



SRRR Workshop Series

Actions to Meet Challenges to Sustaining our Lives on Earth Session I: Tuesday November 28 - A Planetary Overview

Summary Proceedings

Link to the Video: [SRRRSeminar11292023 \(youtube.com\)](https://www.youtube.com/watch?v=SRRRSeminar11292023)

Agenda

Welcome and introduction: David Berry, SRRR Director

Coming to Terms with Societal Collapse: Sandra Faber, Founder Earth Futures Institute, UC Santa Cruz. Response: Marianna Grossman Q&A

Constraints on a Fossil-Free World: Patrick Chuang, Professor, Earth, and Planetary Sciences, UC Santa Cruz. Response: John Wells Q&A

From Dark Matter (in space) to Dark Matter (soil): Alexie Leauthaud, Professor of Astronomy and Astrophysics, UC Santa Cruz. Response: Anupam Saraph Q&A

Growth and Collapses: Ted Heintz, Former Head of Economics, Office of the US Secretary of the Interior. Response: Rich Juricich Q&A

Open Discussion among the presenters, respondents, and questions from the chat

Adjourn

Coming to Terms with Societal Collapse



Sandra Faber, Astronomer, Cosmologist, and Founder Earth Futures Institute, UC Santa Cruz.

Sandra Faber's specialties are galaxy formation and astronomical instrumentation. With Joel Primack, she is a co-author of the Cold Dark Matter theory, the standard paradigm for the formation of structure in the Universe. She is interested in how galaxies make planets and whether Earth is rare. Her foci in Earth Futures Institute are the need for an ethical framework as a prerequisite for planning Earth's future and whether human beings already possess the beginnings of that framework. She is also

interested in the role that computer-mediated pedagogy can play in shaping humanity's values about the future.

Sandra presented her views on the inevitability of societal collapse and the importance of knowledge gained from studies of the cosmos for planning Earth's future. She highlighted her shift in focus towards near-term challenges and her role in establishing the Earth Futures Institute at UC Santa Cruz. She said she was pessimistic about the future, particularly regarding the impending end of fossil fuels and the challenges that would bring. Sandra expressed skepticism about potential mitigation strategies such as converting the electrical grid to renewables and electric cars. Here are the main points of her presentation:



The polycrisis facing human society is comprised of many different elements. The talk featured three that seem both inescapable and imminent.

#1: The end of cheap energy; above all, abundant oil.

- Oil is essential to life as we know it (in developed countries)
- Strategies to substitute for it are unfeasible and by will not succeed
- We will use/burn all the oil we can find until it is gone

#2: Continued burning of fossil fuels will produce a temperature rise of 4.8 C by 2100.

- A quarter of the world's population will have to move or die
- The resulting havoc caused by this and crop failures will make the world ungovernable

#3: The financial underpinnings of the world economy are perilously insecure.

- Debt is growing exponentially, outstripping the ability to pay interest
- Oil and minerals are getting scarcer and more expensive
- Major restructuring is due soon (e.g., massive inflation, failure of endowments/pensions)

Current focus should be on navigating the collapse and shaping the outcome.

Universities should lead in instituting programs to:

- Develop realistic, detailed scenarios
- Educate young people
- Preserve/enforce essential elements such as steady-state economy, stable forms of government, and human rights

Universities are the natural leaders in these areas but are largely oblivious.

“Higher education needs to wake up!”



WHAT SHOULD WE BE DOING NOW?

- 1) *Preparing realistic model scenarios to inform planning*
 - * *How many people, living where and how?*
 - * *Where does their energy come from?*
- 2) *Choosing essential features of today's society that should be preserved and figure out how the new society will provide them. Examples:*
 - * *Refrigeration*
 - * *Basic medicine*
 - * *Free access to all the world's knowledge to date*
 - * *Human rights*
- 3) *Helping young people prepare for a radically different future:*
 - * *Expect to be severely tested*
 - * *Don't assume that society will provide for your needs*
 - * *Develop practical skills*
 - * *Form resilient communities*
 - * *Downsize now*
 - * *Find joy in friends, family, nature, service, creativity – not tech*
 - * *Cling to what is good*

Respondent Marianna Grossman: Thank you Sandra for a powerful wake-up all. The shift from exclusively trying to prevent catastrophes to including planning ahead for coming conditions and naming the global warming pot that we are being boiled in are very important. There are counter examples such as battery systems that are not fossil based, changes in building materials and fertilizers that are bacteria based so there are some solutions in the pipeline. On the survival side a lot of work has been done at the community level to replace fuels with solar cookers and other examples of local resilience.

In the University of California system is a new Climate Health & Equity Center doing important work and lots of important work at Stanford with research and innovation. What do you think that the academic world can do to contribute to this transition?

Sandra Faber: The answer to that question are three points – written from the standpoint of what a University should do. The first point is to create realistic scenarios. I agree that there are lots of studies looking for new approaches. I would like to have a better idea quantitatively of how fast these solutions could be implemented and really make a difference. It's not good enough to know that people are working on different industrial processes etc. There is an urgent need for a team of knowledgeable people looking at each one of them and doing the math. Where are the atoms, how are they going to move and how much energy would it take in order to construct these new facilities? Universities should be taking the next step to tell us how realistic the implementation scenarios actually are in addition to just providing the basic research that might make a difference.

Constraints on a Fossil-Free World

Dr. Patrick Chuang, Professor, Earth and Planetary Sciences, UC Santa Cruz.

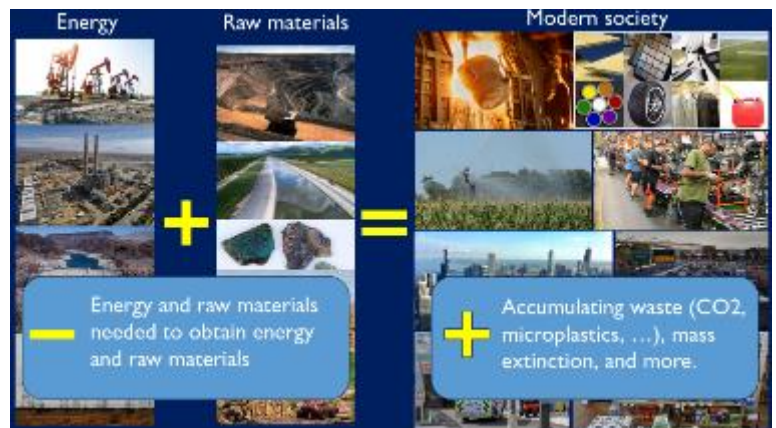


Patrick Chuang is an atmospheric scientist who studies clouds and particulate matter (also known as aerosols), primarily in relation to Earth's climate and climate change. He is also a member of UCSC's Earth Future's Institute, and in this capacity works on a project on the material needs of present-day and future societies. His research group's main interests are the interaction among clouds, aerosols, and climate. Clouds are important to a number of key climate processes, such as precipitation, the Earth's energy balance, biogeochemical cycles, and atmospheric transport. They are also amongst the most poorly understood components of the climate system, and thus pose serious limitations on our ability to predict how Earth's climate may change in the future.

Patrick discussed the concept of energy and raw materials in modern society, emphasizing the importance of efficient waste management to avoid climate change and ensure long-term sustainability.

Patrick highlighted that economic growth, averaging 2.3% per year, is dependent on energy and raw materials, suggesting that a shift to a steady-state economy is necessary for sustainability.

Patrick mentioned the challenges of transitioning to a sustainable economy, including the need for raw materials for renewable energy sources and the diminishing quality of these resources. He showed a graph that made clear that maintaining the current 2.3% annual growth in energy use, in 300 years we would need to cover all the land on the Earth with solar panels, He said there was no clear plan for solving these energy constraints and emphasized the need for long-term thinking.

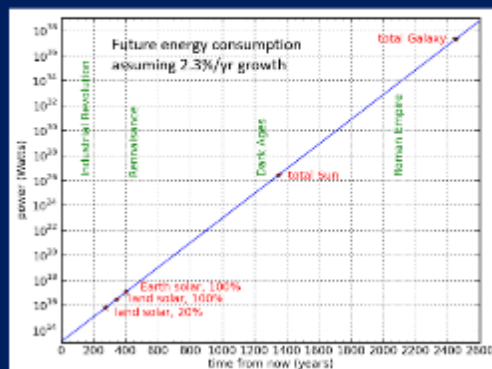


Exponentially growing energy consumption (so the economy can continually grow) leads to unphysical scenarios...

→ impractical amounts of harnessed energy

→ impractical amounts of materials

Energy growth → unlikely on time scales of 10^2 years



Patrick talked about constraints. Economic growth depends on growth in energy supply, so the end of growth in energy suggests society be re-designed to a steady state economy.

Much of our future energy may be solar & wind but as supplies of materials used to build these systems are exhausted, where will the materials come from to rebuild the energy systems every 20 years or so?

Constraint # 1: Replace economic growth with a steady state economy.

Constraint # 2: Most of our energy will be solar and wind. . . but how much can we produce?

Wind turbines & solar panels are REBUILDABLE not RENEWABLE.

– Alice Friedmann, *Life after Fossil Fuels*



Respondent John Wells: I was looking out my window at woods beyond my back yard. I live a comfortable life in retirement with trips to Europe. Patrick, you say that Americans use 5 times as much energy as the average person in the world and you also want the energy companies to give up \$40 trillion in capital assets in the ground and in equipment. Imagine you are an emergency room surgeon, cardiologist, and psychiatrist and I am your patient. I don't believe anything is wrong but my heart is failing and am constantly injuring myself and I don't know why. I am Planet Earth. What are you going to tell me in the emergency room? How are you going to make me see that there is something that needs to be fixed and how are we going to fix it in the time frame that it needs to fix.

Patrick Chuang: I don't know because I don't know what's possible yet. We don't seem to know where we are going. What do we mean by the Green Transition? Are we just going to make changes willy-nilly and hope that whatever destination we transition to is going to work out for 8 billion or 10 or 12 billion people? There seems to be no plan, and part of the reason there is no plan is that we don't know what a reasonable destination is. Much of what we talk about is tweaking the current society. It's like putting band aids on the patient who is havin a cardiac arrest. Part of the answer is thinking long-term about the whole system. That may not be a satisfying answer.

John Wells: I hear a crash coming. Thank you Patrick.

David Berry: Thank you much Patrick. Your answer corresponds to what we collectively know – that is. That we don't know.

From Dark Matter to Dark Matter



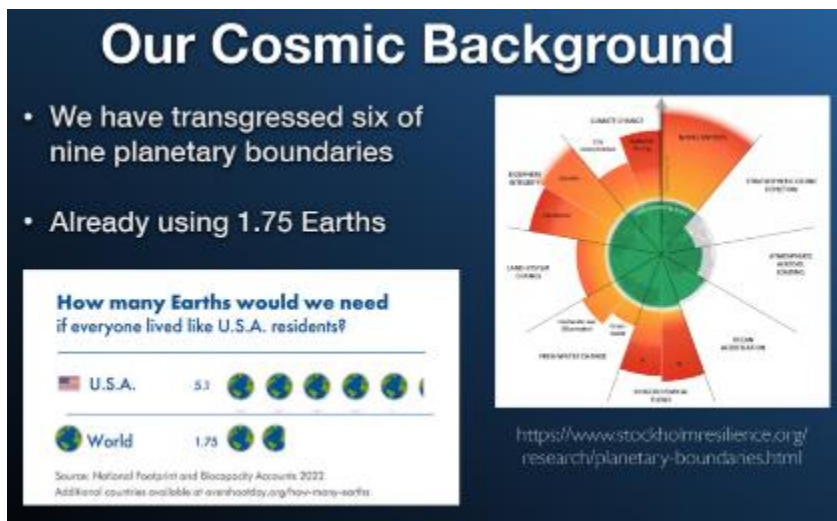
Alexie Leauthaud, Professor of Astronomy and Astrophysics, UC Santa Cruz.

Alexie Leauthaud studies dark matter, dark energy, galaxies, and formation of large scale structures in the Universe. She is involved in dark energy measurements with the Dark



Energy Spectroscopic Instrument (DESI), the first Stage IV dark energy experiment. She is P.I of the Merian survey (<https://merian.sites.ucsc.edu>): a program using 60 nights on the Blanco telescope in Chile to study dark matter and dwarf galaxies. Alexie is leading grassroots efforts at UCSC to build community and resilience as the climate crisis deepens. She is working on several community-based efforts to increase food sovereignty. She is interested in urban food production and resilience and how we make the transition to an Ecological Civilization and the role academia might play in this transition. Her work has been recognized by a number of awards.

Alexie stressed the need to shift focus from fundamental research to addressing the planetary



crisis. She highlighted the possibility for civilizations to either self-destruct when confronted with hard planetary boundaries or to transition to an ecologically sustainable existence. She shared her own shift from studying Dark Matter to working on local food production in the dark matter of top soil to support community resilience in the face of a collapse.

Alexie emphasized the need for

more resilient communities, suggesting a shift towards small to medium-sized towns that use more local resources and have higher levels of autonomy. She talked about the potential of harvesting rainwater in Santa Cruz, California, and the need for communities to learn more locally-relevant skills. She proposed the idea of building fully functional urban gardens to increase local food production and reduce waste. Alexie gave examples of resilient communities past and present and suggested that academia needed to restructure to allow for and encourage more direct climate action. In her opinion, everyone should be working on this. There is need for community outreach, research on sustainability, addressing changes in societal values, and learning from indigenous peoples and small farmers.

Alexie is working in food production in local gardens. Here projects include composting and family gardens, Tank 2 Table, and a proposal to the California Dept. of Food & Agriculture to fund 50 urban gardens based on rainwater harvesting.

She also discussed the importance of focusing on climate action in academia and suggests organizing a high-level meeting with several universities in 2024.

Respondent Anupam Saraph: Thank you Alexie for an insightful, thought provoking presentation. I like that you search for required action and suggest we not research a dead planet. Do you view the planet as a self-regulating living entity as James Lovelock proposed? If humans become extinct and unable to conduct research, would the planet still be considered living? Is operating within planetary boundaries sufficient for an ecological civilization or should we consider the interconnectedness suggested by Lovelock to ensure the livability of our planet? What change in the ecology of our minds would right actions entail? Would it involve considering how we as a species interact with each other, with other species with our ecosystem and our organizations? Could changing how we understand and interact with each other and the world be the key to our survival and prosperity as a species and advancing our civilization?

Alexie Leauthaud: Anupam, those are wonderful insightful questions, thank you. I agree with the Gaia living planet concept of Lovelock. I will re-phrase the question. We are trying to save our own skins. Life has existed here a long time. There have been multiple mass extinctions, the greatest one being 200 million years ago during the Permian when 95% of species went extinct. We could go extinct; we could create a biodiversity crisis but life will likely continue on Earth as it has for four billion years. The question is whether humans will still be around.

So I think life will continue to exist to some extent and life on Earth will encounter other serious challenges in the future. Five billion years from now our sun will become a red giant and that's a serious hard limit we could say. But in the meantime, other life forms will continue to exist. I think the real question is how to save our skins and the other life forms that share the planet with us today. And to do that I think we need to transition to an ecological based goal of civilization where we view our goal is to be stewards of the planet, be mindful of our population and how we impact the other life forms on Earth, and keep the conditions on the planet stable as it has been in the last 11,000 years of the Holocene under which our modern civilization has emerged. That is the only way I think we can survive as a human species. Otherwise Earth will become a world of jellyfish and scorpions and other intelligent life will evolve after us.

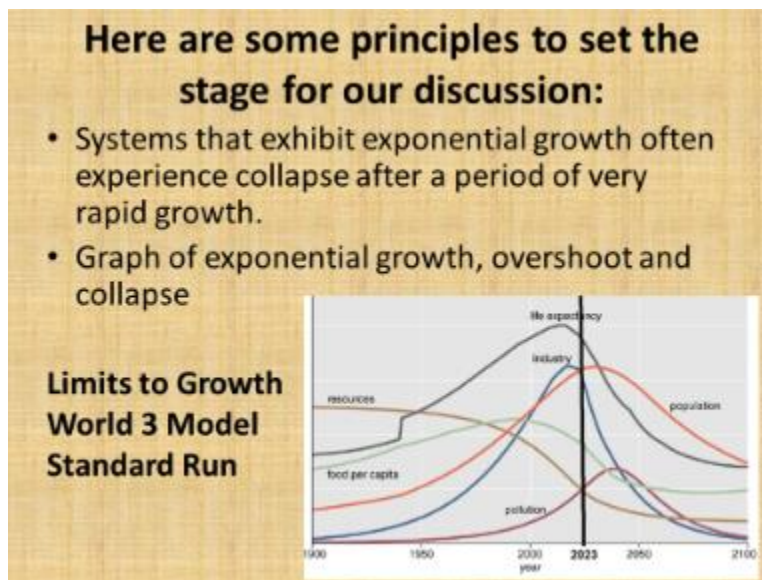


Growth and Collapses



Ted Heintz, Former Head of Economics in the Office of the Secretary of the Interior (retired).

Ted Heintz worked in the Federal government on policy and management of natural and environmental resources. In the Office of Policy Analysis at the Interior Department, he managed groups of economists and policy analysts dealing with natural resource systems. He worked in the development of natural and environmental resource indicators as a member of the Interagency Working Group on Sustainable Development Indicators (SDI Group) and participated in multi-sector roundtables that addressed criteria and indicators for forests, rangelands, minerals, and water resources. For the last six years of his career, he was detailed to the White House Council on Environmental Quality to lead an interagency effort to develop a national system of indicators on natural and environmental resources.

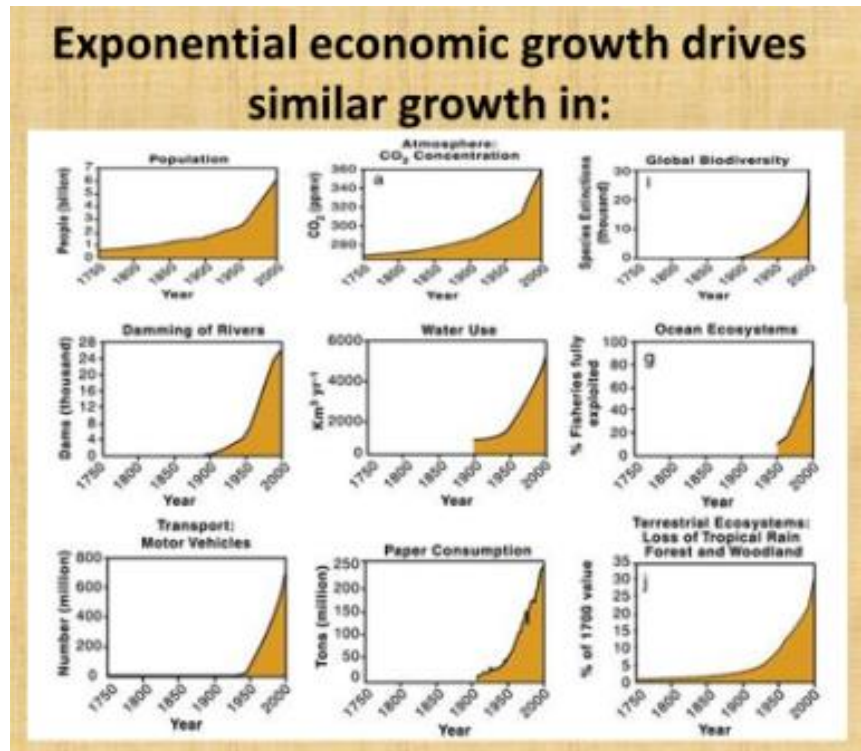


Ted began by reminding the participants that systems that exhibit exponential growth often experience collapse and gave some examples. He said we need to understand why our capitalist economic systems have been growing exponentially and be aware of the potential for collapses. We also need to understand the damaging effects of economic growth on environmental systems that might experience or cause collapses.

Key points from Ted's presentation

- A key feature of our economic systems is the strong positive feedbacks that have shaped the evolution of the drivers of economic growth, especially since the industrial revolution and the beginning of fossil fuel use.
- We are all participants in many parts of the economic system; we experience its feedbacks as incentives that motivate our consumption and production behaviors as well as our political actions.

- The negative feedbacks from environmental damages are mostly weak, indirect, and delayed from the causes of damage.
- Our political and governmental systems experience strong feedbacks from economic growth, making it difficult to bring about strong governmental actions to counter environmental damages.
- Key drivers of economic growth are:
 - investment and finance,
 - science & technological development,
 - efficiency and productivity increases,
 - manipulation of consumer discontent,
 - government management of the economy.
- These drivers all experience strong positive feedbacks from economic success.
- It seems likely that efforts to change the path of our economic systems will fail to avoid collapses of various kinds in various places, perhaps leading to a more general and widespread economic collapse.
- The pathway to changing our economic systems to be able operate within the limits of resources and the environment may be through the changes in peoples' beliefs and behaviors following serious collapses.



Respondent, Rich Juricich: Excellent talk, Ted. A lot of insight there. I just looked at the world population meter a few minutes ago and we are close to 8.1 billion people. I'm curious about the relative importance of exponential economic growth compared to population growth.

Ted Heintz: That is an interesting question. First of all, the effect of population growth on the growth of GDP is positive (that is – it contributes to economic growth). All businesses that are investing on the basis of growth in the consumer market for their products count on population growth, so in societies where we see transition to low replacement birth rates that becomes a serious problem for those managing the economy. We are seeing that in a number of countries.

If you look at a global perspective, there is an odd feedback loop. Clearly a major effect on population growth is health care services and clean water that allows population to grow. With more consumers, there will be more economic production. But we are now seeing the possibility of a decline in population globally over coming decades. What that will mean for economic activity is a little worrisome for the growth advocates because no longer will investors be able to count on a growing market.

Open Discussion

An early question in the discussion revolved around the rise of fascist populist leaders and the potential threat of this trend in the United States. John Wells expressed concern about this phenomenon, suggesting it might be a response to economic conditions and a tendency to blame outsiders for perceived problems. Ted Heintz pointed out that such authoritarian fascist and communist regimes often do not last long due to their ineffective management of the economy and tendency towards wasteful wars.

The conversation then shifted to building local resilience in communities and the importance of grassroots movements. Alexie Leauthaud emphasized the importance of these movements and mentioned plans to connect her work with other similar efforts. Alexandra Sokol mentioned that she is involved in the Millennium Group on use of AI and some of the Sandra Faber discussed obstacles to fostering a plan for working within planetary limits and creating an academic network that could contribute to that planning. She suggested a focus on a small number of people and thought that young people such as graduate students would have both the energy and the motivation to work on a more resilient future. It was noted that students are very busy, their bodies and minds are tired and engaged in their studies and then finding ways to finance them through part-time jobs and searching for grants and then they are dependent on their paychecks and in some ways are like indentured servants to the current system. So how can we engage students?

David Berry said that this has been a challenge for SRRR for many years. We have held meetings at American University and UDC in Washington, U of Michigan, Florida Gulf Coast University, UC Davis and others. Rhonda Kranz also spoke of the difficulty in bringing students into the discussions. David said we have had the experience of emphasizing to our host at a university that all graduate students are encouraged to be present and sometimes none appear.

The group agreed that we need to find more engaging ways to talk to younger people about these issues. Some suggested we emphasize the benefits of a threats to nature because many of them do appreciate going into natural areas, and preserving them could be a motivator.

Theresa Seidner said that people talk about being depressed, regardless of age. Most people live in an urban environment. She said her background in visual arts and film have helped her see that all the news people are receiving about these topics is mediated and the complexity, urgency, and benefits of action are not part of their regular newsfeed.

Anupam Saraph launched a discussion about what do we need to do to reinvent the institutions or the relationships between people and institutions. Ted said our systems are highly evolved but not good at figuring out how to survive after collapses begin. He pointed out that in the US, we tend to rebuild after a collapse (e.g. Paradise after the fire and New Orleans after the hurricane). In some cases, it might not be a good idea to rebuild in the same place.

Sandra said she thinks there is a reason for everything at its place in history. She proposed that as societies move towards a post-carbon future, they may revert to a structure akin to medieval societies, but with larger energy consumption per person than was the case centuries ago. She emphasized the need for better scenario planning to blend old and new elements.

Rick Nolthenius criticized the dysfunctional nature of the current economic system and suggested a need to move away from it before thinking about the future. How can we give people the experience of being happy not with buying products but with presence and learning what actually makes them happy?

Allen Frechette shared his experiences and concerns about the challenges of implementing environmentally beneficial programs that might face opposition due to regulatory or public resistance.

Jim McMahon took issue with the claim that there is no vision for the transition, citing various national and global plans.

The participants had a lively discussion about climate change, with Ulrich Loening quoting Donella Meadows: “If we had unlimited energy, we would have infinite waste.” David Berry emphasized the need for resilience, compassion, and the importance of involving the next generation.

There was discussion about how we get to a less consumption-oriented society and how to convince governments to apply appropriate regulations. How can the general population be persuaded to support the necessary changes when even many environmental groups do not support visions for the different levels of an economic transition. There are some technologies both high tech and low tech that can help if we can find agreement to implement them.

There was a discussion on regenerative agriculture and the need to consider indigenous knowledge for environmental and resource management both the main themes of previous SRRR workshops. Marianna Grossman emphasized the need to think about survival and challenges of working across different organizations. She highlighted the need for mechanisms for specific actions beyond sharing & collaboration. Rick Juricich expressed concerns about current power structures and future pain before people are willing to challenge them.

David Berry shared his pessimism about global action on environmental issues due to diverse views and the strong influence of the fossil fuel industry. He suggested it might be more productive to focus on many small regions rather than only striving to transform the systems of entire nations or the whole world.

Rhonda Kranz highlighted the challenges of shifting the focus from economic growth to sustainable practices.

David Silverman introduced his work with networks among global communities, comparative economics, and transition to renewables. He expressed interest in learning more about the group's work and suggested introducing his networks to Sandra Faber's call for funding for large-scale studies.

Ted Heintz shared a thought that occurred to him during the discussion: while efforts to “plan” new economic systems and small scale experiments with ways of living within the limits of resources and the environment will not cause the systemic changes that are needed, when collapses begin to motivate large numbers of people to change, these efforts will provide ideas and examples for those who will lead the efforts to design new economic systems that will emerge after a collapse.

As the discussion drew to a close, the participants spoke about the challenges of human attitudes and shortness of vision even in the face of experience and scientific discovery.