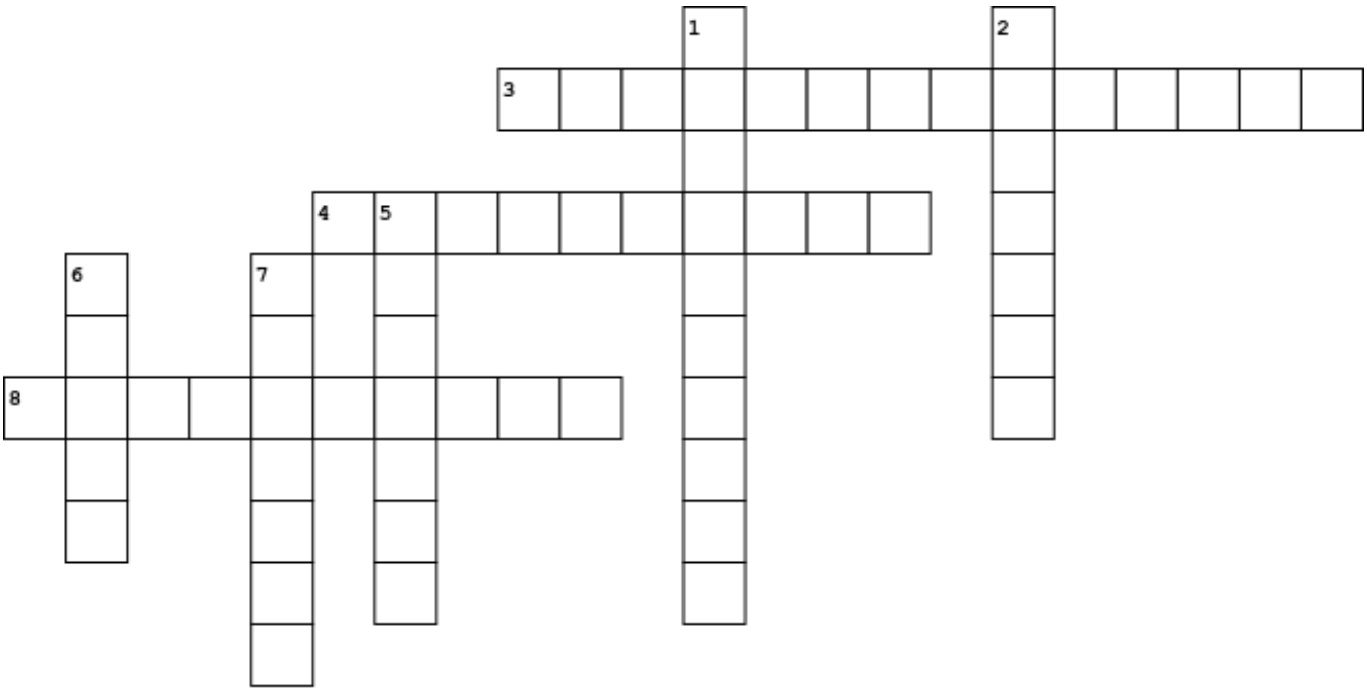
"The Beauty " is a four minute short animated movie directed by Swiss Filmmaker Pascal Schelbi and produced by Aleksandra Todorovi and Tina Vest. Being an animated movie and that too in a poetic sense there is only a single narrator whose voice is given by Charlie H Gardner. Music given by Alexander Wolf David and Petteri Sainio. The movie is also a Winner of a Student Academy Award in 2020.

Basically 'The beauty' is a movie which makes you stick to the end and through a poetic journey you get the flow. It's equally filthy and stunning. In this four minute movie the plastic pollution is not just shown vaguely but it's integration into marine life and how it will affect and the concluding line "that's how we enjoy beauty" fills one with guilt and pushes, challenges one to take some action regarding the same. The animation and screenplay is done in such a manner that there is no cast or characters but like a fish of plastic, aquatic plants made up of straws are enough to convey the message. Discovering a world where concerns, fears, and dilemmas are dissolved into the mysterious depth of the polluted blue sea and this is what is shown in this animated movie.

This movie was made over two years and was inspired by underwater Egypt. In a statement, Schelbli describes the motivation behind the film:
"Instead of showing another mournful stomach full of plastic bags, I thought, ‘what if plastic could be integrated into sea life and nature solves the problem? ’The film should take you on a journey, where all our feelings of guilt will disappear. But in the end, we wake up and realize that we need to change something"

With an amazing screenplay, music that's making the movie more intense and provoking, and the narration stands the movie 7.2/10 on IMDb but personally if I would have to rate I would have rated it 9/10 or 10/10 because these are the movies that we need which can instigate the sense of responsibility and consciousness towards environment amongst us. Would highly recommend this movie. Four minutes is not a long duration but if we spend even those four minutes effectively we can make them worth spending. Available on YouTube and various sites.

CROSS WORD



Across

3. Overfertilization of water bodies due to excessive concentration of nitrates and phosphates leading to algal bloom.

4. The microorganisms which decompose the detritus.

8. Decomposition of organic solid wastes under aerobic conditions.

Down

1.Area covered by the surface of the earth by ice and glaciers.

2. Scientific study of the relationship of living organisms with each other as well as with their environment.

5. Zone of the junction between two or more diverse ecosystems.

6. Plant community of a region is the flora of that area.

7. Amount of living matter present in an organism at a given point in time.

1. cryosphere, 2. ecology, 3. eutrophication, 4. detrivores, 5. ecotone, 6. flora, 7. biomass, 8. composting

CREDITS

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