Discussion #3: Opposite Paths to Success: New Guinea, Tikopia, and Japan

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Class Web Site: http://www.atmos.umd.edu/~rjs/class/honr229L

ELMS Page: https://myelms.umd.edu/courses/1229919

http://www.progresstrap.org/assets/Tikopia-crt.png
http://www.satelliteeye.dk/weeklyimages/week51/Week51_2006_2_Full.jpg

13 September 2017
Tomorrow

We shall meet 7:00 am tomorrow, in front of this building!
Dress nicely: bring pen/paper for notes

The Center for Climate and Energy Solutions cordially invites you to save the date for

**State of the Art: Innovations in CO2 Capture and Use**
Thursday, September 14, 2017
8:30 a.m. – 12:30 p.m.
Hart Senate Office Building, Room 902
Tomorrow

We shall meet 7:00 am tomorrow, in front of this building!
Dress nicely: bring pen/paper for notes

If you sent in an RSVP, you were sent a ticket, which you should either print and carry or else be able to show on your phone:

We’ll debrief the class on this event next Monday.
Class Enrichment

If you have ideas for other class enrichment events (i.e., local visits, guest speakers for a special class meeting, etc) please let me and Walt know
Possible Meeting Date Change

Considering moving class scheduled for next Wed, 20 Sep (Rosh Hashanah) to 22 Sep

Julia lead of this meeting, focused on China

Who can not attend on Wed, 20 Sep ???
HONR 229L: Climate Change: Science, Economics, and Governance

After today’s class

Great if Brad and Julia can stick around to discuss next week’s presentations
First Paper

• Description of the paper topic due a week from today:
  https://myelms.umd.edu/courses/1229919/quizzes/1206092

• Asking for:
  a) the topic
  b) which reading or readings from class will serve as the starting point for paper
  c) how you will expand upon the reading material (i.e., critical analysis of the reading; or, connecting multiple readings; or, relating a reading to the overall objectives of the class)
  d) any other source material that you envision using

• If submitted by Mon, 6 Nov, you will be guaranteed to get instructor feedback prior to the final deadline on Mon, 20 Nov

• By next week, you are asked to simply describe what you intend to write about ... you are not being asked to actually write the paper

• While you may change topic after completion of this essay, please speak with Ross or Walt if you intend to change topic
In your own words (i.e., summarize in a series of short phrases rather than typing verbatim that Diamond wrote), what was his rationale for devoting an entire chapter to the Maya?

Diamond decided to devote an entire chapter to the Maya for a number of reasons. The Maya kept a semi-decipherable written record of their history, so information gathered by a scientific study could be properly corroborated. Furthermore, the Maya are an example of a large, socio-politically and economically complex society suffering a collapse—a clear refutation of the notion that only small, (relatively) primitive, and isolated societies are prone to failure. Finally, Diamond studies the Maya extensively because they exemplify four of the five risk factors for collapse that he outlines in this book.

Nice overall summary and very strong topic sentence.

When writing, I try to use simple declarative sentences to lead a paragraph!
In your own words (i.e., summarize in a series of short phrases rather than typing verbatim that Diamond wrote), what was his rationale for devoting an entire chapter to the Maya?

The **Maya** were one of the largest, **most advanced** Native American societies in the pre-Columbian era, with sophisticated systems of building and engineering. This **civilization collapsed** for several complex reasons, including **environmental damage** and **unmitigated population growth**, exacerbated (and eventually heightened) by existing **political tensions**. These tensions grew into warfare that destroyed the Maya. It is important to learn from the Maya, because they highlight how even the **most powerful societies** are vulnerable to environmental degradation and its effects.

Very well written interpretation of Diamond’s motivations!
The main point Diamond is trying to get across to his readers about the Mayan collapse is that it was multiple factors that led to the collapse. It was the surplus of people and not enough food, the deforestation that occurred, the fighting between the separate communities, all of the droughts (climate change), and the kings not realizing what was happening to their civilization and doing something about it. If only one of these things occurred, the civilization probably would not have fallen but the combination created the disaster.

Indeed, many large-scale accidents can be traced to a cascade of events
Diamond's main point in this chapter is to show that even advanced civilizations (by the standards of ancient times) have the propensity to collapse if they exploit and mistreat their environmental and socio-political capital. Diamond spends a large majority of the time in this chapter speaking to two aspects of environmental degradation that sealed the fate of the Maya. The first, is the availability of fresh water with which to consume (or the lack thereof). He describes the difficult situation in the southern region in the Mayan lands in procuring water because of the thick bedrock. He also described the periodic droughts that plagued the Mayans, and makes mention to the fact that their practice of deforestation contributed to such phenomena. Soil erosion became a serious problem for those living in the hill communities. Finally, Diamond decries the fact that the Mayan political leaders were too preoccupied with fickle things to address the long-term issues of environmental degradation and resource shortage.

Wow! Great overview
In 2 to 3 sentences, describe the main point Diamond is trying to convey about the fall of the Maya in this chapter?

Diamond is trying to relate the collapses of one society to another, while also noting the **stark differences** that are unique to the Maya. The Maya's erecting of temples over times of increased hardship provide an **eerily similar** account of the Easter Islanders' decision to construct moai in their later years. The Maya were arguably one of the most advanced civilizations in their time, and to have their collapse be as dramatic as it was confronts today's society with bigger questions.

Fantastic writing
AT 2, Q 3:

Describe in a sentence or 2 something new you learned upon reading this chapter: please state something specific.

I was surprised to learn of the modesty of Maya agricultural practices; I would have expected more optimized agriculture to feed so large a population. Diamond states that 70% of Maya society were farmers by trade, and on average each farmer produced only twice the needs of himself and his family - compared to Ancient Egyptian farmers, who grew on average five times the needs of himself and his family. The Maya lacked nutrient dense crops, raised land agriculture, and animal transport, making farming a difficult occupation. It could explain the immense destabilization that occurred when comparatively small threats to agriculture cropped up, and by extension, the panic that prompted overexploitation of natural resources.

Nice overview and great connection to the concept of Collapse at the end of this paragraph.
Thanks to Bishop Landa, we lost all but four books that could have helped in deciphering ancient Mayan cultural secrets.
AT 2, Q 3:

Describe in a sentence or 2 something new you learned upon reading this chapter: please state something specific.

Thanks to Bishop Landa, we lost all but four books that could have helped in deciphering ancient Mayan cultural secrets.

Indeed, thanks Bishop Landa
AT 2, Q 3:

Describe in a sentence or 2 something new you learned upon reading this chapter: please state something specific.

The relationship between drought cycles and the collapse of Mayan civilization. I found it interesting that climatologist have also linked the decline of other societies such as the Akadian Empire to this drought cycle. I wonder if doing a cross comparison of all the societies impacted by this drought cycle, would help scientists isolate the human factors that contributed to collapse.

Great question!

I suspect that some have done these types of correlations, but I do not know the results.
In 2 to 3 sentences, describe how the history of the Maya may be applicable to the situation faced by the world’s population may face, with respect to global warming?

Some areas around the world are facing a similar problem in that their overpopulation of the terrain/interactions with it are damaging it. A clear connection between the two comes in the form of soil erosion in Siberia, where the Mayans would destroy the terrain through deforestation a similar problem occurs in the Russian tundras. This has led to the creation of the "Doorway to Hell," where what used to be miles of forests is now an eerie and ominous quarry like terrain due to intense logging and the melting of the permafrost. In terms of overpopulation, countries such as China and India now face a daunting task of limiting population growth before they suffer the consequences.

Thanks for the rosy output.

Well, at least those in Tikopia figured it out!
In 2 to 3 sentences, describe how the history of the Maya may be applicable to the situation faced by the world’s population may face, with respect to global warming?

Society, as well as human population, has expanded exponentially in the past hundred years based on the relatively stable global climate humanity has experienced throughout most of its history. Now that the consequences of our actions are catching up with us and global climate is changing at a faster pace, many societies around the world are facing threatening situations, similar to the Maya and the droughts they had. If humanity as a whole fails to acknowledge and adapt to environmental change, we may face a similar fate as the Maya.

Indeed, and great segue to the discussion Rachel will lead!
Opposite Paths to Success: New Guinea, Tikopia, and Japan

Rachel McHarg

13 September 2017
This chapter discusses two types of political structures:
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- **Top-Down Structure** –

- **Bottom-Up Structure** –
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- **Top-Down Structure** – when a ruler or government create policies for the people to follow

- **Bottom-Up Structure** –
This chapter discusses two types of political structures:

- **Top-Down Structure** – when a ruler or government create policies for the people to follow

- **Bottom-Up Structure** – when individuals create policies for the people to follow
Does anyone have any real-life examples of a Top-Down Structure or Bottom-Up Structure?
The New Guinea natives were found in what was deemed the uninhabitable highlands of the island. Europeans lived on the coast for 400 years before discovering the natives.

*How did the Europeans attempt to “help” the natives better their gardening?*

A European agricultural advisor, advised the natives that instead of having vertical drainage in their gardens, they should have horizontal ones. When they “corrected” their gardens, water built up in the drains eventually resulting in a landslide destroying the garden.
New Guinea used silviculture in their society causing numerous benefits for their gardens.

What is a silviculture?
It is when trees are grown in fields instead of actual crops.

How did planting trees in their gardens benefit the natives?
It increased the soil’s fertility, prevented erosion, and reduced the infestation of beetles.
What type of political structure was used in New Guinea?

Bottom-Up Structure

Plate 19. A densely populated agricultural landscape in the Wahgi Valley, in the New Guinea Highlands. It had become largely deforested, but 1200 years ago people began growing native casuarina trees in villages and gardens here to maintain timber and fuel supplies.
Tikopia is an island with an area of just 1.8 square miles that was able to sustain itself for 3,000 years.

What two problems did the people have to overcome to keep the island populated?

• Preventing the population from increasing to an unsustainable level
• Providing food for all 1,200 inhabitants
What methods were used by the Tikopia people in order to prevent population growth?

- Contraception
- Abortion
- Infanticide
- Celibacy
- Suicide/Virtual Suicide
- War
What challenges were faced when attempting to provide food for all the inhabitants of Tikopia?

- Over hunting of birds, bats, and seafood, led to more scarce sources of protein available.
- Attempted to assimilate pigs into their diet, but they were destroying gardens, so they were completely eliminated.
Tikopia had an annual dry season during the months of May and June.

How did Tikopia survive during these dry periods?
• They would ferment breadfruit in pits, where they could be stored for 2 or 3 years.
• Alternatively they would harvest fruits and nuts from undesirable plants.

What were the trees referred to as on the Polynesian island Rennell?
Hungi kenge because they survived a horrible cyclone of the same name by eating from the trees.
In the 1600s, Japan’s wood consumption increased significantly due to more construction of buildings as well as an increasing population. This not only cause devastating fires in cities to become frequent, but also caused deforestation to become a major problem.

What type of management structure was used by Japan?
Top-Down Structure
What negative responses did the ruling class take in woodland management?

The negative response only reduced the cutting of trees. They made people get licenses to cut down trees, had guards inspect wood shipments to make sure the rule were being obeyed, and created rules to follow that specified for what purpose a tree that had fallen could be used and who could use it.

Positive response?

Japan began developing a system of silviculture. They began planting trees in places where wood was in high demand, such as cities. This led to trees becoming a highly marketable item to consumer, since there was a low supply and a high demand for them.
As discussed earlier Top-Down Management was used in Japan.

Would Bottom-Up Management have worked if it was used instead?

No because Japan is so big that a normal citizen would not know what kind of problems were being faced in other parts of the country. A government is needed in order to see the country as a whole and understand what regulations need to be implemented in order to maintain a sustainable environment.

Plate 20. The forested surroundings of Mt. Fujiyama. As a result of rigorous top-down forest management beginning four centuries ago, Japan is the First World country with the highest percentage (74%) of its...
Remarkably, in the essay about Tikopia, Jared Diamond has resisted the temptation to draw an analog to modern, global society.

Describe how Tikopia might serve as an analog to modern society, with a focus on the dual topics of population control and resource management?

Diamond explains that in Tikopia today, there is a population growth of 1.4% and if that had been the growth rate when the first 25 people arrived, the island would have "already met its modern level of 1,278 people within only 283 years after human arrival." We have to take control over our fast growing population today and prevent the world from getting overpopulated in the future.
World Population Growth

<table>
<thead>
<tr>
<th>Year (AD)</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1AD</td>
<td>0.3b</td>
</tr>
<tr>
<td>1650</td>
<td>0.5b</td>
</tr>
<tr>
<td>1800</td>
<td>1.0b</td>
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<tr>
<td>1927</td>
<td>2.0b</td>
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<tr>
<td>1960</td>
<td>3.0b</td>
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<tr>
<td>1975</td>
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<tr>
<td>1987</td>
<td>5.0b</td>
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<tr>
<td>1998</td>
<td>6.0b</td>
</tr>
<tr>
<td>2011</td>
<td>7.0b</td>
</tr>
</tbody>
</table>

World population growth
Source: United Nations 2008-based Medium Variant Projection

- 9.1 billion at 2050?
- 6.8 billion in 2009

http://aquadoc.typepad.com/files/population-mit-kalnay.pdf Prof Eugenia Kalnay of UMD

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4 Possibilities for Reaching Carrying Capacity

Infinite World

Ideal (no overshoot)

You are here…

Or here…

Hopefully…

Disaster

http://aquadoc.typepad.com/files/population-mit-kalnay.pdf Prof Eugenia Kalnay of UMD
World Population Growth

![Graph showing U.S. and World Population]

**TOP 10 MOST POPULOUS COUNTRIES**

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10.

[https://www.census.gov/popclock/](https://www.census.gov/popclock/)
HONR 229L: Climate Change: Science, Economics, and Governance

Last Word: Opposite Paths to Success: New Guinea, Tikopia, and Japan

Ross Salawitch
Bottom Up Processes: Key to Success

First, some math.

Text (pg 289) states population of Tikopia rose by 1.4% per year, from 1929 to 1952, and started at 1,278 people in 1929.

How would we compute the population in 1952?

Population in 1952 =
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\[
\text{Population in 1952} = 1278 \times (1.014)^{22} = 1278 \times 1.358 = 1735
\]

Text on page 291 states population was 1753 in year 1952.
Bottom Up Processes: Key to Success

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Text on page 291 states population was 1753 in year 1952

What is today’s population?
Bottom Up Processes: Key to Success

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Page 291 states 1,115 people
Bottom Up Processes: Key to Success

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Page 291 states 1,115 people

Wikipedia gives population as ~1200:

Population [edit]
The population of Tikopia is about 1,200, distributed among more than 20 villages mostly along the coast. The largest village is Matautu on the west coast[2] (not to be confused with Mata-Utu, the capital of Wallis and Futuna). Historically, the tiny island has supported a high-density population of a thousand or so. Strict social controls over reproduction prevented further increase.[8][9]
Bottom Up Processes: Key to Success

More math.

Text (pg 289) states if population of Tikopia rose by 1.4% per year from time of discovery until 1929, the population would be 25 million trillion:

Page 287 says Island has been occupied for 3000 years

\[ 25 \times (1.014)^{3000} = 25 \times 1.3 \times 10^{18} \approx 25 \times 10^6 \times 10^{12} \]
Bottom Up Processes: Key to Success

Next, some perspective. And a bit more math.

Tikopia is 1.8 square miles.
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How big is campus?
Next, some perspective. And a bit more math.

Tikopia is 1.8 square miles.

How big is campus?

University of Maryland--College Park is a public institution that was founded in 1856. It has a total undergraduate enrollment of 27,443, its setting is suburban, and the campus size is **1,335 acres**. It utilizes a semester-based academic calendar.
Next, some perspective. And a bit more math.

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\[
1335 \text{ acres} \times 0.0015625 \text{ sq mile } / \text{ acre} = 2.1 \text{ square miles}
\]
Bottom Up Processes: Key to Success

Some would say that a prime example of a bottom up governing process is the US, capitalistic economy.

While perhaps this is debatable, what aspect of the interaction of various entities do you think is most important for the success of a bottom up governing process?

I’m looking for a single word.
Some would say that a prime example of a bottom up governing process is the US, capitalistic economy

While perhaps this is debatable, what aspect of the interaction of various entities do you think is most important for the success of a bottom up governing process?

**Trust**

http://www.forbes.com/sites/davidkwilliams/2013/06/20/the-most-valuable-business-commodity-trust

https://dzone.com/articles/importance-trust-business

http://www.capx.co/why-a-strong-society-can-make-us-all-richer
Top Down Processes: Key to Success

While most shirk at the notion of living under a dictator, Collapse does present many examples of societal success under either a single ruler or a close group of rulers, such as the Shogun of Tokugawa.

While most of us likely would not like to live under a dictatorship, what aspect of a single leader (or close group of rulers) is most important for the well being of the population they govern?

    Again, looking for a single word
Top Down Processes: Key to Success

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While most of us likely would not like to live under a dictatorship, what aspect of a single leader (or close group of rulers) is most important for the well being of the population they govern?

*Benevolence*

https://en.wikipedia.org/wiki/Benevolent_dictatorship


http://www.jstor.org/stable/25766184
Earth’s Carrying Capacity: Motivated by Tikopia

Much has been written about Earth’s carrying capacity

E. O. Wilson of Harvard University writes:

If everyone agreed to become vegetarian, leaving little or nothing for livestock, the present 1.4 billion hectares of arable land (3.5 billion acres) would support about 10 billion people
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Global CO₂ Emission, Population, & Per-Capita CO₂ Emission

Per-Capita Emission = Emission divided by Population

Gt CO₂ = giga tonne of CO₂ = 10⁹ tonne of CO₂

1 tonne = 1000 kg [http://grammarist.com/spelling/ton-tonne]

tCO₂ pp = tonnes of CO₂ per person per year