Somebody please turn this before printing!

Study & Discussion Guide

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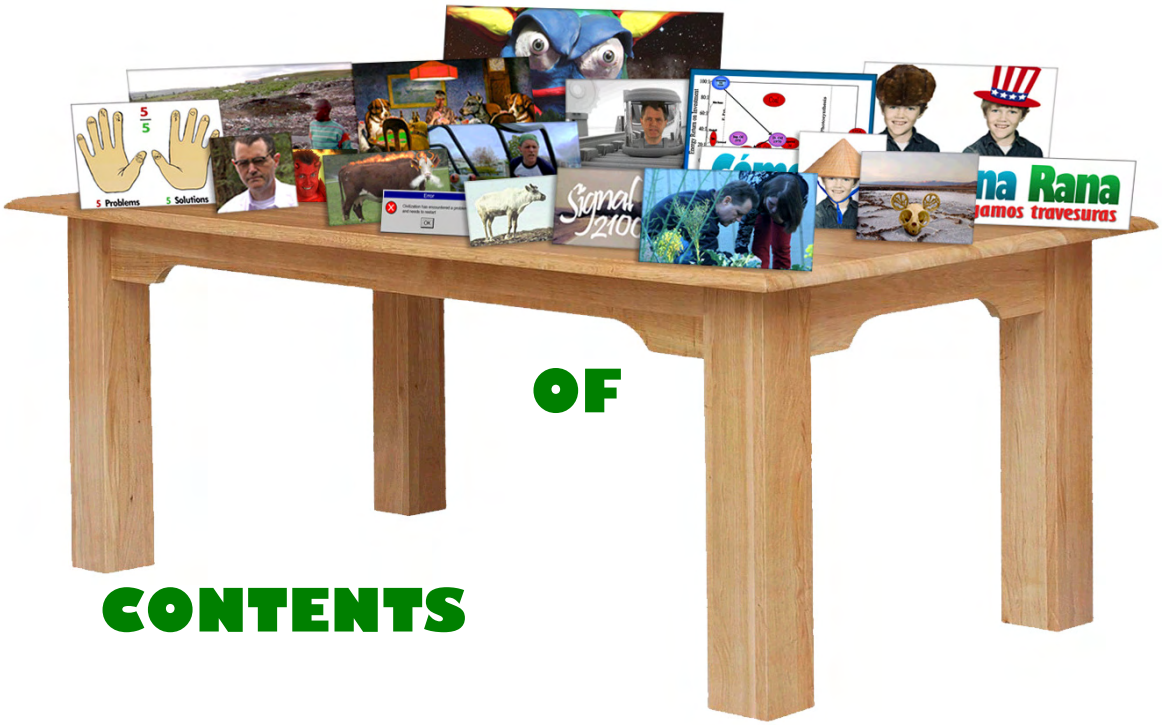


Who made this movie?

THIS GUY.

WILL SOMEBODY FILL HIS NAME IN? I DON'T RECOGNIZE HIM.

What is this movie about?

On the surface, *How to Boil a Frog* is about Overshoot – too many people using up too little planet, much too fast. The news media usually presents all the nasty stuff happening in the world as separate problems: global warming, energy shortages, overpopulation, poverty, deforestation, job shortages, and so on. And of course they are problems, but they're also *symptoms* of this larger problem of Overshoot. So the movie provides a new way to look at the confusing mass of problems we tend to think of as disconnected, as being one big ball of the same thing in different colors.

But what the movie is *really* about is getting people to take action to make their own lives better, and save the world on the way. The director guy (what's his name?) says: "We have this belief that people will change their behavior if they just know the facts. But nothing in neuroscience supports that. The reality is that people make decisions based on emotion, and then rationalize their decisions to fit their thoughts. *How to Boil a Frog* is about figuring out why some people have faulty denial mechanisms and insist on making decisions based on reality. Then we can develop a serum from their blood and secretly slip it into the water supply, which will hopefully also give us superpowers."

Was he serious about that last part?

No.

Why is the movie called How To Boil a Frog?

This is from the director guy (Jim? Josh?): “The movie was originally about the spin campaign to create doubt about global warming, which by the way is going surprisingly well. A few stolen emails have massively lowered the public’s confidence in scientists, and eased our conscience about driving atmospheric carbon dioxide (CO2) back to Jurassic levels, paving the way for the return of the dinosaurs. But as blackly funny as that story is, it became clear to me that global warming can’t be tackled without tackling *all* the symptoms of overshoot at the same time.

“So the subject of the movie shifted, but the title stuck, and I like it because it raises the question of who is slowly boiling us. The answer, of course, includes corporations who benefit from selling our future for money, but governments and the media help out, and I suspect in the end it’s probably my hand, and yours, turning up the flame. That really bugs me.”

HIS ORIGINAL DRAWING FOR THE POSTER

Is he saying I’m to blame for the world’s problems?

Yes. Everyone else in your class is perfect.

You’re kidding, right?

Probably.

What made the director guy want to make this movie?

Jon! His name is Jon Cooksey! Will somebody please write that in up above before we print this?

Here's what he has to say about why he made it:

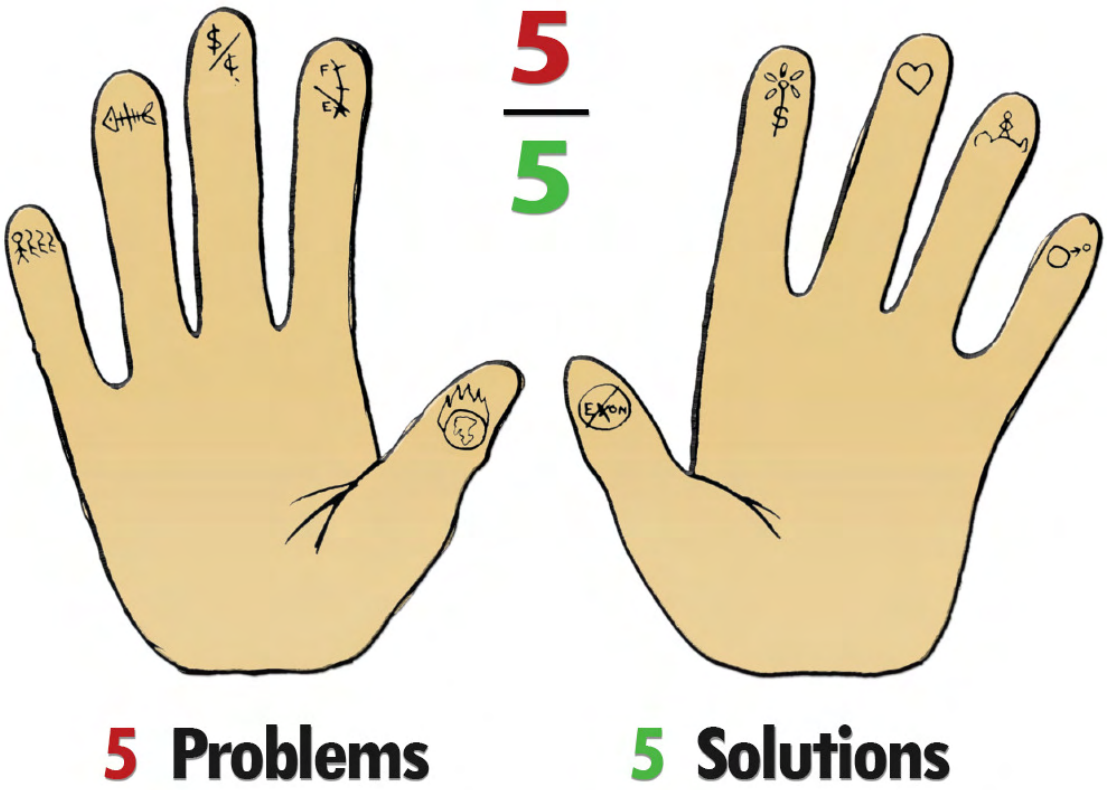
"Certainly a desire to give my daughter a better future was a huge factor for me. But not everybody has kids, and not everybody who has kids wants to save the world for them, so I understand that different things wake people up. For me, I looked around and saw that I couldn't give my daughter a better future without giving everybody a better future, because we're all in this bucket of hot water together.

"It seemed to me that if I could find a way to package the information in an entertaining way, and give people stuff they could do, in their own lives, that would increase their happiness, then I thought people might actually want to *watch* the movie. So it's sort of a combination of comedy, a swift kick in the butt, and an anti-depressant. But legal.

"What I *didn't* know about what made me want to make this movie – what I didn't realize till later – is that I was lonely. Making the movie forced me to open up to a lot of new people, and those people have become my friends, and made my life richer, more fun, and a lot more meaningful. *How to Boil a Frog* has created a new community that I feel incredibly lucky to be a part of. If I pass any one thing along to the people who see it, I hope that's it – I hope the people who watch it will make their own communities, and have as much fun at it as I'm having."

What's with the 2 hands thing?

Jon knew that the movie would have a lot of information in it, and people would have trouble remembering it all. So he simplified the symptoms of Overshoot down to 5 Problems – one for each finger of the right hand – and then came up with 5 Solutions to Overshoot, one for each finger of the left hand. He then made up symbols for each of the 5 Problems and 5 Solutions so that people could draw them on their fingertips, say, when they're bored in class. Not that you personally ever get bored in class.



This guide is divided up just like the movie, into the 5 & 5. When you check out the website (http://howtoboilafrog.com), you'll see that it also just shows 5 of everything – movies, books, articles, funny web videos, links, etc. (There's more stuff in the Archives for each section, but only 5 on the main page.)

This is not meant to be an insult to people with 6 or more fingers.

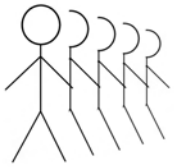
QUESTIONS TO CONSIDER WHILE WATCHING THE MOVIE

Your teacher may show you the movie in sections, or all at once. Use the space below to write your own answers to these questions about the movie – one per section. Extra points for being funny. Double extra points for talking about how you feel.

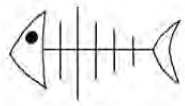
Introduction

What is Overshoot?

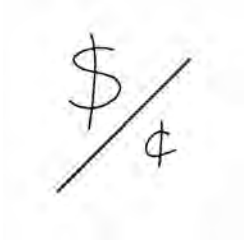
The 5 Problems



OVERPOPULATION: What do you think the most harmful aspect of overpopulation is?

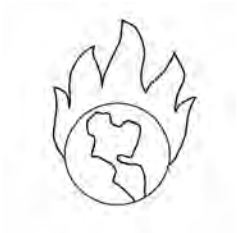


THE WAR ON NATURE: How are the problems presented here (overfishing, deforestation, etc.) a result of overshoot?



RICH vs. POOR: How do you think we got into a situation where a few people have so much, and most of the people have so little?

PEAK OIL: What effect do you think it will have on your life as oil gets more expensive, and there's less to go around?



GLOBAL WARMING: Do you think it's real? Are we causing it?

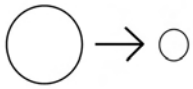
The 5 Solutions

DRIVE PAST EXXON: Do you think a boycott can make oil companies change the way they operate?

LIFEBULBS: Do you think you could be happy if you had less stuff?

CHANGE OF HEART: What do you value most? Least?

GIANT KILLING: The slogan for the movie includes the phrase “make trouble” – after watching this section, what do you think that means?



TRANSITION: What skills have you got (or would you like to have) that would make you a good village member?

End Sequence

SIGNAL 2100: How did you feel after watching this part of the movie?

JUMPING IN: What do you think makes someone a hero?

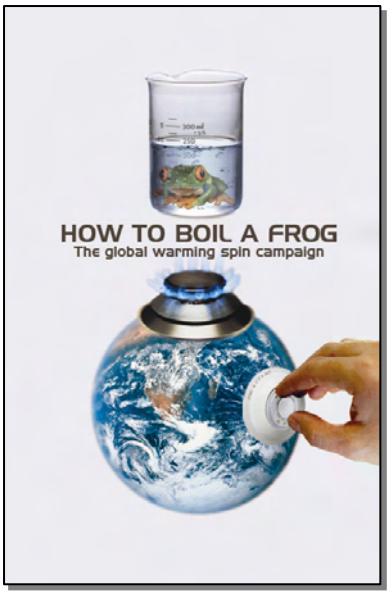
AFTER WATCHING THE MOVIE: DIGGING DEEPER

Now that you've watched *How to Boil a Frog*, you pretty much know everything you'll ever need to know, so pick up your diploma and head for the beach! NOTE: If the beach is more than 500 miles away, pack a lunch.

Ha ha, just kidding. Years of education still stretch out before you, which, depending on what you think of school, is either fantastic, or like one of those dreams where you know you're dreaming, but you can't quite wake up.

JON'S MEMORY OF WHAT SCHOOL WAS LIKE

Either way, *How to Boil a Frog* is here to help. We're going to jump into each of the movie sections now, save civilization, and have some laughs.



AN EARLY VERSION OF THE POSTER

Introduction to the 5 Problems

Digging Deeper

Additional questions to research:

- Could the fall of ancient Rome be considered an example of local overshoot?
- Overshoot happens when a given population exceeds the carrying capacity of its ecosystem. What factors do you think determine the carrying capacity of a given area, in terms of human population?
- How is global overshoot different from earlier examples of local overshoot?

A related issue: *iPat*

iPat: the next-gen item from Apple? Nope, it's the nickname for a conceptual "formula" for the impact that human beings have on the planet, proposed in 1971 by biologist Paul Ehrlich and ecologist John Holdren. The full version is

$$I = P \times A \times T$$

Abbreviations:

I – Impact
P – Population
A – Affluence
T – Technology

Jon learned about iPat from Rex Weyler. Rex took the photos of the Greenpeace guys blocking the whaler.

The idea behind iPat is that the impact we have on our habitat (the Earth) is a function of how many of us there are, but also how much we consume – which is determined by our level of affluence (generally speaking we consume as much as we can afford to consume). If the average person in North America is assigned a 10 on the Affluence scale, then the average person in Cambodia, for instance, would be assigned a rating of 0.02, i.e., 1/500th as much consumption of resources and output of waste (like CO2). It's obvious from the iPat formula that it would take 500 Cambodians to have the same impact as one North American.

But the kicker in the iPat formula is the T: technology. It's obvious that we can cut down a forest much more quickly with a bulldozer than we can with a sharp rock – so Technology is an amplifier. This is important to remember when you see a news story about how some new technological innovation is going to save us from having to adjust our lifestyles. Technology itself is neutral; if we're having a negative impact on the planet with too many people and too much consumption, then technology will help us do our damage even faster. But if we're using technology, for instance, to reduce our consumption (by making things more efficient), then it can amplify a positive impact.

Beware of Jevon's Paradox, though. The history of technology shows an unfortunate pattern: every time something is invented that makes us more efficient, we get excited and use it more than we ever did before…thus driving consumption to even *higher* levels. The only proven way to consume less stuff is to *consume less stuff*. And the fewer of us there are doing the consuming, the less stuff will be consumed. So A and P are the variables in this equation that we need to focus on the most. But it's good the T is in there, because iPA has a kind of hillbilly thing going on.

Resources:

Books

- *Bloom or Bust* by Mark Pearce & Jens Michael-Macha
- *A Short History of Progress* by Ronald Wright
- *The Upside of Down* by Thomas Homer-Dixon

Movies

- Things to Come (1936)
- Mad Max
- Home

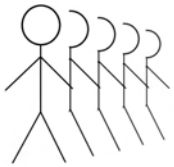
Links

- How Long Will It Last? - http://environment.newscientist.com/data/images/archive/2605/26051202.jpg
- Chris Martenson's "The Crash Course" - http://www.chrismartenson.com/crashcourse
- The Paradox of Choice from RSA Animate - http://www.youtube.com/user/theRSAorg#p/u/0/1bqMY82xzWo

JON BORROWED THE COFFIN FROM THE SET DEC DEPARTMENT AT "SMALLVILLE"

The 5 Problems

Digging Deeper



Overpopulation

Additional questions to research:

- What is the current trend in world population growth?
- How does it affect world population if we improve health and people live longer?
- Have Thomas Malthus' theories on population been proven right or wrong?
- What have been the effects – positive and negative – of China's "one child" policy?
- What is the range of estimates for what human population is sustainable? What factors do these estimates take into account? What factors do they leave out?

A related issue: *Demographics*

How to Boil a Frog talks about the global population growth rate, but that number is derived from two other numbers: global birth rate and global death rate – specifically, the first minus the second. If people are being born faster than they're dying, the population rate grows up. If the reverse, it goes down.

The death rate is a function of all sorts of unpleasant things: disease, war, accidents, getting old, and extreme boredom from watching re-runs of reality shows you've already seen but there's nothing else on. Death rates obviously vary a lot depending on which country you're talking about, and sometimes even by which part of a city you live in.

Birth rates also vary widely, and are usually expressed as live births per 1,000 people per year, called the *crude birth rate*. The global average is currently around 20 – Israel and Mexico are examples of countries that are right around average. At the high end are countries like Niger and Afghanistan – in the 45-50 range – and at the low end are countries like Germany and Japan, with a number under 8. Why do they vary so widely?

Sometimes the answer is cultural (big families are a traditional norm) or religious, whether because big families are seen as a religious duty, or because the use of contraceptives is discouraged. This can cause dramatic shifts in the makeup of the human population. For example, the average birth rate in Islamic families is currently 150% of the global average – as a result, it's predicted that, within a generation, one quarter of the people on Earth will be Muslim. Sometimes the answer is: it was an accident. 2 out of 5 pregnancies worldwide are unintended.

Whatever the reason, humanity does not seem to be exempt from the laws of Nature, which we saw illustrated very harshly in the section of the movie about St. Matthew Island. People may disagree about how many people the Earth can feed, but nobody thinks it's, say, 100 billion. So there's a limit out there somewhere, and increasing worries about the world's food supply suggest that maybe we've already passed it.

So what are the most effective ways to reduce birth rates? Free and universally available contraception is one obvious answer, though one that is controversial for some people. The second big answer is education and empowerment of women. And even *that* is controversial in some places. But the fact is that this is a decision *you'll* be making in the next couple of decades, if you haven't made it already (whoops!), so you'd better start talking about it.

Resources:

Books

- *An Essay on the Principle of Population* by Thomas Malthus
- *Overshoot* by William Catton
- *Limits to Growth: The 30-Year Update* by Donella Meadows, Jorgen Randers & Dennis Meadows

Movies

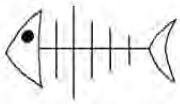
- Soylent Green
- Mother: Caring for 7 Billion
- Children of Men

Links

- National Geographic – Aftermath: Population Overload - http://channel.nationalgeographic.com/series/aftermath/4463/Overview
- NOVA: World in the Balance - http://www.pbs.org/wgbh/nova/worldbalance/
- Global Footprint Network – take the quiz! - http://www.footprintnetwork.org/index.php

The 5 Problems

Digging Deeper



The War on Nature

Additional questions to research:

- What are the consequences of plastic particles in the oceans outnumbering plankton?
- What are the causes and consequences of the bleaching of coral reefs?
- Check out "The Majestic Plastic Bag" on YouTube. Do you think humorous shorts like this are more or less effective than serious news programs in changing people's behavior? Why?
- What impacts are Amazonian construction projects like the Belo Monte dam having on indigenous people there?
- The phrase "water wars" is coming up more often – what does it mean?
- Bugs. Do we need 'em? No, really. What happens if they go extinct?

A related issue: *Systems Theory*

If you were to ask *How to Boil a Frog* what it considered to be the scientist it most admires, it might well say Leonardo da Vinci. The reasoning behind that statement, assuming movies can reason, would be that Leonardo was arguably the last human being who understood pretty much everything there was to understand about science, such as it was in Europe in the early 1500's. Cartography, botany, anatomy, geology, engineering, architecture – he was, as they say, a Renaissance man.

HE DESIGNED THE FIRST HELICOPTER, BUT FOUND OUT IT WOULD BE 400 YEARS BEFORE THE PILOT'S LICENSE WAS INVENTED. LIFE SUCKS SOMETIMES.

After Leonardo's time, things got too complicated for any one human being to keep track of, and so scientists started to specialize. The beauty of specialization is that you can get to know one subject really well. The downside is that you end up being ignorant of the interconnections between important subjects. Robert Oppenheimer, for instance, learned a lot about nuclear physics, but ended up a little light on ethics, and spent his life trying to apply nuclear bombs to every problem in world affairs.

There is a school of thought, however, that recognizes that everything in a given system (whether it be a pond, a city or the Earth) is interconnected: it is called, unimaginatively, Systems Theory. Even the *I Ching* is an early example of systemic thinking, which says that the parts of a whole can only be fully understood in the context of their *relationship*s with the other parts, and other related systems.

Systemic thinking is what *How to Boil a Frog* is based on. Jon wanted to show that the real systemic problem we face is overshoot – which has put our Earth system into crisis mode – and that, in turn, means that any solutions we pursue should be solutions to that systemic problem, and *not* to its individual symptoms (global warming, peak oil, etc.) This gave rise to Jon's unfortunate snot analogy: when you have the flu, and snot is pouring out of your nose, the snot is certainly *a* problem, but it's not *the* problem. Taking a decongestant won't cure your flu, and in fact it may make you sleepy so that you drive over a cliff, which in turn creates other problems. So don't confuse the symptom with the real problem, is what Jon is trying to say, but it's still disgusting.

The War on Nature section presents a series of related issues: over-fishing, gyres, deforestation, extinction, dead zones, fresh water shortages. In the satirical context of this section, these issues are related by Nature's attempt to wipe out humanity, but in fact, they're all interrelated as parts of Earth's dynamic system. Deforestation leads to loss of fresh water systems and thus loss of species, while worsening global warming, which in turn worsens the loss of fresh water and energizes beetles that eat what's left of the trees. And so on. Everything is connected, to the extent that it's impossible to affect one part of the system without affecting everything else.

And the impact on these natural systems, in turn, affects *other* systems. Once the beetles start eating the forest, for instance, the lumber industry takes a

hit, and the economy is affected. A troubled economy in one place can quickly spread its problems to other countries, as we're seeing in Europe. Not that saving that first tree will solve Europe's financial problems, because the deforestation itself is only a symptom of overshoot. So overshoot, the systemic problem, is what we need to tackle. Just tackling the symptoms would be, well, snotty.

Resources:

Books

- *Cat's Cradle* by Kurt Vonnegut
- *Silent Spring* by Rachel Carson
- *The Sixth Extinction:Patterns of Life and the Future* by Richard Leakey & Roger Lewin

Movies

- Silent Running
- Manufacturing Landscapes
- Sharkwater

Links

- Amazon Watch - http://amazonwatch.org/
- Living systems theory - http://p2pfoundation.net/Living_Systems_Theory
- Find yourself in the real circle of life (University of Texas) - http://www.zo.utexas.edu/faculty/antisense/tree.pdf

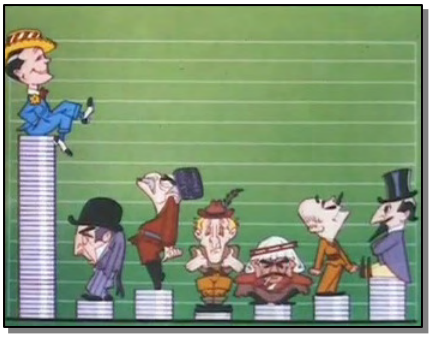
Only when the last tree has died and the last river been poisoned and the last fish been caught will we realize we cannot eat money.
~Cree Indian Proverb

The 5 Problems

Digging Deeper

Rich vs. Poor

Additional questions to research:



- The 400 richest Americans have about the same wealth (an estimated $1.37 trillion in 2010) as the bottom half of American income earners. How do you think imbalances like these – which exist to some degree in all countries -- affect political stability?
- Per the movie, if everyone on Earth were able to consume at North American levels, we'd need 6 Earths to supply all the stuff. Does this mean that we should *not* try to alleviate poverty worldwide, if it will increase consumption?
- Mark Anielski estimates that (based on 2007 figures for ecological footprints) 46.3% of the world's population is living within the average global available biocapacity (1.78 global hectares/capita); 53.7% live in excess of the earth's biocapacity, consuming an unfair share of resources. Does the monetary wealth of developed vs. developing nations reflect this biocapacity measure?
- What would be a fair distribution of the planet's total wealth, on a per capita basis?
- Would you be willing to live on your fair share of the world's wealth, so that everyone else could have the same? If not, what's your reasoning?

Frog cinematographer Pat Williams met Mike Brawan on a plane while flying to Nairobi to film the Kyoto climate conference. Mike invited Pat to visit Nakuru, and it became part of the movie.

A related issue: *Debt*

America is currently struggling to manage a debt of approximately $15 trillion (though it may have gone up a trillion or two yesterday). That works out to about $50,000 for every American, man, woman and child. (If you're American, you paid about $12,000 in interest on that debt this year.) But wait! That doesn't include the personal debt owed by Americans, made up of consumer debt, mortgage debt and credit card debt. That adds about another $50,000 to the tab, per person. With other odds and ends thrown in, the *real* total debt for the USA is about $55 trillion, or about $175,000 per American.

Then you get to the *big* numbers: the "unfunded liabilities" of Medicare, Social Security and the prescription drug program: those add another *million bucks* per person, which will have to be paid out in the future. And tax revenues are falling short of spending by about 1/3 every year, so the debt is likely to keep growing.

And America isn't alone. In fact, just about every country in the world has a national debt. (Liechtenstein seems to be living within its means.) How did they all get so deep in the hole? Partly borrowing from each other, the way you and I borrow from friends. Big lenders to America in the past, for instance, have been China and Japan. But America also gets into debt in a way that's unusual: it has to borrow its own money.

Yes, the US government prints up dollar bills and mints coins, but that currency is just a small fraction of the total US money supply, which is mostly in the form of pixels on the screens of banks: electronic credit. But credit from whom? Back in 1913, after much fighting and lobbying, the US government outsourced control of its money supply to a more-or-less private bank called the Federal Reserve. (They picked a name that would lead people to assume that the "Fed" is part of the US government. It isn't.)

Since then, if the US government wants to expand its money supply – it asks the Fed to credit banks around the country. But the Fed doesn't give that money away. It *loans* it to the banks, and collects interest on the loans. And since the interest on those loans has to be paid, the economy has to keep growing to keep paying the interest. And where does the Fed get the money it lends out? No place. It just creates it. Sweet deal!

$$G = 1 - 2\int_{2}^{1} L(x)\,dx$$

But there's a third way that a country can get into debt: it can be forced to borrow by other countries. Generally this happens when a country gets into such financial trouble that it might actually default on its debt, which would cause trouble for the banks and other countries that loaned it money. At such times the International Monetary Fund (IMF) is often called in, and a typical IMF plan for "restructuring" the country's debt will include selling off public assets (like trains and utilities), and borrowing even more money to pay off previous debts.

Out of control debt can put countries in a spiral where too much of their money ends up going to pay off their loans, and there isn't enough for more basic stuff like, say, feeding everybody. This is why Bono from U2 has been using his fame to further the cause of "debt relief", where poor countries get their debt forgiven by richer ones. He's kept on doing it even when it caused friction with his band-mates. Would you?

Resources:

Books

- *Confessions of an Economic Hitman* by John Perkins
- *The Shock Doctrine* by Naomi Klein
- *The Bottom Billion: Why the Poorest Countries are Failing and What Can Be Done About It* by Paul Collier

Movies

- Garbage Dreams
- Tsotsi
- The Bicycle Thief

Links

- List of countries by income equality - http://en.wikipedia.org/wiki/List_of_countries_by_income_equality
- The US Debt Clock - http://www.usdebtclock.org/
- Kiva – Micro-loans – http://www.kiva.org

The 5 Problems

Digging Deeper

Peak Oil

Additional questions to research:

- How many things that you've done or used today, depended on oil?
- How much oil does it take to build a wind turbine?
- After the accident at Fukushima in Japan, what do you think the future of nuclear power is, as a replacement for oil?
- How much farmland is now used to produce bio-ethanol instead of food? What are the trade-offs?
- If you had to come up with a plan for reducing energy use in your country by half, what would it be?

A related issue: *EROI*

EROI stands for "energy return on investment" – sometimes you'll see it written as EROEI ("energy return on energy invested), or even as EIEIO, but only when referring to the oil found under Old McDonald's Farm.

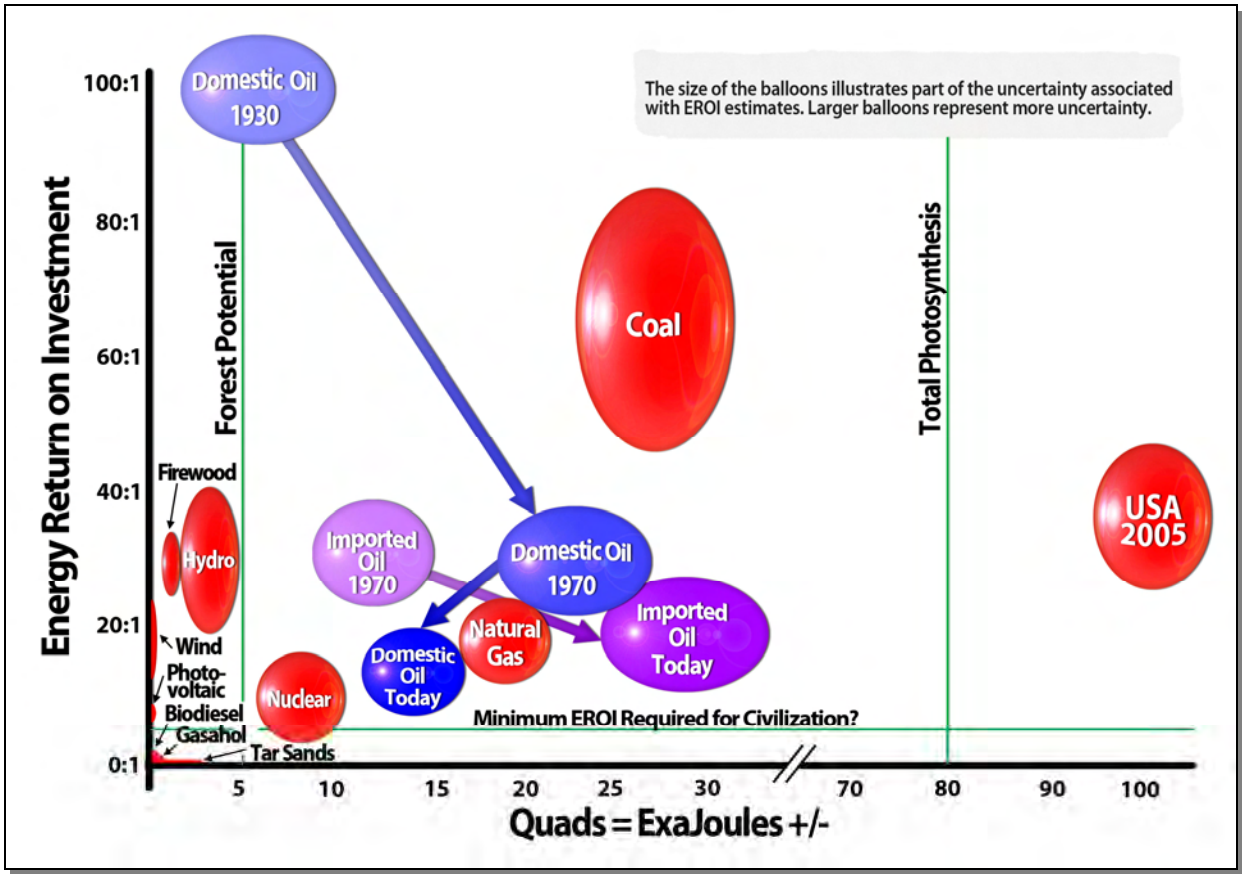
THIS IS CHARLIE HALL. HE CAME UP WITH THE EROI CONCEPT BY WATCHING SALMON.
THAT WAS BEFORE YOU COULD WATCH THEM ON YOUTUBE.

As a young graduate student, Charlie Hall was out in British Columbia, Canada, studying sockeye salmon. He thought about the fact that migrating to Alaska (which these fish do) is a lot of work, so the salmon must be getting more out of it

than the effort it takes. He generalized that to energy systems, and started thinking about how much energy it takes us to *get* our energy.

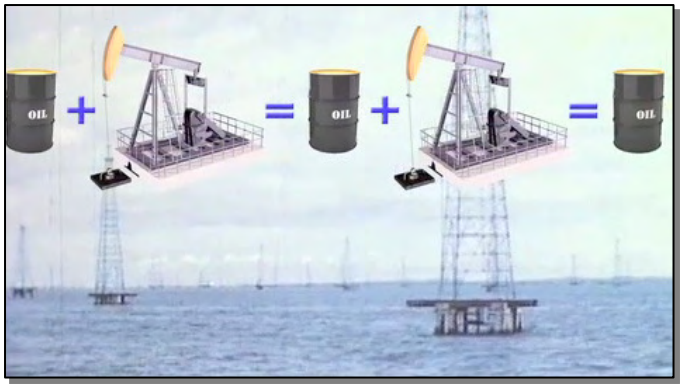
In the movie, Charlie talks about the fact that the first oil wells, drilled in East Texas, were often gushers – returning 100 times as much energy as it took to drill them. We'd call that an EROI of 100:1. But over the past century, the EROI of oil has been falling globally. We still get the occasional oil well with a really high EROI, but we've used up most of the oil in the world that's easy to get, and now we're down to things like oil trapped in shale rock, that has to be fractured ("fracked") and the Alberta tar sands, which has to be dug or steamed out of the ground.

Those methods of extracting oil are harmful to the environment, including us (we're part of the environment, after all), but they also require a *lot* of energy to get the oil out of the ground – sometimes 4:1 EROI or less. Charlie made a "bubble graph" to show the EROI of different forms of energy. Here it is:



Some kinds of energy, like hydrogen, actually have an EROI of less than 1, which means it takes more energy to create that kind of energy than you get from burning it. This means that hydrogen isn't really a *source* of energy, though it is a way to *store* energy, like a battery.

So as long as the energy sources we have are still giving us a little more energy than we use to get them, we're okay, right? Well, it's not that simple. A lot of the stuff we do, like flying airplanes, building skyscrapers, making electric cars – all those activities require *very* high EROI energy. Going after energy that's only slightly more than 1:1 EROI would be like spending your whole morning finding enough food for breakfast…after which you have to do it all over again to find your lunch. Charlie figures that civilization as we know it requires at least 5:1 EROI, on the average, from all our energy sources put together. Average EROI, globally, is probably somewhere between 18:1 and 11:1, according to Charlie's estimates, and dropping. As he discusses in his book "Energy and the Wealth of Nations", this net energy decline is also the hidden factor behind our global economic troubles.



Declining EROI is yet another way that Nature is telling us that we're going to have to really simplify our lives as we go forward into the 21st century. Fortunately, many of the most fun things in life – having fun with friends, being in Nature, playing live music – don't require much energy at all. So the more you base your life around low-EROI activities and living, the better your life is going to be.

See also: Cooksey's Second Law in the Glossary.

Resources:

Books

- *The Long Emergency* by James Howard Kunstler
- *Last Light* by Alex Scarrow
- *Peak Everything* by Richard Heinberg

Movies

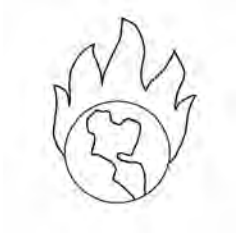
- The End of Suburbia
- GasLand
- The History of Oil by Robert Newman

Links

- How to Boil a Frog Peak Oil page - http://howtoboilafrog.com/peakoil.html
- Energy Bulletin - http://www.energybulletin.net/
- Peak Oil Primer - http://www.energybulletin.net/primer.php

The 5 Problems

Digging Deeper



Global Warming

Additional questions to research:

- If the most the Earth can handle without getting hotter is 11 billion tons of CO2 (equivalent), what does that work out to per person?
- How much CO2 are you putting out now, and how much would you have to cut back to be putting out only your fair share of that 11 billion tons?
- Find the figures for annual increases in global CO2 emissions, and the figures for annual increases in global average temperatures – graph them. How closely do they track?
- Did the recession in 2008 permanently slow down global C02 output?
- Based on your research, what or who do you think is most responsible for global warming?
- What would be *your* plan to stop global warming?

A related issue: *Positive Feedback*

Hey, you're doing great on slowing down global warming! Thanks for riding your bike and skipping that steak for the lentil soup! And that day you slept until 4 p.m. and never actually left your room? That was awesome. Zero carbon output!

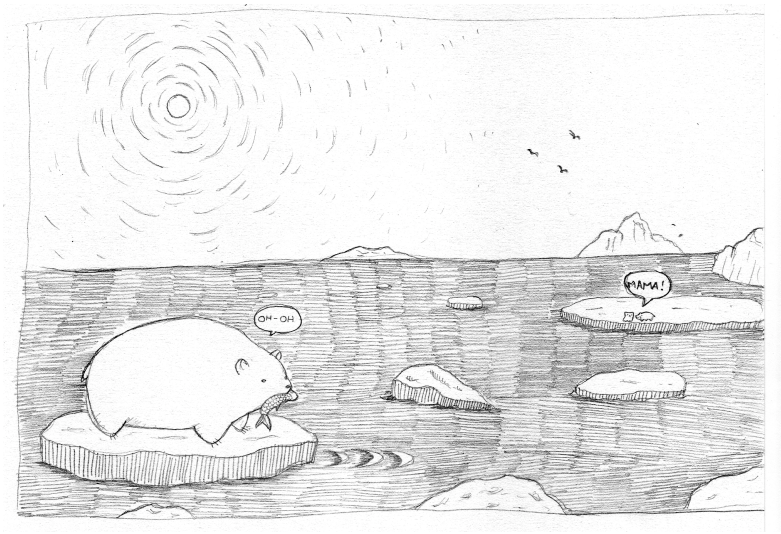
OK, that's not the kind of positive feedback we're going to talk about. We're talking about feedback *mechanisms*, where, for example, part of the output from a system is fed back into that system and affects its functioning. The feedback can either hinder the functioning of the system – that's *negative* feedback – or it can energize it more – that's *positive* feedback.

A good example would be if you and your friend were to drink 10 cups of double-shot espresso, after which you decide you want to set up a track and field meet in a china shop. If your friend thinks that's a great idea and starts hurtling over

Ming vases, that's positive feedback. If he or she punches you in the face to stop you, that's negative feedback.

The movie mentions the effect of positive feedback on the Earth's atmosphere, without calling it that specifically. As the atmosphere and oceans warm, peat bogs and permafrost melt and start to release methane, and the ice crystals in the ocean – called methane hydrates – start to melt. If you want to see a dramatic visual example, go to Google video and search for "Katey Walter Anthony" at the University of Alaska.

One kind of positive feedback loop the movie doesn't mention has to do with "albedo" – how much light something reflects. The albedo of Arctic ice, as you might guess, is pretty high. It bounces a lot of sunlight back off the Earth and out into space. But when the ice melts, the dark ocean underneath starts to soak up all that sunlight, and suddenly Arctic warming goes into overdrive. This is very worrisome to polar bear moms.



And then, of course, there's the dumbass factor. The methane hydrates in the ocean represent an unimaginable threat to keeping Earth livable, and some of that methane is already starting to bubble up as they melt. So what's our plan? Go down into the ocean and *dig them up*! Japan is leading the charge to mine this new source of fossil fuels so they can become "energy independent" (there's no oil in Japan). Mining this "fire ice" could, of course, destabilize it, leading to massive releases of methane, and the positive feedback loop of "runaway global warming" that George Monbiot talks about in the movie. We usually avoid profanity, but we can't think of a better word than "dumbass" for a species that would willingly become part of a positive feedback loop to cook itself.

George Monbiot is an amazingly cool guy. He once had his foot nailed to the floor by a goon while covering a protest as a reporter.

Here's an idea: how about using way less energy so we don't *need* to open Pandora's Other Box?

Resources:

Books

- *Boiling Point* by Ross Gelbspan
- *Heat: How to Stop the Planet From Burning* by George Monbiot
- *The Swarm* by Frank Schatzing

Movies

- Who Killed the Electric Car
- Waterworld
- Six Degrees Could Change the World

Links

- 350.org - http://www.350.org/
- Climate Hot Map (Union of Concerned Scientists) - http://www.climatehotmap.org/
- NASA Goddard Institute for Space Studies - http://www.giss.nasa.gov/

Introduction to the 5 Solutions

Digging Deeper

Additional questions to research & consider:

- A solution to one of the *symptoms* of Overshoot can sometimes make another symptom worse. For instance, an organization trying to save streams to protect salmon might conflict with another organization trying to replace a coal-fired electricity plant with hydro power. What does that tell you about *systemic* solutions?
- Jon never mentions altruism as a motivation for people to change their behavior. Why do you think he made that choice?
- Does it diminish the importance of the issues to be tackled to use fun to motivate people to take action?
- What do you think the best ways are to motivate people to change their behavior?
- How consistent is your behavior with what you believe needs to happen for the world to get better?

A related issue: *Related Issues*

So, this section of the movie is, like, a minute long. Are you trying to milk this or what?

Fine. Let's just go to the next section.

The 5 Solutions

Digging Deeper

Drive Past Exxon

Additional questions to research:

- Over the past 100 years, which boycotts have been most effective in changing corporate behavior?
- Trace the origins of ExxonMobil back to Standard Oil in the 19th century. What other oil companies is it related to?
- How well has ExxonMobil done in terms of cleaning up and compensating people for the damage from the Exxon Valdez spill?

- Look into the amount of spillage from pipelines and shipping around the world. What are the dangers of shipping oil?
- Before the spill in the Gulf of Mexico, BP tried rebranding itself as "Beyond Petroleum" – do you think some oil companies are "greener" than others?
- What role does our dependence on oil play in damage done by drilling, producing, refining and shipping oil?

A related issue: *Climate Denial*

Among the world's climate scientists, there is virtually no disagreement that the Earth is warming, and we're the reason. According to NASA, from 1985 to 2011 (the year this study guide was written), *every single month* had above average global temperatures. And while no particular weather event can be attributed to global warming, as climate "skeptics" are quick to say, the sheer number of catastrophic weather events is piling up quickly. And yet, the public's belief in global warming as a real phenomenon is currently going *down*. How is this possible?

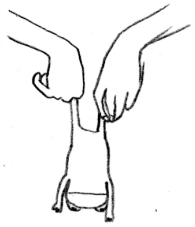
One problem is that most adults either haven't studied science, or slept through the classes they did take. So the basic rules of thermodynamics have been long forgotten. But some of the facts are quite simple: If you heat a closed system (like our planet), you increase the energy in that system – and in a closed system with water (i.e., oceans), you can expect that to result in lots more water vapor in the air. Bill McKibben, an environmentalist and author who's advocating fast

action on global warming, has pointed out that this water vapor has made our atmosphere into a kind of loaded gun, waiting for a trigger. Where we might have gotten a storm before, now we get a hurricane. Where we would have gotten heavy rains, we now get a monsoon.

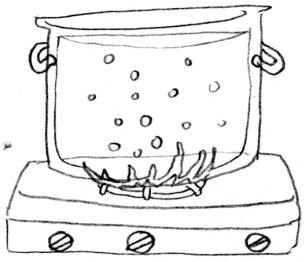
But if these scientific facts are so obvious – and anyone who has boiled water can see that they're true – why is doubt still increasing among the public? The reason is simple: that doubt is being *intentionally manufacture*d by people who have an ideological or economic interest (or both) in doing so.

THIS IS DR. FREDERICK SEITZ. HE WAS A PHYSICIST AND LONG-TIME DOUBT-SPROUTER.

The creation of doubt, as a corporate enterprise, started way back in the 1950's, and the target was pretty obvious: cigarettes. They cause cancer. The tobacco companies knew they cause cancer. But if everybody *believed* that cigarettes cause cancer, it obviously wouldn't be good for sales. At first they hired actors in white coats to play doctors in advertising, and later sponsored the creation of the Tobacco Institute. Much later, in 1979, cigarette-maker Phillip Morris hired Fred Seitz as a full-time consultant to hand out money for research that would use the academic community to find more reasons that cigarettes might not really cause cancer. All of these strategies planted doubt in the public's mind – just enough to keep them smoking.



Then in 1992 the EPA brought out a report that said that cigarettes can give you cancer even if you're just breathing somebody *else's* cigarette smoke. So Phillip Morris took it up another notch. They hired an ad agency called APCO, and APCO created one of the first fake grassroots groups, which came to be called "The Advancement of Sound Science Coalition" or TASSC. (The "fake grassroots" part is how the groups ended up being called "astroturf", much to the displeasure of Monsanto, the company that makes Astroturf.) TASSC – which was created entirely by APCO – then signed up other organizations who, for whatever reason (often their wallets) were opposed to research done by the government.



To make sure nobody suspected that TASSC was set up to protect cigarettes, they mixed in other contentious issues, like biotechnology, nuclear waste…and global warming.

Ka-ching! It turned out there were a whole bunch of companies that were willing to pay even bigger bucks to create doubts about global warming, because their products *caused* global warming and taking action to stop it would cost them money. You can use your imagination – and do your own research – about which companies those might be. Meanwhile, for the very latest in spreading doubt about global warming, visit websites like Climate Depot. But prepare yourself for rhetorical tricks: cherry-picking facts, echoing the views of "experts" who aren't climatologists, ad hominem attacks on people and organizations trying to stop global warming (without actually refuting their arguments), and so on.

See also: Cooksey's First Law in the Glossary.

Resources:

Books

- *Climate Cover-up* by James Hoggan & Richard Littlemore
- *Merchants of Doubt* by Naomi Oreskes & Erik Conway
- *The Heart of the Sound* by Marybeth Holleman

Movies

- Syriana
- Black Wave: The Legacy of the Exxon Valdez
- Out of Balance: ExxonMobil's Impact on Climate Change

Links

- Exxon Secrets - http://www.exxonsecrets.org/maps.php
- PR Watch - http://www.prwatch.org/
- DeSmogBlog - www.desmogblog.com

The 5 Solutions

Digging Deeper

Lifebulbs

Additional questions to research & consider:

- Do you consider how "green" a product is before you buy it?
- When a company says a product is "green", what exactly does that mean? How do you know?
- Check out the Meat Eater's Guide below – how much CO2 could you save by eating meat (say) only twice a week?
- What are the upsides and downsides of a family having just one child?
- "Join" the Compact for a month: don't buy yourself – or ask anyone else to buy you -- anything new (groceries don't count). At the end of the week, report back on how it felt to go cold turkey.

How does your ecological footprint compare to this Masai woman's?

A related issue: ***The GPI***

Currently, the way that countries measure the health of their economy is with a figure called "GDP" – gross domestic product. GDP measures the value of all goods and services delivered in a country over a given period. But GDP is a very problematic way to judge how you're doing. Here's a story that explains why:

A guy named Frank gets drunk at a bar and drives home drunk. On the way, he crashes into a car with 4 people in it, all of whom die instantly in a fiery explosion that sets the local forest on fire. Soon there are ambulances and fire trucks and coroners on the scene. Frank is gravely injured and they take him off to a hospital for lots of emergency surgery to save his life; the other people are carried off to the morgue. Eventually Frank is out of the hospital, but requires lifelong care. Funerals are held for the people who died, and the families all attend Frank's trial, where he's convicted and goes to prison for a while. The lives of everyone involved are ruined; marriages break up, etc. Oh, and the forest burned down and all the critters living in it got fried.

Now from a GDP standpoint, that's a very happy story. The bar made money on Frank's drinks; lots of expensive services were delivered when all those emergency vehicles came to the scene of the accident. The town had to pay to bring in firefighters and helicopters and all sorts of resources to fight the forest fire. The hospital made a mint on Frank's surgery and long-term care, and the local funeral homes had a very good year with all that embalming and burying to do (the local florists also made lots of money). The lawyers and judges and bailiffs at the trial all got paid, as did the guards at the prison where they put Frank. And of course the divorce lawyers and therapists all made money on the ruined lives and marriages, as did the rehab centers where the kids ended up.

According to the GDP, the best thing we can do to boost the economy is encourage *everybody* to drive drunk!

But of course that's insane. The story about Frank is an awful one, full of pain and misery and fried critters and wasted resources that could have gone to help poor people in need of medical care, and so on. So measuring things with the GDP clearly doesn't correspond to our experience of reality, or what we know to be right. Luckily, there are other ways to measure the economic health of a country, including the Genuine Progress Indicator, also known as the GPI.

There's a very smart economist in the movie named Mark Anielski, who worked on the GPI, and went on to write a book called "The Economics of Happiness." Mark is a cheerful, loving guy and people's happiness is very important to him.

Mark is always smiling. This is because he knows the secret economist handshake, which involves logarithms.

In Mark's book he identifies 5 kinds of "capital", that is, valuable things that together add up to our total wealth:

- *Human capital* – a person's knowledge, skills, satisfaction, health, happiness
- *Social capital* – friendships, relationships, marriages -- things that strengthen our communities and bind us to each other
- *Natural capital* – trees, fresh water, animals, clean air, oceans, etc. – in other words, Nature
- *Built capital* – computers, buildings, bikes, cars – stuff we make
- *Financial capital* – money, stocks, bonds, mortgages, debt

The GDP only keeps track of things that fall in the last 2 categories. What happens to things that fall in the first 3? They become "externalities", which is a fancy word for "stuff we don't count". Global warming, for example, has been one huge externality, because we don't put a value on the atmosphere – only now that it's causing crop failures and smashing up people's houses with violent storms and flooding whole cities that need to be rebuilt…well, that's something the GDP can count. The GDP *loves* global warming!

Obviously, we need to switch to a new way of keeping track of things that includes Nature and our communities and our own happiness.

Resources:

Books

- *The Economics of Happiness* by Mark Anielski
- *The Omnivore's Dilemma* by Michael Pollan
- *Small is Beautiful* by E.F. Schumacher

Movies

- Super-Size Me
- Food, Inc.
- Wal-Mart: The High Cost of Low Price

Links

- The Meat Eater's Guide by Environmental Working Group - http://static.ewg.org/reports/2011/meateaters/pdf/report_ewg_meat_eaters_guide_to_health_and_climate_2011.pdf
- ecofreek – free and swappable items! - http://www.ecofreek.com/
- The Compact - http://groups.yahoo.com/group/thecompact/

Animation producer Vandy Savage drew this animation frame by frame. No demon cows were burned during the making of the movie.

The 5 Solutions

Digging Deeper

Change of Heart

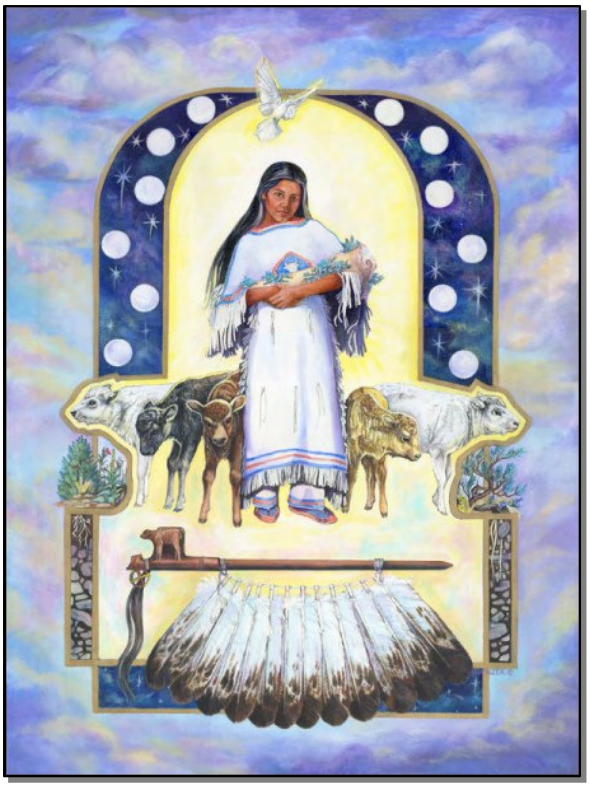
Additional questions to research (or ponder):

- In your opinion, what role has religion played in our journey into global overshoot, and what part is it playing in finding solutions?
- Do you think people sometimes use their worry about global problems to cover up fears they have about personal problems?
- Do you think the solution to global overshoot needs to have a spiritual component?
- The spiritual beliefs of indigenous peoples around the world – such as the Hopi – often include not only the necessity of protecting Nature, but of acknowledging that we are just one part of a much greater whole. How do you think the world could benefit from giving indigenous people a greater leadership role in world affairs?

A related issue: *Pte San Win*

The indigenous people of North America – Native Americans on the US side, First Nations in Canada – share a greeting: "All my relations!" To them, everyone on Earth, friends and strangers, are relatives. This makes a huge difference in how they relate to others; you know that even if a relative of yours is extremely annoying or you disagree with him or her violently, that doesn't make the person stop being related to you. Whatever happens, you'll still have a connection to that person, and even a responsibility for his or her well-being. He or she can never just be "the enemy".

These North American tribes also share certain prophecies. There were more than 500 tribes in North America before Europeans arrived – between 10 and 100 million people – so we can't even begin to cover these prophecies, but one Lakota (Sioux) story in particular is very old, and contains a prophecy shared across many tribes. It's the story of Pte San Win: White Buffalo Calf Woman.



In brief, the story is that a white buffalo calf appeared to two warriors who were hunting for food in the sacred Black Hills of North Dakota. As it came closer, it turned into a beautiful young girl. One of the warriors was attracted to her, and came at her with those thoughts in his mind. A cloud enveloped him, and after a moment all that was left were his bones. (Reminder to boys: No *really* means no!)

The girl told the other warrior to go back to his people, and tell them that she would bring a sacred bundle to his people. He told his elders what had happened, and shortly after Pte San Win appeared to the tribe. She gave them the sacred bundle, and taught them 7 sacred ceremonies, including sweat lodge (purification), child naming, vision quest, and sundancing. From the Lakota point of view, she taught them how to live.

The girl predicted that hard times would come, and that there would be many changes upon Grandmother Earth, called Unc'i Maka: climate changes, earth changes, diseases, disrespect for life and one another. She promised that there would be signs, and that she would return to restore peace and harmony to the world. This prophecy is one that many tribes have in common, and, not surprisingly, many believe that this is the time that the ancients were talking about.

So what was in the sacred bundle? A C'anupa – a pipe – and what's unusual about this story is that that pipe is real, and is kept today by Chief Arvol Looking Horse. He says this: "My Grandmother that passed the bundle to me said I would be the last Keeper if the Oyate (people) do not straighten up." Check him out – he's on YouTube, and tells this story in more detail.

When Pte San Win left, she appeared as a black buffalo, then a red buffalo, then a yellow one, then a white one – representing all the people of the world. So it's part of the story that we're all in this together, and it's up to all of us to make the prophecy come true – it only comes true if we stand up and *make* it come true.

Anita Burke, who's featured in this part of the movie, was in charge of the Exxon Valdez cleanup, but is also a student of indigenous spirituality. She says White Buffalo Calf Woman has visited her in dreams, and in the sweat lodge.

Resources:

Books

- *Voices Of The Winds - Native American Legends* by Margo Edmonds and Ella E. Clark
- *The Feminine Face of God* by Sherry Ruth Anderson and Patricia Hopkins
- *Alcoholics Anonymous*, aka "The Big Book" of AA

Movies

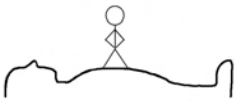
- Play Again
- Koyaanisqatsi
- What the #$*! Do We Know?!

Links

- The Children & Nature Network - http://www.childrenandnature.org/
- First People - http://www.firstpeople.us
- United Religions Initiative - http://www.uri.org/

The 5 Solutions

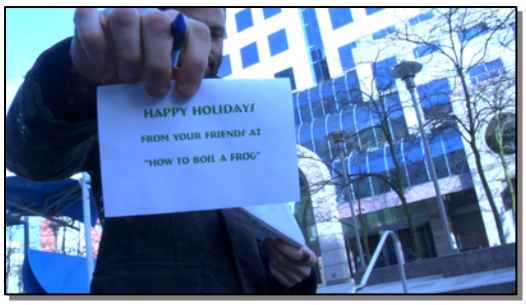
Digging Deeper



Giant Killing

Additional questions to research & consider:

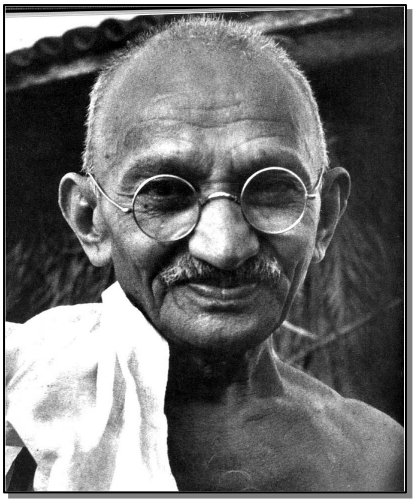
- What are the world's major sources of CO2?
- How many wind turbines would it take to replace the world's supply of coal-fired electricity?
- Which activist organizations do you think use YouTube most effectively?
    - Facebook?
    - Twitter?
- Identify a new social media site that could be used for activism. What would be a completely new way to reach people and inform them about issues like those in *How to Boil a Frog*?
- If it's impossible to predict the exact outcome of changing a complex system, what is our responsibility as activists trying to change society?



A related issue: *Civil Disobedience*

Every 2 year old in the world intuitively learns one of life's most important lessons: If you're asking me to do something, then you'd better get used to the fact that "No" is an answer too. This attitude pops up again during the teenage years, hangs on for a while, then mostly disappears when people become so-called adults. That's not a good thing.

The Declaration of Independence is a great example of people deciding that No is an answer too. Another good one was India deciding that it didn't want to be an English colony anymore.



Gandhi. You knew he'd end up in here somewhere.

So what's the lesson here? That the British Empire provided lots of opportunities for people to tell it to bugger off? No, although it did. The lesson here is that, in the course of human events, it's sometimes necessary to reinvent things, preferably with as few guillotines as possible. And yet, as George Orwell and many others have pointed out, any government that rises to power usually discovers that it really likes power, and goes about doing just about anything it can to make sure that things stay the same way they are now, forever. That's where you come in.

Humanity has gotten itself into a puzzling position. The relatively recent birth of the internet has given us an unprecedented amount of information about how we're overwhelming the habitat that supports us. We know the poles are melting, and rainforests are being cut down, and billions of people don't have enough food and water, and so on. But we aren't taking action on anything like the scale – or with anything like the urgency – that you might expect from a species that has allegedly developed higher brain function. What's up with *that*?

Don't film the dog.

Part of the problem is that it isn't as simple, anymore, as kicking out some musty old King. The Industrial Revolution allowed us to create a global machine that turns resources into comfort for a small portion of humanity, and the systems that support that machine – governments and corporations – have become very set in their ways, and also very intertwined. Like the bewitched broomsticks in *The Sorcerer's Apprentice*, they will keep the machine going unless we intervene.

One guy who did intervene isn't much older than you. His name is Tim DeChristopher. In brief, he went to an auction of oil and gas leases in Utah, where he lives, intending to disrupt the auction because he felt that drilling on those leases – which were in protected wilderness areas – would not only hurt the local environment, but would make global warming worse, thus threatening the lives of people all over the world.

TIM IS A UNITARIAN UNIVERSALIST. UU'S HAVE A LONG HISTORY OF CIVIL DISOBEDIENCE. BONUS: HIS CHURCH POSTED HIS BAIL!

To Tim's surprise, the people running the auction authorized him to bid – he became Bidder 70. Tim ended up bidding $1.7 million for 14 parcels of land totaling 22,000 acres – but, being a college student, Tim obviously didn't have 1.7 cents in his pocket. The authorities demonstrated their sense of humor about the whole thing by arresting him. A grand jury indicted him, and he was ultimately sentenced to 2 years in prison and a $10,000 fine, even though he offered to actually pay for the parcels, and the auction itself was later declared illegal.

Here's what Tim had to say about his own action: "We're in the greatest crisis that humanity has ever faced.... Our actions need to line up with our talk. When we say we're willing to go to jail, that will motivate other people on a very deep level… We have to throw ourselves into the gears of the machine that threatens our survival." Tim's courage has inspired a lot of other people. Check out his website, called Peaceful Uprising.

So where do you fit in? You fit in by making a promise, right now, that you won't forget that No is an answer too. There are a lot of ways to say no, and *How to Boil a Frog* advocates one that fits right into the world of social media that's probably a big part of your life already. Find something that you think needs fixing, get out your video camera, and make your own mini-documentary. You know the rules of YouTube: keep it short, make it funny, and if at all possible put a kitten in it. But get some friends together and *take action*. You'll love it.

Resources:

Books

- *How to Save the World in Your Spare Time* by Elizabeth May
- *Greenpeace: The Inside Story* by Rex Weyler
- *Gandhi An Autobiography: The Story of My Experiments With Truth* by Mohandas Karamchand (Mahatma) Gandhi

Movies

- V For Vendetta
- Roger & Me
- Shut Up & Sing

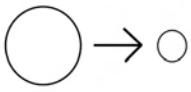
Links

- Twelve Leverage Points for Creating Change - http://en.wikipedia.org/wiki/Twelve_leverage_points
- Strategising Online Activism: A Toolkit - http://www.opportunitiesforyouth.org/2011/06/19/strategising-online-activism-a-toolkit/
- Tim DeChristopher's statement at his sentencing hearing - http://www.peacefuluprising.org/tims-official-statement-at-his-sentencing-hearing-20110726

THIS IS A COMPOSITE SHOT. FIRST THEY FILMED THE FROG AT THE PARK, THEN THEY PUT JON IN.

The 5 Solutions

Digging Deeper



Transition

Additional questions to research & consider:

- How have "just in time" supply chains made our food supply system more efficient? How have they made it more vulnerable?
- What does "community" mean to you?
- In their book "Transportation Revolutions," Richard Gilbert and Anthony Perl predict the end of commercial aviation within a few decades, from peak oil. How will your children's lives be different from yours, if flying is no longer an option?
- Research a functioning rural village from the 1800's, and list out the minimum variety of skills that were needed to make that village function in a self-sufficient way.
- How do you "build" soil?

A related issue: *Permaculture*

So you just finished scarfing down that burger – that *veggie* burger, since you saw *How to Boil a Frog* and gave up eating Daisy – and now you want to throw that wrapper away. There's only one problem: there isn't really any such thing as *away*, unless you plan to throw that wrapper outside Nature, perhaps into a convenient black hole. This is one of the many principles at the core of Permaculture: in Nature, somebody's waste is always somebody's else's food. If you consider, say, fungus a somebody.

FREE FOOD!

LYING ON THE GROUND!

The word Permaculture is a neologism, which is Greek for "a word coined by Bill Mollison and David Holmgren back in the 1970's, when people were doing a lot of that kind of thing". It's a combination of permanent and agriculture, and originally had to do with sustainable ways of growing food.

futuro ≠ pasado

Huh? We've been at this agriculture thing for, like, 12,000 years. What's not sustainable about that? Well, actually, if you check back to early human history, you find out that we've been messing it up pretty much right from the beginning, starting with salinating the soil in Mesopotamia, which is the Sumerian word for "time to take somebody else's land now".

The definition of Permaculture has expanded over time to mean designing sustainable systems for all aspects of human endeavor. A good metaphor: you don't want your life to get harder as you get old and decrepit (say, after 30) – you don't want to work *more* hours every year, with your vacation being spent getting an increasing number of kicks in the head – you want things to start to take care of themselves, so that when you're *really* old and decrepit (say, after 35), you'll be able to relax, hang out with friends, and tend to your fungus collection.

So it is with Permaculture, which seeks to have each successive planting enrich the soil and make the next planting easier and more successful. One way to do that is to plant "food forests," intentionally imitating the way Nature sprinkles in a whole bunch of different plants and bugs and so on to create an ecosystem made up of "guilds", which are the pickup basketball games of the food world. In New Mexico, for example, you've got your Daylilies at point guard, your Lovage on power forward, Siberian Pea Shrub under the net, and Plum tree on zone defense. They all work together to land buzzer-beaters all season. Although they're probably also good at badminton.

Integrating animals is also important. This can get a little awkward in urban settings where, say, chickens may be discouraged on the porch of your 14th floor condo, and putting feathers on your dog – while undeniably a ROTFLMAO – doesn't provide the same kind of fertilizer. Nature needs the birds, bees and other wildlife to enrich the soil, cross-pollinate, spread the seeds and whatnot. Although, as mentioned in the movie, genetically modified corn creatures are capable feeding on your face without assistance.

A third key element is rainwater harvesting, more critical now that global warming tends to make places either too wet or too dry. Either way, Permaculture aims to get the water into the soil, rather than having it evaporate before it gets to the roots or, at the other extreme, before it washes unwisely-placed nuclear power plants out to sea.

And then there's the principle of designing for multiple functions: drying your laundry by hanging it on your dorm window, for instance, if you're too cheap to buy curtains. Or out in the garden, following Iroquois tradition and planting the 3 Sisters: corn, squash and beans. The corn provides a natural pole for the beans to climb; beans stabilize the corn and fix nitrogen in the soil; squash shades against weeds and keeps moisture in the soil – and together they provide a balanced diet of carbohydrates, proteins and vitamins not easily found in pizza, which is much harder to grow.

So what does this have to do with you? If you live on air, nothing. For the rest of us, however, it's time to find our way back to reality. iPhones come from the Apple store, but apples don't come from the iPhone store, and there's no app that makes food.

Resources:

Books

- *The Transition Handbook* by Rob Hopkins
- *Introduction to Permaculture* by Bill Mollison
- *The Geography of Hope* by Chris Turner

Movies

- The Garbage Warrior
- The Power of Community: How Cuba Survived Peak Oil
- The Greenhorns: A Documentary about Young Farmers

Links

- Transition Towns Network - http://www.transitionnetwork.org/
- Permaculture videos - http://www.permaculturenow.com/video.html
- The Natural Step - http://www.naturalstep.org/

Signal 2100
Digging Deeper

Additional questions to research & consider:

- Pick 5 examples of post-apocalyptic movies, TV shows and/or books. Compare their visions of the future. Do they seem accurate based on what you know about where things are headed, or are they pure fantasy?
- *How to Boil a Frog* says that depression is an increasingly widespread phenomenon. Do you know someone who's depressed? How is that manifesting itself? How is depression different from sadness?
- The PTSD Workbook in the Resources section below is all about developing what Buddhists call mindfulness, which research shows is a great way to reduce anxiety (in addition to helping you reach nirvana). Check out the book and try the exercises in it.

A related issue: *Freaking Out*

So, the Black Plague. 1348. Boils, "Bring out your dead!", millions died. Whatever. You're not losing sleep over it. And most of the stuff taught in schools falls in that category. Nobody ever got depressed about the personal implications of an irregular verb, unless it was after they sucked on the test. But a lot of the material covered in this study guide – and in this section of the movie in particular – doesn't fall in that category. This is something new. This is about you, and what kind of future you're going to have. And if you aren't at least a little bit freaked out, after years of hearing about global warming and mass extinctions and e.coli and oil spills and all the other symptoms of overshoot, then you're probably a robot and may want to take this opportunity to return to Planet X.

And here's a secret for you: teachers are human beings too. Many of them are only now realizing the implications of how far into overshoot we already are, how deeply we've impacted the interconnected complex systems that make up the Earth, how far away we are from sustainably occupying our ecological niche and

how hard it's going to be to get back under the Earth's carrying capacity. And many of them are freaked out too. They're trying to figure out a way to teach you about all of it, and about what we need to do, without freaking you out. Which is impossible.

So here's what we'll do instead. Let's acknowledge that the situation we're in is pretty freaky. Global economies are staggering under huge debt loads, unemployment's rising, oceans are warming, war pandemics birds falling out of the sky blah blah blah. It's scary. There. We said it. And it's sad. And it may even make you angry at the adults who brought everything to this point. These feelings are okay. In fact, they're appropriate.

If you've grasped that, then you are now in the forefront of the psychology profession. Most of what you'll learn in beginning psychology courses will be about Skinner's box and brain development and personality disorders and, if they're cutting edge, psychopharmacology. But rare is the psychologist today who will ask a new client: "How do you feel about what's going on in the world right now? How do you think that's going to affect your future?" One exception is clinical psychologist Kathy McMahon, whose nom de web is Peak Shrink.

KATHY'S NOT IN THE MOVIE, BECAUSE JON MET HER LATE IN THE PROCESS OF MAKING IT, BUT IF YOU SQUINT, YOU CAN SORT OF PRETEND SHE'S IN THERE.

Back in 2006, Kathy realized *she* was starting to feel freaked out about what was going on in the world, especially the implications of peak oil. She wondered if other people were feeling the same, so – being research-oriented – she started a blog called Peak Oil Blues and invited people to write her and tell her how they were feeling. She was inundated, and you can read (anonymous) samples of what people wrote to her, on her site. Across the board, people were freaked

out: engineers, moms, farmers, astronauts. OK. We're not sure about the astronauts, but *pretty much* across the board. You saw Yvo de Boer in the movie – former head of the UN's climate change program. He says 2 words: "I'm terrified." Even *he's* freaked out.

And it's no accident that you saw that, because – going all the way back to what this movie is about – *How to Boil a Frog* is really about the psychology of change. How do we motivate people to change their behavior, and make this world a better place? Jon felt that the starting point was to acknowledge how we feel right now, and ask the people he talked to about how they felt. And, to his knowledge, none of them were robots from Planet X. They all have feelings, even if they believe they're not supposed to talk about them publicly.

One thing this means is that, as leaders, we have to learn how to talk to people about how we're feeling – openly, without embarrassment – because that gives *them* permission to talk about *their* feelings. We have to be unafraid to go deeply into ourselves and face those feelings, which is a spiritual journey that's been described in one form or another in every hero story since Og left the cave to bash a mammoth. And once we're at peace with those feelings, we have to *act*. We have to stop breaking stuff, and then fix the stuff that's already broken. Hoping things will get better doesn't work. Acting works.

Does that mean that saving civilization is your job? Sounds like it sometimes, doesn't it? But the answer is no. Jon has this to say: "I wonder if young people don't sometimes think there are no responsible adults left in the world, but I can tell you, there are. I've met hundreds of adults who are out there, every day, all over the world, working to make our situation better. And if I know hundreds, then there are hundreds of thousands, maybe hundreds of millions. Young people can help if they're ready – we need all the help we can get. But we're the adults. It's our job."

On the other hand, Elizabeth May's gramma used to say: "Thought without constructive action is demoralizing." So you're going to have to get off your butt and *do something*. We'll talk about ideas in the next section.

Resources:

Books

- *Reinventing Collapse* by Dmitri Orlov
- *Oryx & Crake* by Margaret Atwood
- *The Mind-Body Workbook for PTSD* by Dr. Stanley Block

Movies

- The Age of Stupid
- Princess Mononoke
- 2012

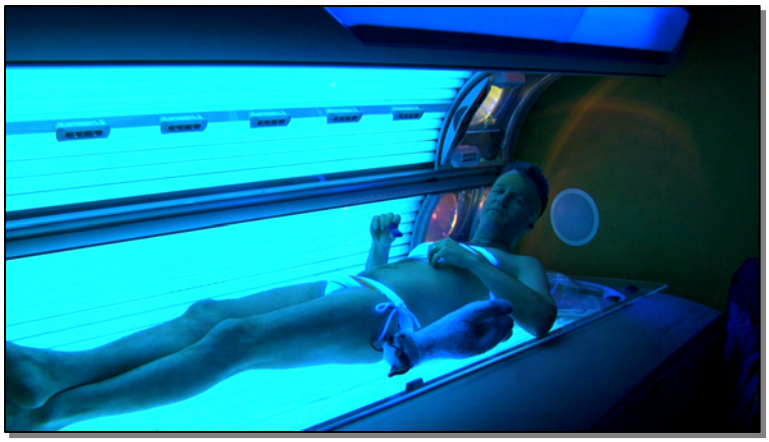
Links

- Future Scenarios - http://www.futurescenarios.org/
- Peak Oil Blues - http://www.peakoilblues.com/
- Future Me – http://www.futureme.org/

JON WORE HIS DAUGHTER'S BATHING SUIT IN THIS SCENE.

SHE WAS NOT HAPPY WHEN SHE FOUND OUT.

AS KARMIC PAYBACK, HE GOT A TERRIBLE SUNBURN.



Jumping In

This section is not going to be a laundry list of one-size-fits-all ideas for taking action, because one size does not fit all. *How to Boil a Frog* suggests 3 guidelines for choosing an action to take:

- Make sure the action you take is working towards a *systemic* solution, that is, a solution to overshoot. A good systemic solution will address multiple symptoms of overshoot, at whatever scale you're working on.
- Start with an activity you already love, and see how you can tweak it to be part of a systemic solution.
- Whatever you're going to try to do, gather a bunch of friends together and do it as a group. If you don't succeed, you still end up with a community, so you won anyway.

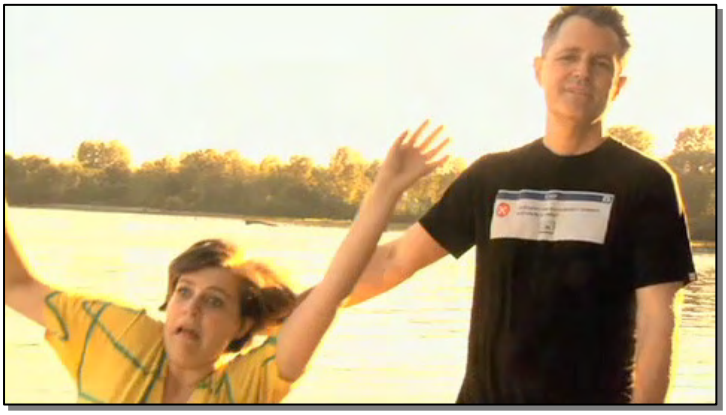
The other question is: do you tackle a local problem, or a global one? This is a real dilemma. Local actions are the ones that are most likely to be effective, and they take care of the piece of the Earth you live on. On the other hand, if everybody does local stuff and nobody tackles global problems, then the Tragedy of the Commons will kick in. So a 4th guideline:

- If you're going to tackle a problem that's bigger than local, see if there's an existing group working on that, and join it. But make sure you really agree with what they're doing, and how they're doing it.

Having said all that, here are some suggestions for action that fit the *How to Boil a Frog* model. If they don't work for you as is, tweak them to fit, or come up with ideas of your own!

- Grow food. Always gonna be #1.
- Make videos for the People's Video Project, according to the guidelines on the *How to Boil a Frog* Funhouse page.

- If you're big into social media, stop being a passive consumer and start using it to change the way things are going. *How to Boil a Frog* focused on YouTube, but Facebook, Twitter, Tumblr, Google+ and many other websites give ways to connect and organize people for action.
- If you're religious, look more deeply into what your tradition says about social justice, caring for others, and stewardship of the environment. Join existing groups within your faith devoted to causes that inspire you. If they don't have one, start one.
- Building on a principle of Permaculture, take from the waste stream of society rather than using up new resources. Sites like Craigslist.com and Kijiji.com are great sources for used stuff of all kinds. For used books, Abebooks.com is the best. For clothes, try RustyZipper.com – vintage! Or just bike to your local thrift store – no CO2 and you get the rush of a mad shopping spree.
- Rather than drive or get a ride, use public transportation, a bike, or your feet if you're able.
- Connect to the indigenous peoples in your area, learn their history and stories, and make them a bigger part of your community.
- Throw a potluck for the 10 people who live closest to you. Extra points for total strangers. Movie nights are a great way to kickstart community. Start with *How to Boil a Frog*!



- Practice meta-communication – talking about talking – when you get into conflict with people. Learn how to communicate constructively with people you don't agree with, or even like. You'll need them too, in hard times.

- Change your diet to eat lower on the food chain. As Michael Pollan says: "Eat food. Not too much. Mostly plants."
- Make art or write music that bypasses people's defenses and raises their consciousness. For a great example, check out "Sorry State of the Union Blues" by Friend o' the Frog Fraser McArter on YouTube. (Fraser's the one you see in the credits, missing his cues to turn on the Lifebulbs lamp.)
- Join your local Transition Town group. If there isn't one, contact the Transition Network and start one.
- Practice gratitude on a daily basis, using this exercise: "Imagine you just lost everything and everyone you love…and now imagine you just got it all back."
- Gamers: track down Jane McGonigal and play her real-world problem games: http://janemcgonigal.com/
- Think about what subjects you could pursue in your education -- and what practical skills you can learn -- that will make you a good global citizen…and a good village member.

And the biggie: **Design your own positive vision of the future.**

Our civilization has to be re-designed so we can live sustainably on the Earth. People in the developed world need to drastically lower consumption and output of CO2 and other pollution, to create room for the people at the bottom to come up and meet at an equitable level of around 7%, give or take.

Visionaries like T.H. Culhane at Solar CITIES are actively working on technology for this redesign. But much of what needs to happen won't be technology-driven – iPat and EROI are 2 of the obstacles there. Rather, many of the changes in the developed world will be about simplification. As Arne Naess said: "Richer lives, simpler means."

Given what you now know about where we are, and how to make things better, what's a possible future that you'd love to live in? How can we get there?

CURRICULUM INDEX

How to Boil a Frog is a little radical in suggesting that there are things you need to learn for the century ahead that aren't included in a typical curriculum: how to grow food, how to learn to make and repair things the way our grandparents or great-grandparents did, how to re-think our economic system so it includes Nature, how to be a leader in changing your community for the better, and perhaps how to make horseshoes. (Hey, at least horses don't run on oil.)

That said, Jon's ability to research and write How to Boil a Frog was based on a strong secondary school and university education, and much of the information in the movie fits right into the subjects you're studying right now. Following are just a few examples while we plan the revolution to take over the entire educational system. *Viva Froguevara!*

English

How to Boil a Frog is a documentary in the sense that all the facts in it are documented, but its real genre is satire. Satire uses humor as a weapon of social criticism, holding up lies, abuses, crimes and other follies to ridicule, often through the use of irony. Following is a list of writers (including examples of their work) who were an inspiration to Jon as a satirist. How many of these books, movies and TV shows have you experienced?

- Voltaire (*Candide*)
- Mark Twain (*The Adventures of Huckleberry Finn*)
- Jonathan Swift (*A Modest Proposal*)
- Joseph Heller (*Catch-22*)
- Kurt Vonnegut (*Cat's Cradle*)
- Larry Beinhart (*American Hero*), adapted for the screen as *Wag the Dog* by Hilary Henkin and David Mamet
- Paddy Chayefsky (*Network*)
- Trey Parker & Matt Stone (*South Park*)
- Jon Stewart (*The Daily Show*)
- Stephen Colbert (*The Colbert Report*)

Exercises

- Give 5 examples of ways in which *How to Boil a Frog* uses satire to make its point. Which do you think is most effective? Least effective?
- What are the advantages and disadvantages of using satire to communicate complex issues?
- Write a satirical essay in the style of one of the above writers.
- Write a "deleted scene" for "How to Boil a Frog" about a related subject that wasn't covered in the movie, using Jon's style.

Science/Math

"Are humans smarter than yeast?" That's the question posed by Dan Chay in a YouTube video of the same name, dealing with the concept of exponential growth. The science portion of this lesson is to observe exponential growth rates in the lab, using yeast, bacteria, fruit flies, or another organism with a rapid doubling time. Alternatively, this experiment can be (and often is) done as a math problem, given variables for growth rate, amount of food and space available, etc. Questions to explore:

- For each "ecosystem", what is the carrying capacity (K)?
- What happens when the carrying capacity is exceeded?
- Does the population decline to a sustainable level, or die off completely?
- What factors set the limits to growth?

Total collapse is not the only option, of course: the case of the reindeer on St. Matthew Island, presented in the movie, was notable *because* it was a closed ecosystem outside of a lab. In the real world, ecosystems are all interconnected and overlapping, and a collapse in a population (such as cod off the Eastern coast of Canada in 1992) is rarely total or permanent.

The more usual case is that populations rapidly decline, *undershooting* the carrying capacity of the ecosystem then gradually recovering to a stable population underneath the K line, sometimes with oscillations.

- Draw a graph showing a population on the Y axis, time on the X axis, and a dotted horizontal line K, representing carrying capacity.
    - What would a line representing overshoot and total collapse look like on this graph?
    - What would a line representing overshoot, decline and oscillating stabilization look like?
- Modify the graph to show a scenario in which the overshoot in population has lowered the carrying capacity (as when the reindeer ate nearly all the lichen). How does this affect the recovery of the population?

Any recovery scenario is an example of the population achieving a *dynamic equilibrium*, a constantly-changing balance between the tendency of a population to grow, and the ability of its ecosystem to sustain it. This is what Nature is quite brilliant at achieving, if given any chance at all, and it demonstrates an important fact: Sustainability is not a fixed state – it's a *flow*, always correcting for instability, as you do when riding a bike. As we work on making our civilization sustainable, we have to design around this concept of dynamic equilibrium.

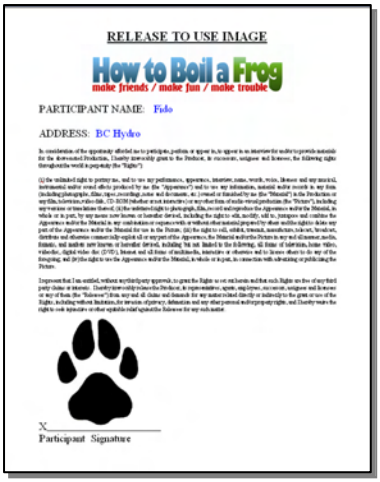
- Albert Bartlett says: “After maturity, continued growth is either obesity or cancer.” Write about what he means, and how this applies to our present situation.

History/Civics

The original purpose of corporations was to do single projects -- say, building a bridge across the stream near a village – that were too big, too expensive, or too risky for one person. Corporations were granted a charter by local government to do the project, and once it was finished, the charter was revoked and the corporation was dissolved. But nowadays, corporations are essentially immortal (unless they go bankrupt) and have many of the same rights as human beings – they have achieved “corporate personhood”. What happened?

Questions for research:

- What are the earliest references to corporations as “artificial persons”?
- What case law was involved in giving corporations the same rights as “natural persons”? Do you agree or disagree with the judgments in those cases?
- One consequences of conferring “personhood” on corporations is that they can participate in politics the same way us human beings can, by lobbying and donating money. What effect has this had on the political process?
- Could a corporation ever end up running for office?
- The movie “The Corporation” takes the position that corporations are “sociopathic” because they have been given the same rights as human beings, yet have no conscience. Watch the movie and argue for or against this proposition, based on your study of the history of corporations.


RELEASE TO USE IMAGE

How to Boil a Frog
make friends / make fun / make trouble

PARTICIPANT NAME: Fido

ADDRESS: BC Hydro

X_____
Participant Signature

- Naomi Klein’s research for her book *The Shock Doctrine* revealed that corporations that had been hired to rebuild war-ravaged countries had also bought into the armaments business and the delivery of health care to wounded soldiers, creating a kind of vertical integration similar to what’s been seen in the oil and entertainment industries. Should corporate investments and mergers be regulated simply because they seem to have a moral aspect, or is the responsibility on us to address the underlying moral issue?
- Some people want to amend the US constitution to end corporate personhood. Do you think that would address these issues?

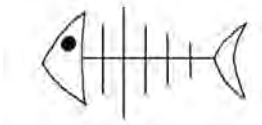
Languages

"How to Boil a Frog" has already been translated into Spanish and Chinese, and translations into German, French and Arabic are in progress. The trickiest part of that isn't merely that Jon talks so fast, but that he uses references and jokes that are sometimes specific to North American or European culture.

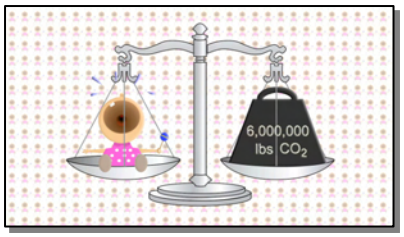
- Translate a sequence from "How to Boil a Frog" into the language you're studying
- If available, have your teacher request the existing translation of the movie into that language, and compare.
- In discussion with your teacher and fellow students, look at where literal translations of the English don't convey the humor of a joke.
- Notice where a cultural reference, such as "That's like a governor in America", might not even make sense to a viewer in Latin America, the Middle East, or Asia. How would you replace a reference like that with something culturally appropriate that conveys the same meaning?
- Find 5 other examples within your own translation, or other parts of the movie, where a cultural reference needs to be replaced rather than translated.

Art

"How to Boil a Frog" uses a variety of icons, graphics, photomontages and logos to emphasize or illustrate key points, and sometimes even as examples of how to make activism more effective. Here are some examples from the film:



Icon



Graphic

Photomontage

Logo

- Jon chose a simple line-drawing style for the icons so that people could draw them on their own fingertips. Design alternate icons for the 5 Problems & 5 Solutions, using your own style.
- Create a humorous graphic to illustrate a serious issue relating to the movie's subject matter.
- Using photos from your own collection, create a photomontage that expresses your feelings about the issues raised in the movie.
- Design an official-looking logo for a group that would address an issue in your community that you care about. For instance, here are logos that Jon recently designed for groups that he and his friends are part of, in the Vancouver area:

Designed for one of a number of groups working to stop the shipping of Alberta crude oil through Vancouver's port.

This is a project to retrofit people's houses so they use less energy to heat.

- Now that you've designed the logo for your new group, start a Facebook page for it, get some friends together, and figure out a fun way to solve that issue. Now *that's* art.

GLOSSARY

Ad hominem attacks – A way of diverting attention from the weakness of your argument by pointing out the personal failings of your adversary rather than refuting his or her points. Example: "Sure, Gandhi is all 'You should be non-violent', but dude, he wears a *diaper*."

Albedo – the reflecting power of a surface, measured on a scale from 0 (no reflectivity) to 1 (no absorption of light, i.e., pure white).

Astroturf – an attempt to portray a group or entity created to advocate a particular point of view as being a spontaneous "grassroots" reaction from the public. Generally used by corporations and ad agencies with commercial or political agendas, and given spectacularly ironic names like "Citizens Happy Over Killer Effluent" which have unfortunate acronyms.

Biocapacity -- the capacity of an area to provide resources and absorb wastes. When the ecological footprint of an area's inhabitants exceeds the biocapacity of the area, the situation is unsustainable. See "Six Earths".

Butt – the part of governments and corporations that requires kicking in order for them to serve the best interests of all people in a sustainable fashion. Also, what sticks out of your jeans if you lean over too far, apparently.

Capital – In neoclassical economics, one of 4 factors of production, the others being labor, land and management. Unfortunately, neoclassical economics has turned out to be a poor model of the real world, due to the omission of certain critical factors like air, energy and happiness.

Carrying capacity – Similar to biocapacity, though when talking about humans, food, habitat, and water are supplemented by complex factors like health care and sanitation.

Climate – the meteorological condition of a given region over a long period of time, taking into account humidity, temperature, rainfall and other elements. Not to be confused with weather.

Climate change – see Global Warming. They're the same thing. Really.

Climate refugee – someone forced to migrate or flee a region where environmental conditions have become unlivable due to global warming.

Cooksey's First Law – Similar to the PV=nRT formula from thermodynamics, wherein, if temperature is held constant, pressure must decrease if temperature increases, and vice versa. Cooksey's Law as applied to global warming is abbreviated as W=AD, where:

- W = warming (rising global temperature)
- A = action
- D = denial

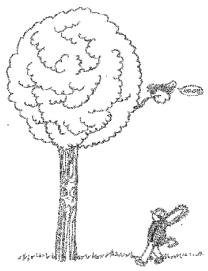
Simply stated, for a given increase in warming, either increased action must be taken (by you and others) to counteract it, or the amount of denial in the world must increase to ignore the rising level of danger. This Law is also known as "What, Me Worry?"

Cooksey's Second Law – relates to the fact that wealth in an economy is not actually created by labor, capital, land or cleverness – it is a product of the amount of net energy (mostly fossil fuels) injected into that economy. (Charlie Hall et al.) As net energy declines, the economy declines, but the decline can be temporarily masked by borrowing lots and lots of money. Therefore, the law is abbreviated as NE+D=1, where:

- NE = net energy
- D = debt

Both of Cooksey's Laws break down at a certain point, though. You can't keep borrowing money forever, and if the temperature of the planet goes up too far, no amount of denial will be able to keep up. So don't push it.

Default – what happens when a debtor cannot meet his or her payment obligations. Sometimes followed by collection efforts. Could be awkward when China repossesses America.



Demographics – the statistical characteristics of a particular population.

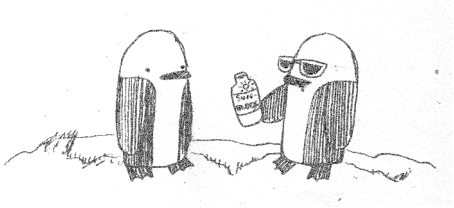
Dynamic equilibrium – a state in which opposing forces or influences within an environment have balanced each other out, sometimes with on-going adjustments.

Echo chamber – in communications, a scenario in which one person makes a statement, then many like-minded people or entities repeat it, making it seem like the statement is common knowledge and often driving up Google rankings.

Ecological footprint – a measure of one person's – or Humanity's – demand on Earth's resources. Co-developed by Friend o' the Frog William Rees and Mathis Wackernagel.

EROI – Energy return on investment – the net energy obtained from a source, after deducting the amount of energy needed to get it.

Externality – a benefit or (more often) a cost not reflected in the price of a product or service. For example, coal-fired power plants are not currently charged for putting CO2 into the atmosphere, though the environmental damage CO2 causes has recently been calculated at up to $900 US per ton.



Global Warming – Same thing as climate change. An increase in average global temperature, which causes changes to the Earth's climate.

Gyre – in oceanography, any large system of rotating currents. Gyres have an unfortunate habit of being where plastic goes to die.

Irony – In speaking, irony involves saying the opposite of what you mean; when it's got an edge, we call it sarcasm. Situational irony involves taken action that has the opposite effect of what's intended: see any Laurel & Hardy movie. Irony doesn't have to be funny, but when it is, it's one of the most effective kinds of social satire, with Stephen Colbert's live in-character performance in front of a US congressional hearing being perhaps the greatest modern example. From the Ancient Greek εἰρωνεία *eirōneía*, meaning dissimulation or feigned ignorance.

Liechtenstein – A very small principality in Europe. Just go to Switzerland and turn right. You can't miss it.

Methane Hydrates – a form of methane trapped in a crystalline structure of seawater, in low temperatures and under great pressure. Also called clathrates and "fire ice". Thought to contain at least twice the amount of carbon found in all known fossil fuels on Earth, making them an excellent new source of global warming.

Nirvana – an awesome band from the '90's. Also a state of bliss free from suffering and individual existence, reached after breaking free from the wheel of samsara.

Overshoot – what happens when a particular population or species exceeds the long-term carrying capacity of its environment. William Rees estimates that Humanity is currently exceeding Earth's carrying capacity by up to 50%.

Peak Oil – the point in time when the rate of oil production reaches its maximum, after which the rate of production will decline. First presented as a concept by geophysicist M. King Hubbert in 1949.

Six Earths – number required if all 7 billion human beings consumed resources at developed world levels. So far, we've only found the one.

Systems theory – a multidisciplinary approach to understanding a given system, such as the Earth, as a series of interconnected subsystems in which changes to one system will affect others, and possibly the system as a whole.

Tragedy of the Commons – a dilemma in which those who share a space or resource will tend to take what they want according to their own self-interest, ultimately depleting the space or resource until nobody gets what they need. First articulated by Garrett Hardin in an article for *Science* in 1968.

Weather – what's it like outside today. Not to be confused with climate. Or whether, for that matter.

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Special thanks to Janet Mahannah for her help with graphics!

THE LAST PAGE

This is the last page. If there's another page after this one, somebody really messed up. We're glad you made it this far because this is the part where we tell you that you're *our* hero. We weren't sure we were going to be able to save civilization before you showed up, but now, piece of cake.

And now, for some cool logos:

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