Our lives begin to end the day we become silent about things that matter.

Martin Luther King, Jr.

There is no point to intellectual and political work if one were a pessimist. Intellectual and political work require, nay, demand optimism.

Edward Said
Durable living:
Preparing for climate change and energy decline

Global climate change

Energy decline (and economic impacts)

Durable living arrangements
  Water
  Food
Regional history

Mimbres collapse ~860 ybp

Overshoot in human carrying capacity

Enabled by cheap energy source
Climate chaos

Intergovernmental Panel on Climate Change
late 2007: 1 °C by 2100
Climate chaos

Intergovernmental Panel on Climate Change
late 2007: 1 C by 2100

Hadley Centre for Meteorological Research
late 2008: 2 C by 2100
Climate chaos

Intergovernmental Panel on Climate Change
late 2007: 1 °C by 2100

Hadley Centre for Meteorological Research
late 2008: 2 °C by 2100

United Nations Environment Programme
mid 2009: 3.5 °C by 2100
Climate chaos

Intergovernmental Panel on Climate Change
late 2007: 1 C by 2100

Hadley Centre for Meteorological Research
late 2008: 2 C by 2100

United Nations Environment Programme
mid 2009: 3.5 C by 2100

Hadley Centre for Meteorological Research
October 2009: 4 C by 2060
Intergovernmental Panel on Climate Change  
late 2007: $1 \, C \text{ by } 2100$

Hadley Centre for Meteorological Research  
late 2008: $2 \, C \text{ by } 2100$

United Nations Environment Programme  
mid 2009: $3.5 \, C \text{ by } 2100$

Hadley Centre for Meteorological Research  
October 2009: $4 \, C \text{ by } 2060$

Global Carbon Project, Copenhagen Diagnosis  
November 2009: $6 \, C, 7 \, C \text{ by } 2100$
Climate chaos

Intergovernmental Panel on Climate Change
late 2007: 1 C by 2100

Hadley Centre for Meteorological Research
late 2008: 2 C by 2100

United Nations Environment Programme
mid 2009: 3.5 C by 2100

Hadley Centre for Meteorological Research
October 2009: 4 C by 2060

Global Carbon Project, Copenhagen Diagnosis
November 2009: 6 C, 7 C by 2100

UK Meteorology Office (Gornall et al. Phil. Trans. R. Soc. B 365: 2973-2989)
September 2010: Agriculture significantly impacted by 2020
Climate chaos

Proceedings of the National Academy of Science:
Climate change is irreversible

(10 February 2009)
Climate chaos

Proceedings of the National Academy of Science:
Climate change is irreversible
(10 February 2009)

United Nations Environment Programme:
During 2008, global carbon emissions increased

(November 2009)
Climate chaos

*Proceedings of the National Academy of Science*: Climate change is irreversible  
(10 February 2009)

United Nations Environment Programme:  
During 2008, global carbon emissions increased  
(November 2009)

*Climatic Change*: Only economic collapse will prevent runaway global climate change  
(21 November 2009)
Southwestern United States is entering permanent Dust Bowl, with increased drying beginning immediately

(Richard Seager, unpublished data, August 2010)
Climate chaos trumped by economic collapse?

Intergovernmental Panel on Climate Change
late 2007: 1 C by 2100

Hadley Centre for Meteorological Research
late 2008: 2 C by 2100

United Nations Environment Programme
mid 2009: 3.5 C by 2100

Hadley Centre for Meteorological Research
October 2009: 4 C by 2060

Global Carbon Project, Copenhagen Diagnosis
November 2009: 6 C, 7 C by 2100

UK Meteorology Office (Gornall et al. Phil. Trans. R. Soc. B 365: 2973-2989)
September 2010: Agriculture significantly impacted by 2020
Energy decline: Economic scenarios

This Time is Different
by Carmen Reinhart and Kenneth Rogoff (2009)

> 250 financial crises
  66 countries
  800 years
Energy decline: Economic scenarios

*Société Générale*

(November 2009)

Prepare for global economic collapse within two years
Energy decline: Economic scenarios

Société Générale

Prepare for global economic collapse by November 2011

Energy decline: United States
Energy decline: United States
Energy decline: United States imports

Percentage Of U.S. Oil Consumption Coming From Foreign Oil

- 24% in 1970
- 42% in 1990
- 70% in 2008

Mexican Petroleum Production 1995 to 2008

Data source: U.S. Energy Information Administration
Energy decline: World

Oil discoveries have been declining since 1964

- 10-Year Discovery in Billions of Barrels
- Note: World oil discovery over 10-year periods, by Association for the Study of Peak Oil and Gas.
Energy decline: World

World Oil Production
Daily Average January 2001–December 2006

Barrels per Day

Month of Production

This chart compiled April 14, 2007 by www.princeton.edu/hubbert/.
Energy decline: World

World Oil Production 1900-2080

4% annual decline (projected)
Energy decline: World
Energy decline: World

Past Recessions and Oil Spikes

Global Recessions

Real Oil Price
Energy decline: Future scenarios

International Energy Agency

Projects 9.1% annual decline, based on assessment of world’s largest oil fields (*WEO 2008*) (~3% through June 2010)
Energy decline: Future scenarios

International Energy Agency
Projects 9.1% annual decline, based on assessment of world’s largest oil fields (WEO 2008)
(~3% through June 2010)

Jeff Rubin’s forecasting record
2000: predicted $50/bbl in 2005 (actual = $70.85)
Energy decline: Future scenarios

International Energy Agency
Projects 9.1% annual decline, based on assessment of world’s largest oil fields (*WEO 2008*) (~3% through June 2010)

Jeff Rubin’s forecasting record
2000: predicted $50/bbl in 2005 (actual = $70.85)
2005: predicted $100/bbl in 2008 (actual = $147.27)
Energy decline: Future scenarios

International Energy Agency
Projects 9.1% annual decline, based on assessment of world’s largest oil fields (*WEO 2008*)
(∼3% through June 2010)

Jeff Rubin’s forecasting record and forecast
2000: predicted $50/bbl in 2005 (actual = $70.85)
2005: predicted $100/bbl in 2008 (actual = $147.27)
October 2009: predicted $225/bbl by 2012
Energy decline: Economic scenarios

*Joint Operating Environment 2010*

(Pentagon, February 2010*)

No spare oil capacity by 2012

* citing U.S. Department of Energy’s Energy Information Administration
Energy decline and economic collapse

*Peak oil $\rightarrow$ Greatest Depression*

Massive unemployment (~100%)
Fiat currency worth less and less
Energy decline and economic collapse

*Peak oil ➔ Greatest Depression*

Massive unemployment (~100%)

Very little gasoline, diesel
Energy decline and economic collapse

*Peak oil* → *Greatest Depression*

Massive unemployment (~100%)

Very little gasoline, diesel

No food in the grocery stores
No fossil fuels for A/C or heat
No water from municipal taps
Energy decline and economic collapse

*Peak oil $\rightarrow$ Greatest Depression*

Massive unemployment (~100%)

Very little gasoline, diesel

NO WESTERN CIVILIZATION
Energy decline $\rightarrow$ economic collapse: good news

GDP (billions of dollars)

Species listed under ESA

Year

1973 1987 2000

Brauer et al. (2005) Science 308:791-792
Durable living

Recognize that the industrial economy is a subset of the environment
Durable living

Recognize that the industrial economy is a subset of the environment

Use only local materials (no exports or imports)
Durable living

Recognize that the industrial economy is a subset of the environment

Use only local materials (no exports or imports)

Consume materials at the rate they are produced

Soils
Water
Fossil fuels
Durable living

Recognize that the industrial economy is a subset of the environment

Use only local materials (no exports or imports)

Consume materials at the rate they are produced

Soils
Water
Fossil fuels

Rely on local human community for support
The antithesis of durable living

**Consume**

1. To do away with completely; destroy

2a. To spend wastefully; squander

2b. Use up

3. To waste or burn away; perish
The antithesis of durable living

Obedience

Oppression
Durable living: a personal example

The trouble is that once you see it, you can’t unsee it. And once you’ve seen it, keeping quiet, saying nothing, becomes as political an act as speaking out. There’s no innocence. Either way, you're accountable.

Arundhati Roy (Power Politics, 2001)
You can either take action, or you can hang back and hope for a miracle.

Miracles are great, but they are so unpredictable.

Peter Drucker
Durable living: important attributes

- Water extraction and delivery
- Food production and delivery
- Maintain body temperature
- Rebuild human communities
Durable living: important attributes

Thriving in the post-carbon era

Water security
Food security
Maintain body temperature
Human community
Durable living: Water
Durable living: Water
Durable living: Water

Silver City: >850 million gallons/year
Durable living: Food
Durable living: Food

Population of Silver City >10,000

Population of Grant County >30,000
Durable living: Food

Population of Silver City > 10,000
Population of Grant County > 30,000

VICTORY GARDENS?
Durable living: Failure of leadership
Durable living: Failure of leadership