

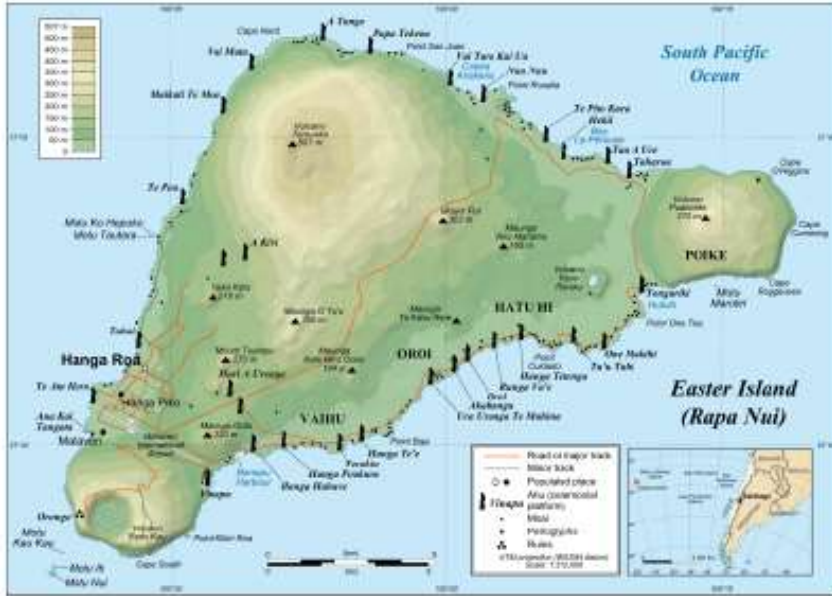


<https://www.youtube.com/watch?v=eR2IXZqPCkE>

Mystery of Easter Island

NOVA MYSTERIES

VIDEO ANALYSIS QUESTIONS



- Summarize the video in three sentences. _____

- In what country is the experiment being conducted? _____
- According to legend, how did the Maori statues move? _____
- What are some causes of the death and failure of civilization on Easter Island? _____

- How did the scientists solve the problem of the statue not standing on its own? _____

- What was the solution to the scientist's problem of the statue not moving? _____



THE MYSTERY OF EASTER ISLAND

An Ecology Case Study

The history of Easter Island, its statues and its peoples, has long been shrouded in mystery. Some have suggested that aliens marooned on earth planted the statues as signals to their fellow aliens to rescue them. Others have said that the statues were constructed by a great race of guilders that were stranded on the island and built them before being rescued. Still others are convinced that an ancient society with the capability of flight constructed them along with the Nazca lines in Peru. However new evidence based on pollen analysis supports a much simpler theory, that the Easter Island inhabitants destroyed their own society through deforestation.

When Easter Island was "discovered" by Europeans in 1722, it was a barren landscape with no trees over ten feet in height. The small number of inhabitants, around 2000, lived in a state of civil disorder and were thin and emaciated. Virtually no animals besides rats inhabited the island and the natives lacked sea-worthy boats. Understandably, the Europeans were mystified by the presence of great stone statues, some as high as 33 feet and weighing 82 tons. Even more impressive were the abandoned statues-as tall as 65 feet and weighing as much as 270 tons. How could such a people create, and then move such enormous structures? The answer lies in Easter islands' ecological past, when the island was not a barren place.

The Easter Island of ancient times supported a sub-tropical forest complete with the tall Easter Island Palm, a tree suitable for building homes, canoes, and latticing necessary for the construction of such statues. With the vegetation of the island, natives had fuel wood and the resources to make rope. With their sea-worthy canoes, Easter Islanders lived off a steady diet of porpoise. A complex social structure developed complete with a centralized government and religious priests.

It was this Easter Island society that built the famous statues and hauled them around the island using wooden platforms and rope constructed from the forest. The construction of these statues peaked from 1200 to 1500 AD, probably when the civilization was at its greatest level. However, pollen analysis shows that at this time the tree population of the island was rapidly declining as deforestation took its toll.

Around 1400 the Easter Island palm became extinct due to over harvesting. As well, its capability to reproduce had become severely limited by the proliferation of rats, introduced by the islanders when they first arrived, which ate its seeds. In the years after the disappearance of the palm, ancient garbage piles reveal that porpoise bones declined sharply. The islanders, no longer with the palm wood needed for canoe building, could no longer make journeys out to sea. Consequently, the consumption of land birds, migratory birds, and molluscs increased. Soon land birds went extinct and migratory bird numbers were severely reduced, thus spelling an end for Easter Island's forests. Already under intense pressure by the human population for firewood and building material, the forests lost their animal pollinators and seed dispersers with the disappearance of the birds. Today, only one of the original 22 species of seabird still nests on Easter Island.

With the loss of their forest, the quality of life for Islanders plummeted. Streams and drinking water supplies dried up. Crop yields declined as wind, rain, and sunlight eroded top soils. Fires became a luxury since no wood could be found on the island, and grasses had to be used for fuel. No longer could rope be manufactured to move the stone statues and they were abandoned. The Easter Islanders began to starve, lacking their access to porpoise meat and having depleted the island of birds. As life worsened, the orderly society disappeared and chaos and disarray prevailed. Survivors formed bands and bitter fighting erupted. By the arrival of Europeans in 1722, there was almost no sign of the great civilization that once ruled the island other than the legacy of the strange statues. However, soon these too fell victim to the bands who desecrated the statues of rivals.

Easter Island is a prime example of what widespread deforestation can do to a society. As the forests are depleted, the quality of life falls, and then order is lost. The example of Easter Island should be enough for us to reconsider our current practices.



Figure 1 Location of Easter Island on the Globe.

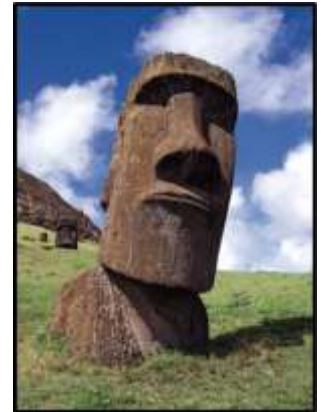


Figure 2 Moai are giant human figures carved from rock on the Polynesian island of Rapa Nui (Easter Island) between 1250 and 1500 CE.

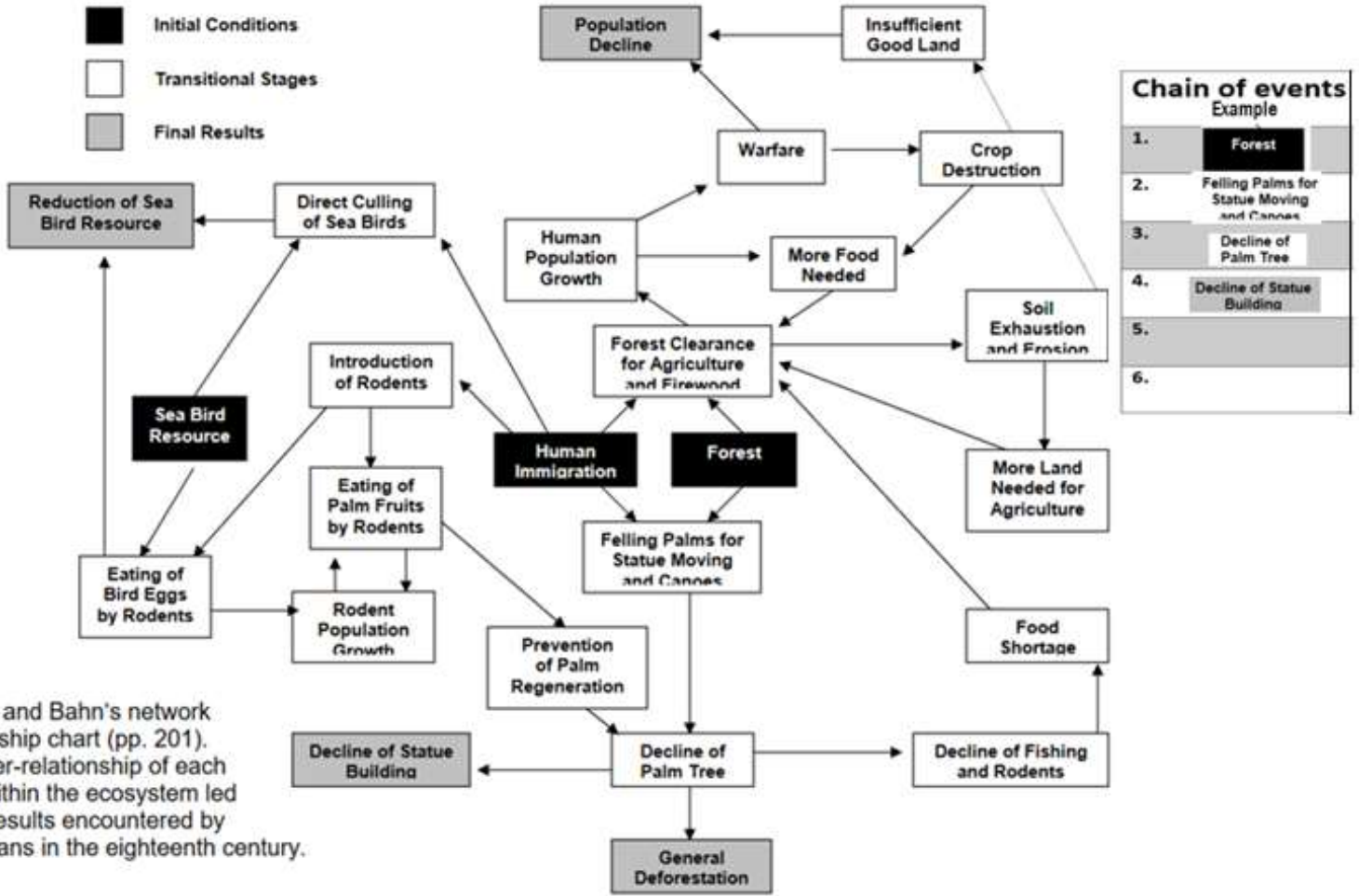


PART ONE: Article Question

1. Explain what happened to all the palm trees on Easter Island.
2. Where did the rats come from and why did they have such a negative effect on the palm tree?
3. Explain what happened to the birds on Easter Island.
4. What did the decline of porpoise (e.g. dolphin) bones in garbage piles indicate?
5. Why weren't the people on Easter Island able to grow their own food to survive?
6. Why did the Easter Islanders stop producing giant Moai statues?
7. Imagine that you could help the people of Easter Island prevent the destruction of their civilization before it happened. What three pieces of advice would you give them to help them avoid the collapse of their society and make them live more sustainably?



PART TWO: Look at the network relationship chart below, describe three chains events from initial conditions to transitional stages, then final results. Use the example



Flenley and Bahn's network relationship chart (pp. 201). The inter-relationship of each actor within the ecosystem led to the results encountered by Europeans in the eighteenth century.

Chain of events #1	Chain of events #2	Chain of events #3
1.		
2.		
3.		
4.		
5.		
6.		

Which if the chain of events do you think is more responsible for the population crash? Explain your answer.



Identifying the parts of an experiment

Dr. Sonia Haoa has been researching the Easter Islands for years. She knows from researching other cultures that increasing population growth combined with a fragile environment can lead to a population collapse. She wondered if this was the same reason for the downfall of the Rapa Nui society. She thought, yes, the cause of the population crash of the Rapa Nui society was due to the population growth resulting in reduction of natural resources. She decided to test this by comparing the population vs. the amount of natural resources available. She would compare the results to a stable growth society. She asked the question; How does the amount of natural resources available affect the population of the Rapa Nui society? She thought that if the amount of natural resources decrease, then the population of Rapa Nui society would decrease because there would not be enough food and shelter for the people.



1. What was the observation?
2. What was the informal question that led to the experiment?
3. What evidence did Dr. Haoa use to try and answer the informal question?
4. What was her inference (informal hypothesis)?
5. How was she going to test the question?
6. What is the control group?
7. What was the experimental question?
8. What is the independent variable?
9. What is the dependent variable?
10. What was her hypothesis?

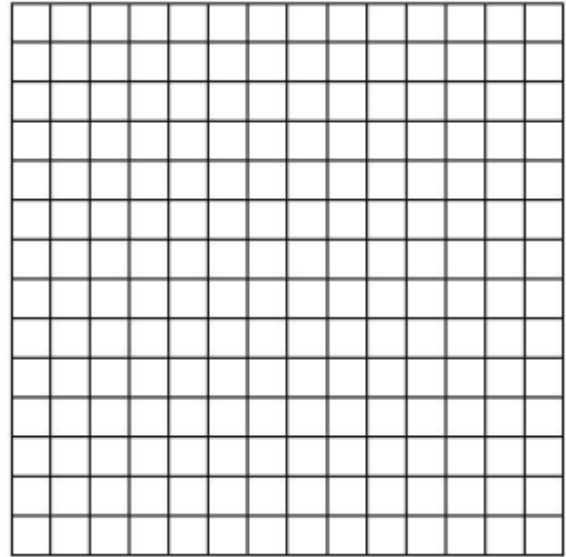


Graph the data below, make sure to scale the graph correctly and use I-Talk to have all of the correct parts

PART TWO: Graphing Skills

How does the amount of natural resources available affect the population of the Rapa Nui society?	
Population (Thousands)	Natural resources (Thousands Kg)
0	12000
50	12000
110	11500
400	11000
1450	10500
2150	10000
5900	9600
9400	7500
10200	6050
9200	5500
7550	4900
5800	4950
4200	5000
3800	5550
3500	6000

Use I-TALK to create a graph



1. What is the correlation on the graph?
2. If the hypothesis was, if the amount of natural resources available increase the population of the Rapa Nui society would decrease because of the lack for food and shelter, was the hypothesis supported or disproven?

Dimensional analysis

1. Chandler is 4,180 miles from Easter Island. What is this distance in kilometers? (1 km = .62 mile)
2. The tallest moai erected, called Paro, was almost 10 metres high and weighed 90.4 tons! What is the height in inches? What is the weight in kilograms? (1 meter = 100 cm, 12.54 cm = 1 in, 1 ton = 2000 lbs, 2.2 lbs = 1 kg)
3. In the early '80s, researchers tried to recreate some of the statues and move them using only tools that the islanders had to their disposal. They found this almost impossible to do. Then in 1987, American archaeologist Charles Love managed to move a moai replica. He and his men rolled the statue 46 meters in just 2 minutes. How fast is that in mi/hour? (1000 meters = 1 kilometer, .621 miles = 1 kilometers, 60 min = 1 hour).
4. Dr. Sonia Haa is trying to carbon date the 900 moai statues on Easter Island. Using modern techniques, she is able to carbon date 3 statues every day. How many months will it take her to carbon date all of the statues?