

Keeping the Earth Spinning
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Introduction

The earth consists of a very complex set of interconnected systems, and there are a lot of us living here now. I've asked to speak to you this morning because I believe we've come to a point where we need to stop and look at whether the way we are living on this earth can be sustained over a long period of time.

What is Sustainability?

Sustainable living simply means meeting our needs today in a way that will allow future generations to also meet their needs. There are many areas in which people talk about sustainability such as sustainable agriculture and sustainable energy use, but today I'd like to talk about sustainable living as a whole, as a framework for thinking about environmental problems. There are four things that affect sustainability.

- 1) How many people now live on the earth and how fast are we adding new ones?
- 2) How rapidly are we exhausting the fixed and renewable resources of the earth?
- 3) How much pollution are we creating that the earth has to dispose of?
- 4) What impact are we having on the earth's ability to sustain life?

I know how you feel

Now I know what you may be thinking. Geeze what do they want now?

- I recycle my garbage.
- I quit putting phosphate on my lawn.
- I use Phyllis's recycled paper for all my greeting cards.
- I switched to Monica's funny little light bulbs.
- I'm buying my food from Nan's community supported agriculture in Donna's canvas shopping bags.
- I'm paying extra to get Lisa's wind-generated electricity.
- I take the bus (to the State fair).
- I tried the light rail
- And I'm even thinking about trading in one of my SUVs.

So get off my back.

I understand how you feel. Sometimes environmentalists seem unrelenting and it's very easy to get caught up in the doom and gloom trap. I'll try not to do that, but I probably wouldn't be up here if I thought everything was just peachy either, and sometimes, as W.C. Fields observed, you just need to take the bull by the tail and face the situation.

Population

Population Growth

So let's start with how many people live on the earth and how fast are we adding new ones. It's pretty obvious that how much effect we have on the earth depends on how many of us there are. The more people there are the less impact each one of us can have without doing some serious damage.

If there were only a few million people on earth, they could do just about anything they wanted. In fact until a few hundred years ago, that was the case. There were so few people on the earth that, although they could and did destroy the ecology of isolated areas, their impact on the earth as a whole was negligible.

That's clearly no longer true. With 6.4 billion people on earth each living longer and using more resources than ever before, we need to be a lot more careful. In fact human beings are now one of the chief geophysical forces affecting the earth. Consider this:

In 1650, and with apologies to the fundamentalists that's at least 60,000 years after people first appeared on earth, there were about half a billion people. By 2000, 350 years later, the population had grown to 6 billion – 60,000 years to reach half a billion; 350 years to hit 6 billion – that's almost 13 times as many people in only about 17 generations.

Exponential Growth

World population is growing exponentially. Not only does the population increase each generation, but the size of the increase also gets larger. That's because there are more people in each generation having babies. Exponential growth can be an insidious thing because it sneaks up on you. By the time you are aware there is a problem; it can be too late to do anything about it.

Pond Riddle

Some of you may be familiar with a French riddle that goes like this. Suppose you owned a pond. One day you noticed that a single water lily was growing on your pond that would double in size each day. If the plant were allowed to grow unchecked, it would completely cover the pond in 30 days, choking off all other life in the water. But at first the lily seems small, so you decide not to worry. You'll deal with it when it covers half the pond. So the riddle is, how much time have you given yourself to prevent the destruction of the pond?

The answer of course is just one day. On the 29th day, the pond is half covered. The next day – after one final doubling – the pond will be totally covered. At first, it seemed reasonable to postpone doing anything until the pond was half covered. On the 21st day, the plant only covered 2% of the pond. It seemed like you had plenty of time. Even by the 25th day, it covered only 3% of the pond.

You can see how exponential growth, combined with delays in action, can lead to problems beyond our control. For a long time the growth looks insignificant. Then suddenly change comes on faster and faster until the problem is unmanageable.

Current Population Growth Rate

World population is currently growing at the rate of about 1.2% each year. That may not sound like much, but it means the population of the earth will double every 60 years.

Think about that. People born in the year 2000 when world population was about 6 billion will see 12 billion by the time they retire. And their grandchildren, born when the population is 12 billion will live to see 24 billion. Wherever you see one person now, they will see four:

- four times as many people on the roads;
- four times as many hungry mouths to feed;

- four times as much energy needed;
- and four times as much pollution created.

I don't think even the most giddy optimist believes that can happen unless we dramatically change the way we live.

Growth Rate Trends

However, as sobering as that is, population may not continue to grow that fast.

The worldwide average birth rate decreased from 5 babies per mother in the 1950s to about half that many in the 1990s. In Europe, the average is 1.4. Japan, China, and Australia are also well below the replacement level.

Population Projections

Unfortunately, that doesn't mean that the population problem is solved. Many scientists believe that world population will peak at about 8 to 10 billion some time in this century and then begin to fall.

Even if that's true, and many government programs and religious beliefs are trying to keep it from being true, there are two problems.

1. The first is that most of this growth will occur in the poorest nations in Asia and southern Africa that are least able to support it.
2. The second is that an increase to 10 billion people may require some very significant changes in the way we live.

Limits

So who says the earth can't support 8 to 10 billion people? There are still lots of places where nobody lives. The problem is that when population grows exponentially, everything that people do grows exponentially too. The food and water we consume, the land we use, the resources we exploit, and the pollution we create all grow along with the population.

Limits to Growth

In 1972 three scientists at MIT wrote a wonderful book called The Limits to Growth. It described very sophisticated computer modeling they had done to look at the earth's systems and resources.

Different assumptions about growth and technology were used to see what effect they would have on the earth's ability to support life.

Two subsequent books by these authors updated this information and evaluated the earlier predictions. They found that after 30 years their estimates of population, resource usage, pollution, and many other factors were surprisingly close to what actually happened.

The simulations they considered most likely to be accurate showed that the earth's systems already exceed sustainability and have since the last quarter of the 20th century:

- We are using far more oil than we are discovering.
- Fresh water shortages are becoming a major world problem

- The climate is warming.
- Species are disappearing,
- And hunger is widespread.

I don't believe any of that is news to you. Put simply, it means that since the late 1900's, we have been using more resources and creating more pollution than can be sustained.

Ecological Footprint

In 1997, a team of scientists popularized a concept called *ecological footprint*. Since the earth is made up of a finite amount of land, they evaluated everything people do in terms of how much land it requires.

This included land:

- to live on,
- to provide food, water, and natural resources,
- and to absorb the wastes that the people produced.

This analysis also found that since about 1980 the amount of land required to meet our needs sustainably is greater than the amount of land there is on earth. Since 1980, the extent of the overshoot has continued to increase.

Overshoot

Definition

To overshoot means to go beyond the limits accidentally without intending to do so. You can think of overshoot as the opposite of sustainable. Things that do not exceed their limits are sustainable; those that do overshoot.

Shower Example

If your shower takes a long time to warm up like mine does, you probably turn the water all the way to hot while waiting for it. In a perfect world, you would recognize the exact point at which to start turning the hot water down so that the temperature leveled off without ever getting too hot.

We all know that's not what happens. When the hot water finally reaches your shower, it gets hot very quickly and if you are not paying close attention, it gets too hot before you test it. If you have to spend time kicking the cat out of the bathroom, you could even be delayed long enough to get burned.

And these are in fact the three characteristics we always see in overshoot: a rapid change, a limit that can't be safely exceeded, and a delay in responding to that limit.

Global Warming

One issue we've all been hearing a lot about lately is global warming. This is a critically important problem that we absolutely must solve. But, in a sense it's not the problem. It is just a very important area where one of the earth's systems is in overshoot.

Solutions

Dissenting Opinions

Those who don't think sustainability is anything we should worry our pretty little heads about usually have two reasons: technology and market forces so let's talk about these.

Technology

The technology solution says that we'll invent our way out of overshoot. No matter how fast we grow, technological improvements will resolve any issues the growth creates. We'll find a way to neutralize nuclear waste. We'll figure out how to release billions of barrels of oil from sand shale. Genetic engineering will allow us to produce almost limitless food.

Clearly, technology is very important. In fact the computer models described by the MIT group show that technology improvements are a critical component of any realistic path to sustainability.

Technology is a Two-Edged Sword

But technology by itself is just not enough, and it's often a two-edged sword. It frequently solves one problem only to create others.

- Computer-controlled fishing vessels can stay at sea for months. They stretch bottom-dragging nets out for miles and have dramatically increased the number of fish caught. However they have also resulted in widespread destruction of fish habitat and projections that most world fisheries will collapse within 50 years.

Limits to technology

Technology does improve many problems, but it:

- tends to work for only a specific problem
- costs a lot to develop and implement
- takes time to perfect
- and often has unintended, negative consequences that we aren't very good at anticipating.

It can help us live sustainably, but it definitely won't allow us to continue growing exponentially forever.

Market Forces

The other solution that some imbue with almost magical powers is market forces. Don't worry; the market will take care of it. I agree that market forces are important. But markets thrive on expansion at a time when we are already in overshoot.

Endless Economic Expansion

We view our well being in terms of the size of our economy, our GDP -- how much money we are spending. That just seems wrong.

Would you use the amount that you spend personally as a measure of your financial well being? Borrow up to your credit limit and sell off all of your assets because the more you spend the better off you are. When our GDP hits new highs, we are burning through our natural resources at record

speed and creating frightening amounts of waste. A World Bank economist described it as treating the Earth like a liquidation sale.

Grow or Die

We simply can't keep growing exponentially forever in a world of finite resources.

What to do

So what is the answer or as Woody Allen said, "Is knowledge even possible and if not, how will we know that?"

I find the Earth to be an amazing place. It provides us with food, recreation, beauty that seems greater to me every day. How do we live on it without screwing it up?

This is a huge problem, but here are six things to consider.

1. Change our Vision

First, we need to change our vision of the future. We seem committed to the notion of ever-expanding growth. That needs to change. We have to figure out how we can prosper in a world where people are not constantly pushed to consume more than they need or want.

2. Control population

The second thing I believe we need to do is to control world population. The reading this morning was from Genesis. Be fruitful and multiply and subdue the earth. I think we can safely check that one off of the list. We have multiplied quite enough, thank-you, and now we need to live in harmony with the earth; not subdue it.

Population control is not even on the national radar even though it is the multiplier for all other sustainability issues. It's not an easy task, but we do know that countries where ordinary people live well tend to have lower birth rates than poor countries, and families will usually not have fewer children until they believe those they do have will survive.

So lowering birth rates in poor countries where most population growth occurs requires us to do the heavy lifting to help them not be poor countries.

3. Treasure our Resources

The third change is to quit wasting our natural resources.

We can't use fixed resources any faster than we develop suitable alternatives, and we can't use renewable resources any faster than they can be replaced using sustainable processes.

4. Deal with Pollution

Fourth, we need to significantly reduce the amount of pollution we create, especially greenhouse gasses. The rate at which pollutants are released can't exceed the rate at which they can be recycled, absorbed, or rendered harmless.

I recently bought an electronic device that included disposal instructions for 11 countries. The United States was not one of them even though we produce far more waste per person than any other country. Part of the design of new products needs to include processes for disposing of them and of the waste created in manufacturing them.

5. Change the way we live

The fifth thing we are going to have to do is to change the way we house ourselves. We need to use green building techniques and only build what we really need. Think of continuing care communities or even college campuses as models. Does it really make sense for us to duplicate all of the things we have in our homes for each family:

- a separate lawn mower and snow blower
- exercise equipment
- tools
- home theaters
- guest rooms and on and on....

Wouldn't it be less wasteful to share many of these? Do we really think that huge, single-family homes stuffed with furniture and electronics make us happier?

After all, "The best things in life aren't things."

6. Get a horse

Finally, we have to do something about transportation other than buying ever more cars and building even more roads. Ecologically, the automobile is probably the most harmful thing we've ever done. Walk, bike, car pool, get a fuel-efficient car, take the bus, support public transportation, move closer to where you often go. We can do better.

Summary

I want to be very clear about what I am asserting. Sustainable living requires four things:

- population control,
- technology improvements,
- creative use of market forces
- and changes in the way we live.

I don't believe that any of these can be omitted.

These are big changes that we must make as a society because sustainability is a system problem. They probably will not be led by politicians. Grass-root efforts will be needed, and that's where you come in. I have also included some changes you can make personally in your order of service. I hope you will consider them seriously.

Another thing you can do is to take the Minnesota Energy challenge. There is a flyer in your mail box explaining how to do it. If aren't comfortable with computers, members of the Green sanctuary committee will have a computer set up downstairs on February 11 after the service and will be glad to help.

We can change

I am sometimes asked if I think the situation is hopeless. I honestly do not. The most amazing thing about people is their ability to change. I know we can change because we do it at all the time. We just need to understand what needs to be done.

Think about the changes you have seen in your life – not just the technology-led changes but the changes in the way people live based upon beliefs about their well-being.

1. We got rid of lead in our paint and gasoline.
2. We got rid of CFCs in our refrigerators, air conditioners, and spray cans sooner than almost anyone believed we could.
3. Organics are the fastest growing segment of the food market.
4. Huge numbers of us started paying amazing prices for bottled water.
5. We greatly reduced air pollution and acid rain.
6. Smoking cigarettes has gone from really cool to being illegal in many indoor areas.
7. In just a few years we went from not recycling anything to curb-side programs that recycle more than 40% of our garbage in Minnesota
8. And as I said, we cut our birth rate in half in just a couple of generations.

The point is that we can change in big, important ways. We have changed. We will change. I believe that.

Closing

I would like to close with a quote from The Letters of Obermann by Senancour

*Man is mortal.
That may be true, but let's die resisting,
And if our lot is complete annihilation,
Let's at least not live in such a way that it seems like justice!"*