

The Great Simplification

Nate Hagens (00:00:02):

You are listening to The Great Simplification with Nate Hagens. That's me. On this show, we try to explore and simplify what's happening with energy, the economy, the environment, and our society. Together with scientists, experts, and leaders, this show is about understanding the bird's eye view of how everything fits together, where we go from here, and what we can do about it as a society, and as individuals.

(00:00:33):

Today's guest is my friend and educational mentor, Herman Daly. For many of my listeners, Herman will need no introduction. He is an emeritus professor of economics at the University of Maryland, a former senior economist at the World Bank, and one of the founders of the field of ecological economics.

(00:00:52):

Reading his book Valuing the Earth over 20 years ago was one of the key things that caused me to leave Wall Street and study natural resources and ecological economics. Those who have been lucky enough to interact with Herman would probably all concur that he brings wisdom and insight to a conversation, but he does it with a humility, light and grace, that is becoming lost in the modern supernormal stimuli culture. Today, Herman and I talk about the biophysical underpinnings of human economies, and how a social system that is more tethered to our ecological reality might come into being. I hope you learn from and are inspired by my conversation with Herman Daly. Hello, Herman.

Herman Daly (00:01:49):

Hello, Nate.

Nate Hagens (00:01:50):

Good to see you again, sir.

Herman Daly (00:01:51):

It's a pleasure.

Nate Hagens (00:01:53):

So you may or may not know this or may not remember this. But 20 years ago, this month, I read For the Common Good, soon followed by Valuing the Earth, and it was

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the main thing that propelled me to leave my Wall Street career a year later. And I think you do remember that around that time I called you, I emailed you and then I called you, and asked if I could be your student. And you told me that you were not accepting any students for PhD programs, and you connected me with your colleague Josh Farley. So I ended up getting my PhD at University of Vermont. But I owe leaving the dark side largely to you and your thinking.

Herman Daly (00:02:41):

Well, I probably cost you a lot of money.

Nate Hagens (00:02:44):

Well I was going to say, I wish I would've waited five years before I read your books and then I would've had some money saved. But it's all good. I traded real capital, knowledge, and relationships for financial capital, and I'm happy with that.

Herman Daly (00:03:00):

That's good. The reason I didn't accept as students was I was at that time, on the outs with my department at LSU. I was such a minority, that any student who studied with me was at a disadvantage. I could not put together a committee of five people that would likely accept a dissertation done with me. And I shortly after, left LSU and went to the World Bank, which in some ways was out of the frying pan, into the fire, but in other ways was a big improvement.

Nate Hagens (00:03:37):

So let's talk about that a little bit, First of all, give us a little bit of background. Like me, I was doing one thing, and I moved to study this stuff, and live it, and teach it, and I'll try to understand it better. What was your change in thinking from the conventional way? I know you were a graduate student of Nicholas Georgescu-Roegen. How did you start thinking that the stories we are told in conventional textbooks and parlance are not exactly what's going on?

Herman Daly (00:04:09):

I had to change my mind. I started out as a ordinary growth economist. And I grew up in Texas, right there in contact with Mexico. I thought I saw a lot of poverty in Mexico

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and in Texas, and I felt that my little contribution to the world would be through economics, help to eliminate poverty, or reduce it at least.

(00:04:38):

So I went to study as an undergraduate at Rice University in Houston. And it's interesting, all undergraduates at some point has to choose a major. And I was having real difficulty choosing a major because I liked science and I liked humanities. And I didn't want to give up either one in preference for the other particularly.

(00:05:03):

And so I thought social science. Well, there's a compromise. That's right in the middle. And economics looks like the most interesting of the social sciences to me, has one foot in the world of ethics and humanities, and the other foot in the world of physical science. So that's what I'll choose.

(00:05:28):

And I was aided in that choice, but because the first course I took was the history of economic thought, and that was sort of the way it was. But quickly, I realized when I got into microeconomics, macroeconomics, and so forth, more advanced courses, that I'd made a mistake, that economics being taught had both feet in the air. There wasn't any grounding in physical science. There wasn't any grounding ethics to speak of. But I was already committed to that, and I did like it, and I was still interested in the poverty aspect and Latin America.

(00:06:09):

So I went to Vanderbilt University because of the Latin American Development program there, not because of Nicholas Georgescu-Roegen. In fact, all the students in Vanderbilt were scared of Georgescu-Roegen because he was kind of fierce. But I was required to take his course, and it really opened my eyes. I said, "Well, this guy's really got it right." So I became his devoted student.

Nate Hagens (00:06:38):

What were one or two things that opened your eyes back then in the same way that my eyes were opened from your work?

Herman Daly (00:06:45):

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Well, I'd been unhappy with the lack of grounding of economics in something more solid. At that time, he himself went through a transition. He was a mathematical statistical economist, and then he got interested in the entropy law as a foundation of economics. So while I was taking his course, he was working on his magnum opus, which was the entropy law and economics. So I got a preview of that book in his course.

(00:07:22):

And that really opened my eyes. I mean, to see the importance of... Economics deals with scarcity. One of the roots of scarcity in the physical world is the entropy law, and the laws of thermodynamics generally. So that turned me on, and I just thought I was in presence of a real intellect, switched my view.

(00:07:48):

I was still interested in going to Latin America and working in development. And so I eventually did that, went to Northeast Brazil with a Ford Foundation professor at the University of Ceara.

(00:08:03):

And seeing the population problem in the northeast of Brazil at that time, I guess further gave emphasis to my interest in the balance between population, and resources, and scarcity, and environment.

(00:08:22):

And then I read Rachel Carson's book Silent Spring. And that was an eye-opener because I thought, "Well, that's not just pesticides that are screwing things up. It's the whole waste stream from the entropic use of resources." So that was more or less what led me away.

Nate Hagens (00:08:42):

So the main two things that I learned from your work 20 years ago, and I've continued to learn them, and now they just seem obvious to me, is number one, we live in an energy and materials economy, not a monetary economy. Money is just a marker for the real biophysical things.

(00:09:02):

And the second thing is that the damages to nature, and other species, and ecosystems, and the environment are not included in the prices of things we pay for.

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And that is called an externality. And it just shocked me that we go and consume and live our lives, but a lot of the negative impacts are not included in our prices. And I just never thought of that before, and now it just seems so obvious.

(00:09:34):

So these are two of the aspects of the field that you were one of the founders of, ecological economics, which is what I got my PhD in. So in your own words, how would you describe ecological economics in contrast to conventional economics?

Herman Daly (00:09:54):

Going back to the common first syllable, eco, ecological economics repeats that syllable. And for ecology, that means the household. Eco comes from the Greek oikos, meaning household and free ecology. It's the study of the total household of mankind, the natural ecosystem, the biosphere.

(00:10:20):

And economics then, is the more narrow household of mankind, the economy. And so ecological economics studies the relationship between the human household and the larger household of nature. What flows across the boundary of those household? And how does the economy fit within the larger biosphere? And more importantly, I guess, how does it fail to fit? How does it fit badly? And what can be done to correct it?

(00:10:55):

Why wasn't that always the way we looked at it? I think the earlier economists looked at it as the economy was everything. And indeed, that made sense. If the economy was very, very small relative to the total ecosystem, you could therefore assume that the larger system was basically infinite, and then you couldn't hurt it. You could take from it without depleting it, and you could throw waste into it without polluting it, because it was so large relative to the system.

(00:11:30):

Well then as the economy... This is a great insight by the economist Kenneth Boulding. He told us that when something grows, it gets bigger. And sure enough, when the economy grows, it gets bigger, and bigger, and bigger, and the ecosystem stays basically the same size. So we have a bigger and bigger impact, and that's where these externalities come from. They used to be maybe negligible, but now they occupy center stage, and have to be taken into account.

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(00:12:07):

So one way of putting it is if neoclassical economics has to consider the capacity of the biosphere to support life as an externality, something outside of its theory, while it's destroying that capacity, then it's really past time to change the theory to take into account. And that's what ecological economics tries to do.

Nate Hagens (00:12:36):

But that was two generations ago, and things have gotten so much worse, and so much more obvious. Which leads me to question, is it people's ignorance or lack of knowledge that is limiting, including ecological economics principles into our operating system? Or is it something else? Is it that the power, and the metabolism, and the momentum, and the politics of our situation will not allow for these better long-term sustainability governance things to be incorporated into our system? What do you think about that?

Herman Daly (00:13:21):

Well, I started out thinking that it was a question of ignorance, and that once we explained things more clearly, we would gain adherence, and the total mainstream economics would move in our direction. So we were not trying to start ecological economics. We were trying to influence mainstream economics, but we couldn't do it. There was no acceptance.

(00:13:46):

So that has led me more to accept the likelihood of your second explanation, that they're real systemic and invested interests. Not only material, economic vested interests of people who benefit from the growth system and don't want to see it changed. But also, intellectual vested interests from economists and thinkers who have invested their time and mental effort into elaborating and studying all these complex models of growth.

(00:14:20):

And then I think there's just... I would call it almost a religious, or ideological, or indeed idolatrous mindset that human beings are all powerful. We are not creatures, subject to the limits of a larger creation. We are the creators.

(00:14:45):

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And look at what's going on now with our billionaires racing each other to the moon to sell short-term flights to other billionaires and touting this as the wave of the future, and evidence that we can do anything, while the world is burning, flooding, and pestilence is raising. How does that happen?

Nate Hagens (00:15:11):

It's amazing to me, first of all, that Stephen Hawking and Elon Musk are saying that we need to colonize Mars because of climate change, and nuclear risks, and other things. On the worst possible Mad Max Armageddon post nuclear collapse, the world that we live on would be a paradise compared to Mars. So even if it were physically possible, it's just delusional. But did you see a couple days ago, Herman, William Shatner's response after he flew on Bezos' ship and came back into from space? That was amazing, wasn't it? I mean, he felt a profound sadness. He's like, "Out there is death. This is life." And he's kept Captain Kirk. So I was thinking this could be an Overton window maybe of the preciousness of what we have and what we're losing.

Herman Daly (00:16:10):

Yeah, I couldn't help wondering if Bezos at that moment when he was speaking, might be telling him, "Hey, don't say that. That's not what I want them hear."

Nate Hagens (00:16:23):

I don't know.

Herman Daly (00:16:23):

I didn't know what went on there.

Nate Hagens (00:16:25):

But I will say this, and I think I've told you this on our previous chat with you. I've talked to parliamentarians, and senators, and governors, and world leaders over the last decade on our existential risks that we face with energy, climate, finance, the whole story.

(00:16:46):

Invariably Herman, these high level people are always directly flanked by an economist or an MBA that's kind of acting as the idea gatekeeper. And so all this, "We

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have an energy and materials economy, not a monetary one. Climate change is an existential risk." All these things are poo-pooed away under the framework of neoclassical economics.

(00:17:15):

So let me ask you a question. The power and the influence aside, do standard economists truly believe intellectually that things in our economy have perfect substitutability, and that we actually can physically grow for centuries or millennia? Do they really believe that?

Herman Daly (00:17:38):

Well, goodness. I think some do. Julian Simon, I think believed it. Others don't. I've been thinking about that. I read an article that impressed me a while back comparing two economic ways of thinking.

(00:17:58):

I believe that economists study...What are they studying? They are studying their model. In other words, they have a number of what they have taken to calling "canonical assumptions." And you make those assumptions. And then the rest is a model studied and elaborated mathematically, and worked out in all its implications.

(00:18:24):

And that's the subject matter. That's what you study. And you contrast that with what you're talking about here, which is the matter energy economy, sort of the real world, the physical world, the thing that I didn't want to give up as an undergraduate.

(00:18:42):

That is another subject. That's often the physics department, or chemistry, or ecology, or something in the university. That's not economics. Economic studies the model.

(00:18:55):

And so I think that's a case of what the philosopher Alfred North Whitehead called the fallacy of misplaced concreteness. We have to deal with abstractions in order to understand things. But then when you forget the level of abstraction and you begin to treat your abstractions as if they were in fact the real world, then that's what he called the fallacy of misplaced concreteness. And I think economics commits that wholesale.

Nate Hagens (00:19:29):

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Was it always that way, or did the early economists have a tighter link to physics and the real world?

Herman Daly (00:19:37):

The earlier economists were much more connected to the real world. The classical economists were much more tied to... And one example of that is... I mean, they didn't have the laws of thermodynamics at that time. Well, Alfred Marshall did. And he did refer to the fact that you can either create or destroy matter and energy, but he failed to go on to the idea with the degradation entropically of matter and energy.

(00:20:09):

And all of the classical economists in their textbooks always had a chapter on population. That was part of the total picture, population. And they looked at resources, the law of diminishing returns, the fixed factor production is land, and you keep adding labor, you're not going to continue to get the same returns. So they were much more connected to the real world.

Nate Hagens (00:20:36):

And when did that change?

Herman Daly (00:20:37):

Yeah, how did that change? That was I think when classical economics sort of changed to neoclassical economics. The theory of values shifted from labor and a more physical concept of value, to utility, a psychic notion of value. And I think while they perceived physical limits to labor and capital and land, utility, psychic experience didn't seem to have any obvious physical limitations. Enjoyment, you could just go on enjoying things more and more. Utility could increase without limit, or at least so it seemed. So I think that pushed the physics into the background.

Nate Hagens (00:21:29):

So I'm going to come back to that in a second. But in your excellent essay Economics for a Full World, you write that neoclassical economics is essentially economic imperialism. And here's a quote from that essay, "Subjective, individual preferences, however whimsical or unconstructed, are taken as the ultimate source of value. So maximizing utility is the goal of humans in an economy." But what is utility? It's

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self-referential. It's kind of like what you were saying before, that you're not studying the real world, you're studying the model. Because if you define as our objective utility, and you define utility as that which what we want more of, isn't this tautology, circular reasoning, untethered from biology or physics?

Herman Daly (00:22:23):

Yes, I think it is. I do think that value in economics has two roots. One is a root in the physical world of scarcity, entropy, matter, energy, and so forth. And the other root is in the psychic world of wants and satisfaction.

(00:22:42):

I mean, you can spend all the energy you want. But if it's on something that nobody cares for, it's not going to be valuable. So you can't have simply a cost theory of value. And I think you can't have just a utility theory value either. You have to have the, as Alfred Marshall, a great economist, put it, to ask what causes value or in his case, price? Is it supply or is it demand? Well, it's the intersection of the two that determines price, and price has something to do with value, the way we operate today.

Nate Hagens (00:23:24):

But isn't a lot of that based on the ability to pay? And how does that involve in this? Because an obese westerner, another slice of pizza brings them more utility, when that same amount of dollars would feed a family in Nigeria or whatever. How does the market treat that, or doesn't it?

Herman Daly (00:23:50):

That is what you just described. There is the law of diminishing marginal utility, which was a fundamental concept of neoclassical economics, part of the breaking away from classical economics.

(00:24:05):

The diamonds-water paradox was something of a conundrum to early economists. How is it that diamonds which are totally useless, could come in such a high price while water, which is necessary for life, has zero price?

(00:24:25):

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Well, they resolved that by the law of diminishing marginal utility. There's such a great abundance of water that our marginal wants, our least important wants for water can be easily satisfied, because there's so much of it. Whereas our diamonds are very scarce and hard to come by. And so even though our wants for our total utility of diamonds is very low, the marginal utility, the extra, the least important use we have for diamonds is still important to us, because the diamonds are so rare.

(00:25:06):

And so that was the resolution of the diamonds-water paradox by diminishing margin utility. And then of course, margin utility is what determines price. When you go into the market to exchange things, you exchange them on the basis of marginal utility, not on the basis of their total utility. So that was a real advance of neoclassical economics. But then I don't know, then you got into the growth business, which I think obscured a lot of that reasoning.

Nate Hagens (00:25:42):

Here's what I think about that, and tell me if you concur or take it a little deeper. Classical economists used to have land, land productivity as variables. And then when we started to access fossil carbon and add it to our economies, it was so powerful. Just a barrel of oil does around five years of yours, of my physical work. And all of a sudden, our productivity and our growth took a moonshot.

(00:26:11):

And over time, they attributed that to our cleverness and technology, because all we were doing was paying for the marginal cost of extraction, not the cost of creation or the pollution. We've underpaid for the main input to our economies for over a century. And the main flaw in macroeconomics, neoclassical economics, is they treat energy the same as any other input into our system. It's not special.

(00:26:42):

But from an ecological economic standpoint, or a biophysical economic standpoint, energy cannot be substituted by anything other than energy or another form of energy. And so the Cobb-Douglas function in economic theory describes where our wealth comes from, where our productivity comes from. And neoclassical economics treats capital and labor with a little bit of a productivity factor in there, as describing our wealth. But energy is completely absent.

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Herman Daly (00:27:17):

Yeah, you're absolutely right. The Cobb-Douglas production function as it's represented in textbooks, nearly always omits any resources. Energy materials, any natural resources. Only labor and capital. And the amazing thing to me and to many others is that the work of Robert Solo, they fitted the Cobb-Douglas production function to the data on production. And he explained the total increase in production by increases in labor and capital.

(00:28:03):

But then statistically, he had this huge residual that was unexplained. It was like 60% unexplained residual. So what do you do? You'd say, "That's technology." So you just attribute that all to technology.

(00:28:23):

Well, you could attribute it all to energy. And that's what other economists have done. They say, "Well, if you don't call it technically advanced, just call it energy, and you get a explanation of just about everything." You have very little residual if you put in energy. So that just seemed to me to be a very bad mistake on the part of economists.

Nate Hagens (00:28:47):

Reiner Kummel, who was on our board a few years ago, wrote papers on this showing that almost the entire residual is due to energy. And I think if there were more funding for this research, it could be shown that the vast majority of that is due to energy inputs. But this seems so obvious, Herman. Why is it persisted to this day that this isn't breaking through other than heterodox economics?

Herman Daly (00:29:14):

I can't give you a definite answer, but my suspicion going back is that it's again, this bias in favor of human beings. Human beings want to consider themselves the star of the show, not nature or other things. So labor and manmade capital are human things, where they're controlled by human beings.

(00:29:40):

So this is what accounts for production. These are things that we do that we're control. Nature, well, that's just a pile of indifferent stuff. That's just stuff that we use and it doesn't have any particular properties that we need to pay any attention to.

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Nate Hagens (00:29:58):

Well, and I think the further away that we get from a biophysical ecological equilibrium, the harder it is to actually make these hard choices to change the system to something more sustainable. Which is why I'm of the opinion, I don't know if you read my paper about the superorganism economics for the future. I think we're going to continue to kick cans until we have no cans to kick. And there's going to be a recalibration.

(00:30:27):

I mean, right now, stock markets are making all time highs. It's not because the world is a healthy place. It's because central banks, artificially low interest rates, too big to fail guarantees, quantitative easing, all these prop ups and this flood of liquidity into financial markets. This is not a response to a healthy system. Meanwhile, 20% of Americans during Covid went broke. So the wealth divide and the income divide is still accelerating.

(00:31:01):

But in any case, I personally am of the opinion we are not going to make incremental steps to change our policies and change our underlying structures. We have to build plans for when there's a crisis, because there is going to be a crisis.

(00:31:17):

Right now, getting back to the core of a biophysical worldview, we are creating money and monetary claims on an exponential trajectory. And our low entropy, high potential energy and resources are declining. And the disparity between those curves is growing by the month.

Herman Daly (00:31:41):

Right.

Nate Hagens (00:31:41):

So what do you think about all that?

Herman Daly (00:31:43):

Well, what you say is very well put. I got it into ecological economics. And I think all of us, in the early days of ecological economics, we said, "Well, money is simply a veil,"

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which economists have always sort of believed. But let's just deal with the real stuff, energy, and materials, and what happens.

(00:32:07):

I think we went a little bit too far in that direction. And I was brought up short by discovering the work of Frederick Soddy. Frederick Soddy, just a word, he was a chemist who won the Nobel Prize.

Nate Hagens (00:32:28):

This was in the 1920s, right?

Herman Daly (00:32:31):

Yeah. This was 1926 that he won the Nobel, I think won the Nobel Prize, or around then. Soddy was a chemist. He worked with Rutherford in developing atomic theory. And he realized that as a result of the theories that he had helped develop, what they then called subatomic energy would become available.

(00:32:54):

And he said, "Well, what will people do with this new source of energy? Well, hell, they'll blow each other up with it. They'll make bombs with it. That's the first thing they'll do. And I Frederick Soddy," I'm imagining that he thought this, "am partly responsible for this, although I didn't intend it, so I should do something to correct it." Why do we use the gifts of science in such a bad way? And so he said, "Well, it's because of the economy. Our economy is screwed up and we don't know what we're doing."

(00:33:30):

So he went to study economics. And what did he find out? Very much like what you just said a minute ago. He said, "What really governs our economic life in addition to wants and satisfaction, are the laws of thermodynamics." And look at all the magnitudes of economics. Production, consumption, energy, materials. All of that obeys the laws of thermodynamics. You don't create matter out of nothing. You don't dispose it into nothing, so forth.

(00:34:06):

What is it that doesn't obey the laws of thermodynamics? Well, it's money. We create money out of nothing, and we destroy it into nothing. And money is supposed to be

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the symbol or counter for real wealth. So if the symbol by which we calculate, and operate, and govern the production, and consumption of wealth, if the symbol we use can do things which the reality that it's supposed to symbolize cannot do, then we're going to screw up. And we already are, and we have been. And the big problem is with the banking system and the commercial banking system's ability to create money, which was based at the time, it still is on fractional reserve banking.

(00:34:57):

So he advocated very strongly, 100% reserve requirements for the banking system to take away their ability to create and destroy money. So that would at least be a step in the direction of controlling money.

Nate Hagens (00:35:14):

Was Soddy the guy that had the example of the negative pigs, or was that you?

Herman Daly (00:35:19):

Yeah, right.

Nate Hagens (00:35:21):

Can you describe that?

Herman Daly (00:35:22):

Yeah, Soddy said that if you have a positive pig-

Nate Hagens (00:35:28):

Like a pig on a farm?

Herman Daly (00:35:30):

Yeah, a pig on a farm. If he's on the farm, you have to feed the pig. The pig takes up space. The pig needs to be cared for, and fed, and cleaned up after, etc. So there's kind of a limit to how many positive pigs you can have, because it costs money to have positive pigs.

(00:35:50):

But negative pigs, that is a debt claim on a pig in the future. A negative pig, that's subject to the laws of mathematics, not to the laws of physics. And so you can increase

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the number of negative pigs all you want. And so we have too many negative pigs and not enough positive pigs.

Nate Hagens (00:36:10):

We have a whole lot of negative pigs right now. Because as you know, from an ecological economic standpoint, money is a claim on energy, and debt is a claim on future energy. Every dollar bill or electron in yours or my bank account, when we eventually spend it, it will be spent on something requiring energy.

(00:36:37):

So when we are issuing all these debt bailouts, stimulus plans, some of that will go at a real productive investment. But we are creating it by increasing our debt, which means basically, we're borrowing physical resources from someone in the future.

Herman Daly (00:36:58):

Yeah. That debt will have to be redeemed out of future production if it is ever to be redeemed. And it probably won't be when it gets to be too big.

Nate Hagens (00:37:09):

Yeah. So in your essay that I referenced, you had a large list of recommendations near the end, but I just want to talk about a couple of them. One, you have reforming national accounts. Separate GDP into a cost account and a benefits account so that throughput growth can be stopped when the marginal cost equal the marginal benefits. Could you talk about that for a bit? We didn't vote to have GDP as our goal. It started out as an econometric measure that wasn't ever intended to be a goal around 1930s or something, right?

Herman Daly (00:37:46):

That's right. GDP started out as a... Really, I think it was more a way of trying to have a measure of how much of productive activity of the economy could be diverted into the war effort, and what would you have left over? And a way of just keeping account of what was going on in the economy. It was never intended as a measure of welfare, or benefit, or something to be maximized.

(00:38:16):

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And indeed, economics itself, if you look at microeconomics, this is where that idea of equating marginal cost with marginal benefit... The whole idea of microeconomics is not for a firm to grow forever. It's to grow to the point at which they're maximizing profits. And when do you maximize profits? You maximize profits when marginal revenue equals marginal cost. And so you grow up to that point, and then that's what's been called the when-to-stop rule in microeconomics. You stop growing a micro entity when marginal costs equal marginal benefit.

(00:38:57):

Okay, jump over to macroeconomics now. Where's the when-to-stop rule? Well, it's not there anymore. So we just keep on adding more and more micro activities with no notion or counting of the limits of the total scale of the system.

(00:39:22):

One way I like to say is we don't have anything in economics currently which is analogous to the Plimsoll line on a ship. The Plimsoll line is a mark on the hull of a ship. And when the water level reaches the Plimsoll line, that's the signal that the ship is fully loaded. And you don't go beyond that, for danger of sinking.

(00:39:48):

Well, we can allocate weight in the boat in the optimal manner. If you put it all on in one place, you'll sink the boat faster, and you can distribute among the passengers in all sorts of different ways.

(00:40:03):

So you've got the distribution of the load among passengers. You've got the allocation of the load in different parts of the boat by efficiency. And then you've got the total load limit of the boat, the Plimsoll line.

(00:40:18):

Our economy doesn't have any Plimsoll line. We talk about allocation among different parts of the boat, different commodities. We talk some about distribution. We ought to deal with that a whole lot more. And we don't talk at all about the total load limit of the scale of the economy. So I think that's a major effort or contribution of ecological economics is to build that into analysis.

Nate Hagens (00:40:46):

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So let me ask you about that. If we were to have a Plimsoll line, would that have to be global? Because if for example, the United States created such a limit and lived within our limits, then other countries would outcompete us at least economically, though maybe that would no longer be our goal. But does such a governance potential structure even theoretically have to be global?

Herman Daly (00:41:11):

I would say that in maybe thinking really logically in the long run, yes. But I think if we try to go directly, first step global, we won't get anywhere in my opinion.

(00:41:26):

I think you can do a lot at the local level. You can live within the confines of your national geography, and have a Plimsoll. You can consider that, what's the carrying capacity of our natural ecosystem within our country? And try to live within that.

(00:41:47):

But that does mean you'll have to control international trade. You will not be able to really have free trade with that kind of system. And then eventually, you might broaden the area to the world. But I don't have any faith whatsoever after six years working in the World Bank of going to a global control policy of a Plimsoll line. I'd be very happy to see us approximated at a national level, and then gradually attempt to influence other nations to do similar things.

Nate Hagens (00:42:30):

I mean, my belief is the boat is going to have leaks, and have to go to shore, and be rebuilt, or things like that. I mean, as you know, when I called you a few weeks ago, I was in DC. What I'm trying to do is work with politicians and future politicians, meaning current staffers and analysts and such, to understand the systemic predicament that we face, to build in a Plimsoll line, break glass in case of emergency plans for when there is a crisis.

(00:43:02):

Because I just don't see... All the things that we need to do now to make our future more sustainable are going to require pain in the near term that no one is going to vote for. So we have to anticipate that en masse as a society, we are not going to keep the carbon in the ground. We are not going to constrain our consumption. As individuals, we can. But as a society, I just don't see that's going to happen.

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(00:43:28):

So if you understand that, you know that eventually, there will be a crisis. And we want to build in as many possible speed bumps and metaphorical parachutes, etc., to prepare for that moment. And I know on your long list, you have a ton of big ideas, one of which overlaps with a big project we're working on. I'd love your input on it.

(00:43:51):

You talk about changing the prices via taxes. And given that we've underpaid for the main input to our economies for the last century, just for an example, a barrel of oil does four and a half years of my work. The average American, at \$50,000 a year, four and a half years, that's \$200,000 worth of productivity in one sense, that you get for \$60.

(00:44:22):

So if we were able to put a tax on non-renewable inputs to our economy, and remove a tax on labor, which is 95% of what's taxed right now, so that if you make \$50,000 a year, you get to keep all 50,000. But a lot of things in your life are substantially more expensive. You might have to do without some things. You might have to repair things and have them last longer. And such a tax would spur innovation tethered to our reality, and it would spur conservation. So what do you think about that? What work have you done on that?

Herman Daly (00:45:01):

Well, I think that I agree with you. That's a very important and obvious thing to do. And I, for the life of me, cannot understand the fixation economists and others, politicians, have had on the so-called value added tax.

(00:45:21):

You've got two things. You've got the flow of matter and energy through the economy, which we call it the throughput. Now, that is what we're adding value to. When we add value, what is it you're adding value to? You're adding value to the natural resource energy and materials going through... What is adding the value? Labor and capital are adding the value to...

(00:45:51):

Now, what is the limiting factor in the long run? Well, back in the old days, in the empty world, the limiting factor used to be labor and capital. We had a whole lot of

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natural resources. That was the limiting factor. Nowadays, the limiting factor is natural resources, energy, and structured materials.

(00:46:16):

So let's raise the price. Let's tax the limiting factor, raise its price, use it more efficiently, garner our public revenue, which we need in any case, from that largely. And let's ease up on taxing value added.

(00:46:36):

Actually, we want to add more value. The more value we can add, the better. So that's almost the definition of efficiency, to add more value to what's basically scarce. So I would like to, as you outlined, shift the tax burden, the tax base away from value added and onto that to which value is added, the labor flow. I think that would help.

Nate Hagens (00:47:05):

So that would indirectly help the environment as well, because we would be using less. And therefore, there would be less waste. But are there any other wider boundary recommendations that you would have?

Herman Daly (00:47:22):

Well, as you know, there's this debate about the carbon tax versus cap and trade sort of things. That, I think is a difficult debate. And I personally think that quantitative limits theoretically are better than price limits, taxes. If you limit that quantity, then given a demand curve, you'll determine the price.

(00:47:53):

But, demand curves are really not known. You can draw one on the blackboard, but they're shifting all around, and there's errors and omissions. And so if you fix a price, then a shifting demand curve will result in quantity variations.

(00:48:10):

The ecosystem cares about quantities. The ecosystem doesn't really care about prices. So it's safer ecologically, I think, to fix the quantity, and then let the variations, and errors, and omissions work themselves out in price variations. That would be my preference theoretically.

(00:48:31):

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Politically, there's a good argument counter to that saying, "Yeah, but that's complicated. You have to set up all these auction systems and so forth, and the carbon tax is much simpler." In fact, all you'd have to do is just change the algebraic sign of the depletion allowance to the oil companies, change that from a subsidy to a tax, and you're almost there.

(00:48:59):

So I could see that being an immediate policy, a first step, something that's easier to do right now. You can try them both out. But I do think I do prefer limiting quantities and letting the price work itself out, rather than trying to increase the price and think that that's going to control the quantity.

(00:49:27):

Because as you pointed out earlier, look at what the fed's doing with the money supply. You could increase the money supply to finance the tax that you just imposed, and end up not limiting quantity much at all.

Nate Hagens (00:49:42):

Yeah. I mean, I often ask my climate friends, what is the carbon impact of quantitative easing? And they don't really make the connection that when we're issuing all this debt, it's an immediate claim on energy that is tethered to carbon. So these financial crises in 2009 and 2020 have made our climate situation much worse.

(00:50:09):

So not to put you on the spot, but what do you think about the future? We won't discuss worst case, but what do you expect as a base case of the next coming decades? And if some of your prescriptions and others come to pass, what would be the best case of our society heading in the direction of an ecological economy?

Herman Daly (00:50:34):

I guess you might say I try to be a hopeful pessimist. I think one has to work with the idea that there is a possibility. I can't really foresee the future, and there may be an inbreaking of understanding that is a surprise. So I'm glad to see people continuing with ecological economics, and I continue with it for my few remaining years.

(00:51:12):

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But for reasons you've indicated, that really may not work out. And as my students would frequently say, just as you did at the end of the semester, "Yeah, yeah. Professor Daly, all this steady state, what you advocate looks reasonable. Your assumptions, we can't find anything wrong with them. Your logic sounds true. I can't find an error yet, but you know Congress will never enact these kinds of programs that you suggest and to follow. So are you sure you haven't wasted our time? Maybe we should be doing something else."

(00:51:58):

And my answer to that is not a very good answer, but I said, "Well, what are you going to do after it all crashes, and every day it looks like we're heading more and more to a crash? What are you going to do then? It would be good to have some ideas on the shelf for rebuilding and reconstructing whatever is left after we crash in a way that it may not crash again." So I see that as a justification, even in the worst case scenario of doom and gloom.

Nate Hagens (00:52:34):

I mean, that's my similar philosophy. And by the way, your work has created an Overton window, if nothing else, for hundreds of thousands of people or more. Because my class called Reality 101, a lot of my students are already worried about climate change, and they take my class. And they learn a lot more things that are risks. Energy, financial depletion, geopolitics.

(00:53:01):

But at the end of the semester, they feel energized because they understand what's happening. And the understanding resolves some uncertainty, and it just makes their actions a little clearer. So I think we have a biophysical bill coming due this decade. And it doesn't have to be a disaster. But if we prepare as individuals, as communities, as a nation, and start to change... I mean, not our consciousness in a metaphysics sort of view, but change our values and our consciousness of what matters.

(00:53:41):

We don't need a 100-to-1 exosomatic surplus of energy to be happy, healthy, and live meaningful lives. I mean, Europe has half of what we have, and most Europeans are as happy or more than Americans.

(00:53:58):

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So it's this giant monkey trap. We've got our hand on the banana, which is economic growth, and we cannot let it go. All we need to do...

(00:54:08):

You've had a long and illustrious career, and you've influenced so many people, including me. If you had to do anything different looking back professionally or educationally, would you change anything?

Herman Daly (00:54:22):

Well, that's a good question, and it's a very hard one to answer. Because so many things, looking back on one's life, are the result of apparently trivial coincidences or changes. I mean, I came under the influence of Georgescu-Roegen, but that didn't have to happen. I didn't have to be interested in population.

(00:54:49):

So it's really hard to know to put together all of the influences on one's life. Growing up in Texas, I probably wasted a lot of time in junior high school and high school.

Nate Hagens (00:55:04):

So does everyone Herman. Any interesting stories about your experience at the World Bank?

Herman Daly (00:55:12):

Well, yeah. There are a number. But a story that I think is very instructive in the World Bank... As you probably know, the World Bank comes out with a World Development Report every year or sometimes two years.

(00:55:26):

Back in 1992, a couple years after I had just gone to the World Bank, they were going to do one on sustainable development, which at that time was the big new concept that had just come down from the UN and they had to deal with it. I was not on the team, which was going to write the report, because I was too low in the hierarchy. But because I was environmentalist in the environment department, I was on the review panel to comment on successive drafts of the report.

(00:56:01):

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And I thought that was very important. Here's something really, the World Bank comes out and says... Okay, first draft comes. I eagerly start reading it. In the first chapter, there's a diagram, which is titled The Relation of the Economy to the Environment. And it consisted of a rectangle labeled economy, and an arrow coming in from the left labeled inputs, and an arrow exiting to the right labeled outputs. Nothing else. That was the relationship of the economy to the environment.

(00:56:37):

So I said, "Okay." So I wrote a comment. I said, "This is a really good beginning here. We've got a picture of the economy. It depends on inputs, and it generates these outputs. But the caption says Relation of Economy to the Environment. Where's the environment? These inputs are coming from nowhere. The outputs are going nowhere. So let's draw a big circle around the rectangle and label that environment, and then we'll see that the inputs are coming from the environment. We could talk then about depletion. The outputs are going back to the environment as waste. We can talk about pollution. We can talk about the capacity of the environment to regenerate the waste, so that some might be reusable again. We can talk about the balance between the two, inputs and outputs in terms of the loss of thermodynamics and the size of the subsystem relative to the total system. How big can the subsystem be relative to the total system? We can talk about the entropic nature of this throughput of matter, energy, etc., etc. We can really develop this picture into something important." And so I sent that back in as my comment.

(00:58:01):

Here comes the second draft of the thing. I look at the diagram again. There's the same diagram, but this time with a great big rectangle drawn around the original rectangle as basically a picture frame. You just took the same picture and put it in a frame. No labeling, no change in the text, no discussion of anything.

(00:58:26):

So I said, "Well okay." I said, "This is really the same thing." I repeated the things I'd said before, tried to be more diplomatic, sent it back in. Here comes the third draft.

(00:58:42):

The third draft, I look. No more diagram. Completely abandoned any attempt to draw a diagram of the relation of economy to the environment. Now, that's something, isn't it? That's not hard to do. I mean, this is kindergarten. You got a large system, and a

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smaller system inside it, and a relation of dependence. Why won't they look at it that way? Why do they not want to do it?

(00:59:13):

Well, I realized slowly the reason is that picture threatens you with questions to which you cannot give a good answer within the context of the World Bank, because it immediately says if the economy is a subsystem of a larger system, the larger system is finite, non-growing, and materially closed. How big can the subsystem be relative to the total system, before it disrupts it? Limits to growth. Holy cow. We can't talk about that.

(00:59:49):

Entropic relation to pollution, laws of thermodynamics. Hell, nobody understands that. Nobody's going to listen to that. We don't understand it either. It's going to limit growth, we understand that much. And we can't do that, because the World Bank is in the business of growth. So better to abandon it.

Nate Hagens (01:00:11):

How soon after that did you leave the World Bank?

Herman Daly (01:00:16):

That was in 1992. I left in, I guess it was '94.

Nate Hagens (01:00:22):

Okay. Yeah.

Herman Daly (01:00:22):

So it was a while later.

Nate Hagens (01:00:24):

In all these things, it is truth is outcompeted by identity, and job, and tribal affiliation, and that's very discouraging. But I will tell you, in talking to former politicians, very senior people, these ideas are finally staring us in the face, and people are wanting explanations for the human ecosystem. How do things fit together? And they're still threatened and scared about the answers, because the answers are not going to be politically or socially sanguine. But they're fundamentally aware in a way that 20

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years ago or even 10 years ago, they weren't. I mean, people on both sides of the aisle are very worried about climate change.

(01:01:11):

And resources, I think people are becoming aware. I mean, the United States, we've squandered our endowment of high quality ores, and oil, and resources. We've effectively drained America first, and now we're left with the source rock, which is depleting at 40% a year on balance. What could we do with that energy 20, 50, 80 years from now, if we had adopted your kind of principles 40 years ago?

(01:01:42):

So Herman, thank you so much for this hour. As a long-term educator... I was able to teach for seven years. You've been a teacher your whole life. What kind of advice would you give to young Americans, young humans who are alive during this time, have a whole lifetime ahead of them, about preparing for, learning about, playing a role in our collective future? What kind of advice or thoughts would you have?

Herman Daly (01:02:11):

Yeah, of course, I guess the obvious one would be to pay attention to ecological economics, and to politically try to push it. And to recognize that so-called economic growth, which we've been pursuing for so long, has now become uneconomic. It's increasing illth faster than wealth. It's making us worse off. So we have to reverse our long-held positions.

(01:02:41):

I mean, in a way, back to the idea of scale. What is the scale of the human niche in the total biosphere? Well, we've been increasing that scale over and over, and that just plays into our natural anthropocentrism. The more of us, the better. That's progress. The more we are, the better. And the more things we have, the better.

(01:03:07):

Well, that's going to have to reverse. That's going to have to contract. We're going to have to go back and say no, for at least a while, the less of us, and the less of those things, the better.

(01:03:19):

So when I say things like that, people say, "You're anti-human, you're a misanthropist," etc., etc. Well, no. My answer to that is I think more people are better than fewer

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people. More lives are better than fewer lives, as long as they're not all lived at the same time. So we have to spread out our lives and our identity into the future. That's sort of what we mean by sustainability. If you have too many people alive at the same time, you're elbowing each other and God's other creatures off the planet.

Nate Hagens (01:03:55):

So a good approximation, it's kind of a disgusting factoid or shocking fact. Around 10% of all humans that have ever lived are alive today. I mean, we have 8 billion, and the estimate is around 100 billion have ever lived. So it's a pretty profound thing. Your recommendations to young people?

Herman Daly (01:04:20):

Oh, recommendations. Well, I think we are going to have to pay more attention to... I see a big danger in materialism. And I don't mean materialism so much just in the sense of consumerism and that, but philosophical materialism. I mean, the basic notion that the world consists only of matter and motion, and that determines everything, including our thoughts and so forth. So I think if you're a philosophical materialist, you're pretty sure to be a determinist also.

(01:05:02):

And I think that's a real danger philosophically, that's going to undercut any sort of policy efforts that we try to take. Because if your fundamental view of the way the world is that it's determined, then it doesn't make sense to try to have policy. And so I think that's a very deep underlying philosophical problem that young people need to think about, because they've been fed a whole lot of determinism in the colleges.

Nate Hagens (01:05:36):

Yeah. Well, that dovetails with my view that I think we have some emergence on the horizon, and that's why you and I are doing what we're doing. We're trying to change the initial conditions of future moments so that humans rise to the occasion, as we have many times before. Yes, we have a hell of a lot of constraints, but I think no one knows the future. I think using ecological economics framework gives us an ability to see what's likely not to happen. But it doesn't tell us what's going to happen, and I think we have to keep breathing life into those opportunities. Any closing thoughts, Herman?

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Herman Daly (01:06:21):

Well, I'm just very glad that you're devoting your youthful energy to these things, and I'm delighted by what you're doing. And I hope you keep it up, because it's certainly needed.

Nate Hagens (01:06:33):

Thanks so much, Herman, for everything that you've done and everything you've done to influence my life.

Herman Daly (01:06:38):

Well, thank you, Nate. God bless you and your work.

Nate Hagens (01:06:41):

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