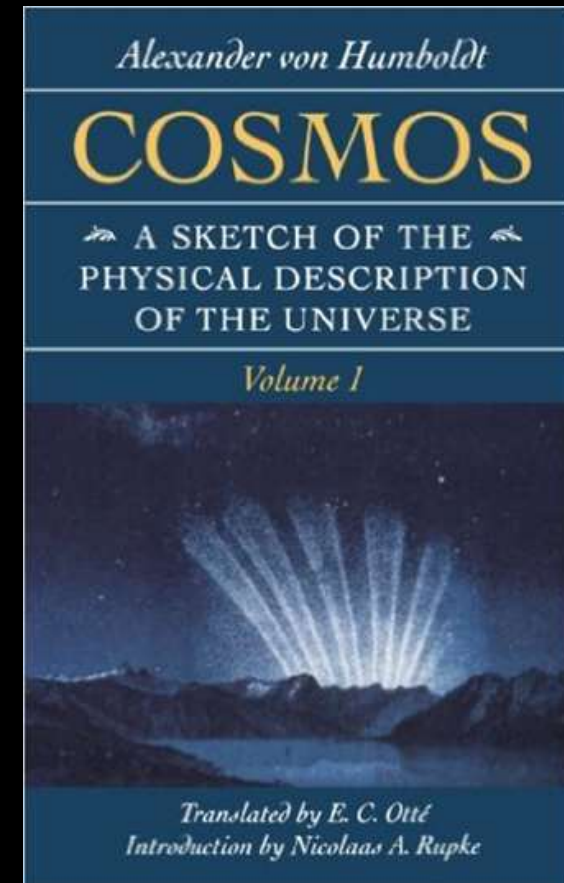
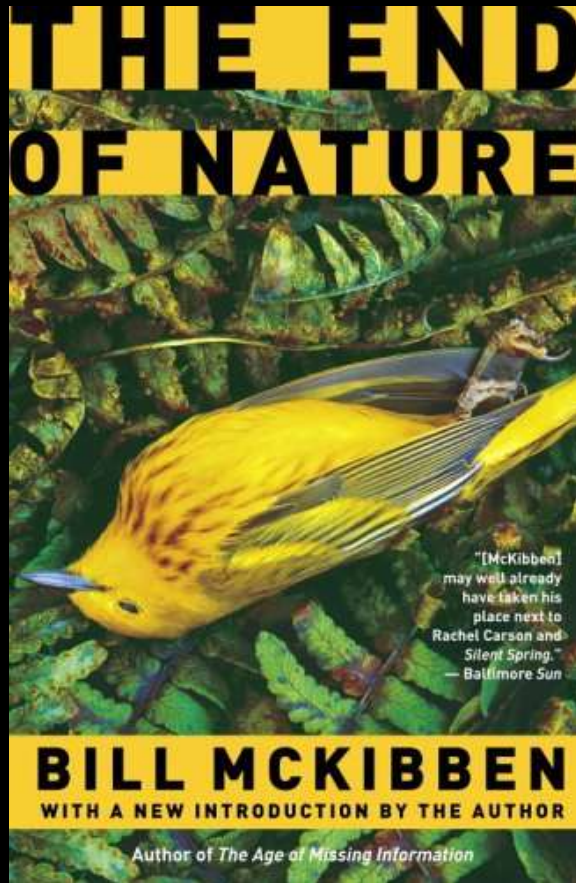


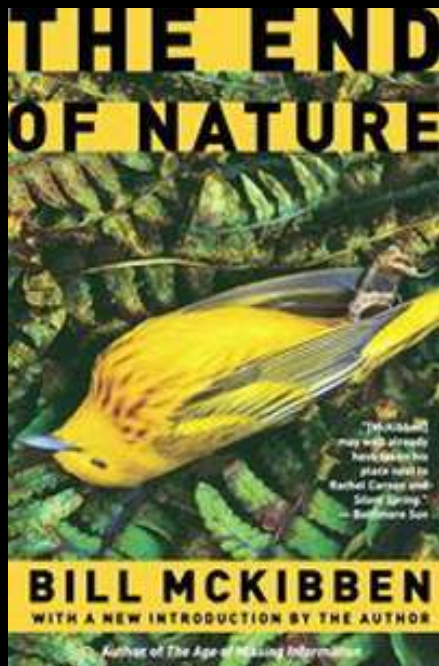
The End of Nature: Permanence, Change, and the Anthropocene

Kevin M. Anderson Ph.D.

Austin Water Center for Environmental Research



Permanence, Change, and the Anthropocene



The End of Nature (1989)

"The idea of nature will not survive the new global pollution –

We have changed the atmosphere, and thus we are changing the weather, we make every spot on earth man-made and artificial.

We have deprived nature of its independence, and that is fatal to its meaning."

"There's no such thing as nature anymore—and there is nothing except us alone"

"It was about the idea that a redwood was somehow sacred, that its fundamental identity should remain beyond our control. But once that barrier has been broken, what is the fight about, then?...How can there be a mystique of the rain now that every drop – even the drops that fall as snow on the Arctic, even the drops that fall deep in the remaining forest primeval – bears the permanent stamp of man?

Having lost its separateness, it loses its special power. Instead of being a category like God – something beyond our control – it is now a category like the defense budget or the minimum wage, a problem we must work out...one of the possible meanings of the end of nature is that God is dead."



Learning *to*
Die
in the
Anthropocene



REFLECTIONS ON THE
END OF A CIVILIZATION

Roy Scranton

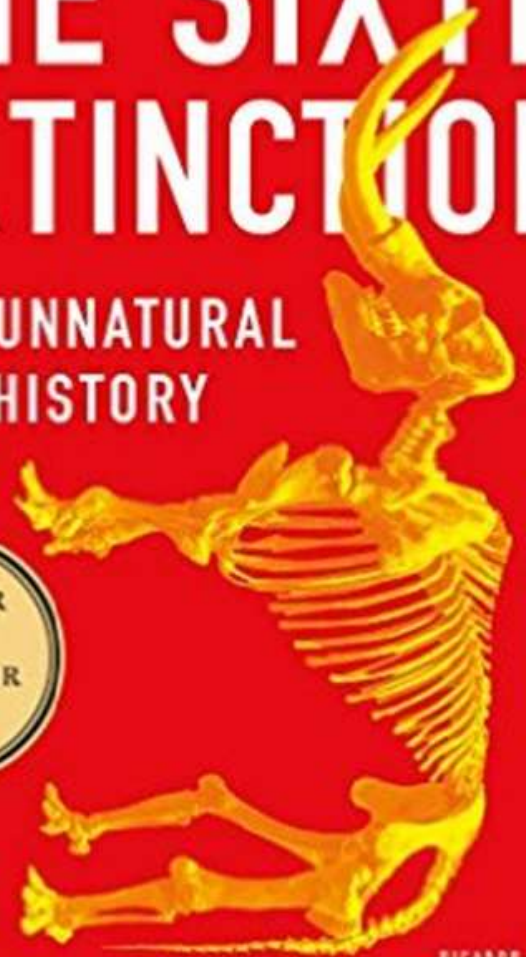
"Scranton draws on his experiences in Iraq to confront the grim realities of climate change. The result is a fierce and provocative book."

—Elizabeth Kolbert, author
of *The Sixth Extinction*

NEW YORK TIMES BESTSELLER
**THE SIXTH
EXTINCTION**

AN UNNATURAL
HISTORY

WINNER
of the
PULITZER
PRIZE



PICADOR

ELIZABETH KOLBERT

Author of *FIELD NOTES
FROM A CATASTROPHE*

Humboldt - Human Impacts on the Environment

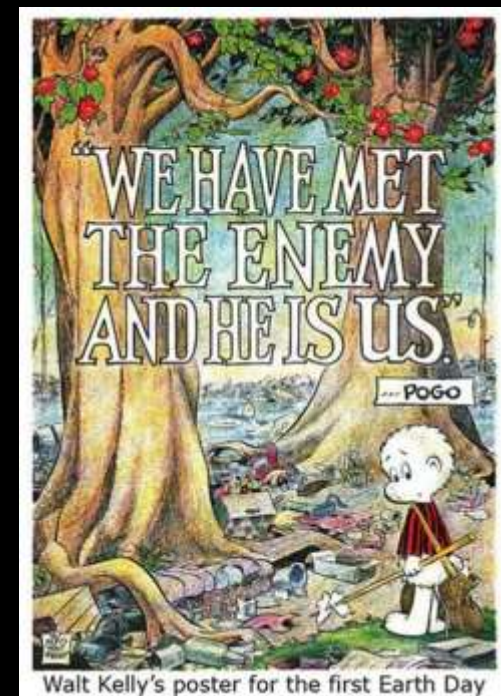
In his book *Central Asia* (1843), Humboldt listed three ways in which the human species was even then affecting the climate:

“Through the destructions of forests, through the distribution of water (irrigation and drainage), and through the production of great masses of steam and gas at the industrial centers.”

“The wants and restless activity of large communities of men gradually despoil the face of the Earth.”

- Humans are part of nature
- Nature/Cosmos is bigger than us
- Most human impacts are unintended consequences
- Limits of human understanding of nature should encourage caution

Humboldt said it was the duty of scientists to examine the changeable elements in the “economy of nature” to understand human impacts.



Humboldt's Cosmos

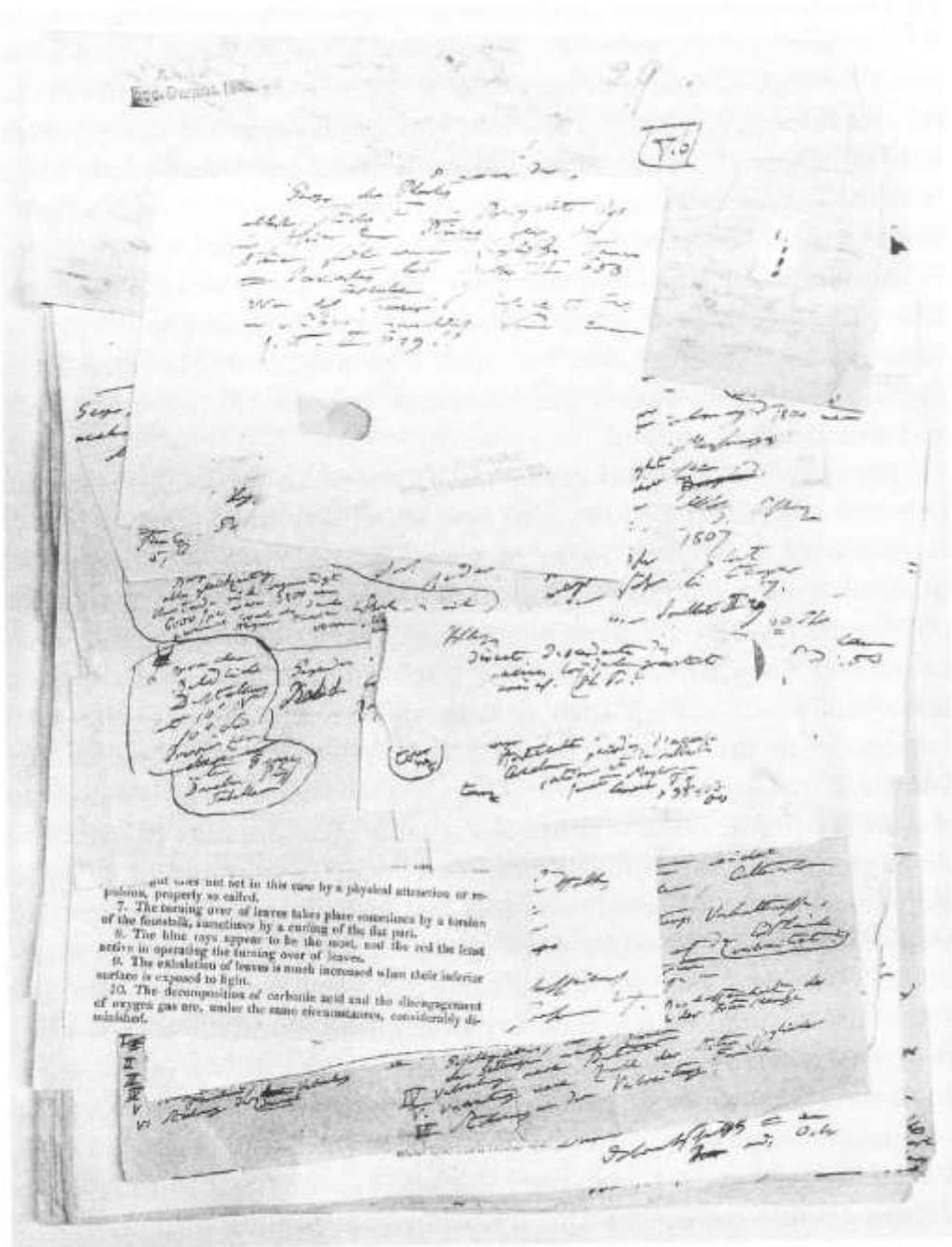
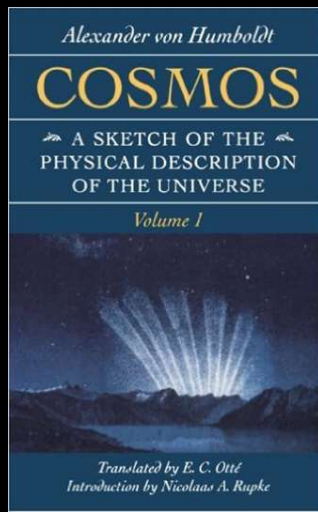
The dance of world and mind

Humboldt lived in Paris from 1805-1827 but was forced to return to Berlin in May 1827

In November 1827 he began a series of 61 lectures that proved so popular he added 16 more. For six months he gave lectures several days each week.

No entry fee was charged and hundreds of people attended ranging from the royal family to coachmen and half those attending were women. Humboldt "democratized" science.

From these lectures, the multi-volume work Cosmos was born.

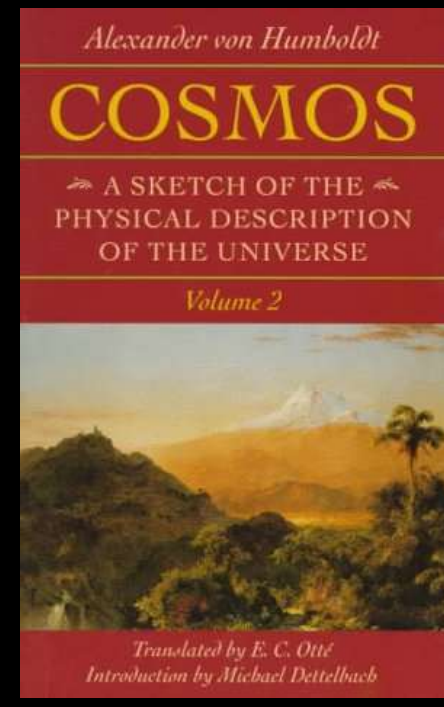
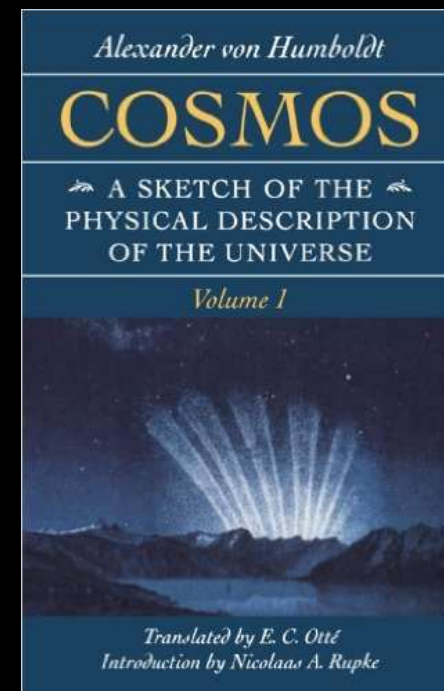


Humboldt's lecture notes on plant geography

Cosmos: A Sketch of the Physical Description of the Universe

Humboldt's five-volume opus *Cosmos* (1845-1862)

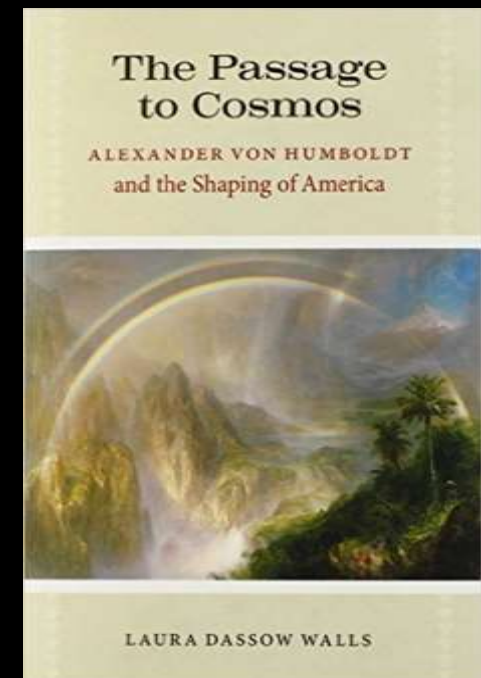
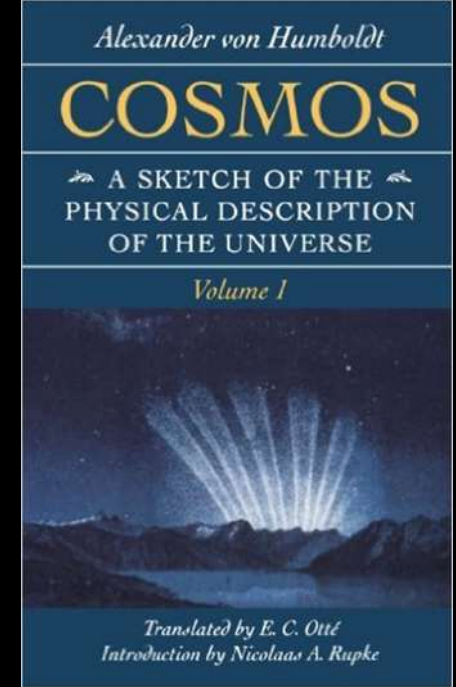
Cosmos was the scientific bestseller of the age. In 1845, the first edition of the first volume sold out in two months; by 1851, Humboldt estimated that eighty thousand copies had been shipped. He himself superintended the French translation, and by 1846 it had also been translated into English, Dutch, and Italian. His publisher wrote in 1847 that the demand for the second volume was "epoch-making"



“Cosmos” The dance of world and mind

– Tangibles and Intangibles – Mind and Nature

- Key to Humboldt’s use of the ancient Greek word “Cosmos” was its double references the physical universe as it exists apart from humanity, and to the beauty and order of that universe, which are ideas intrinsic to humanity. In short, the universe exists without us, but it exists as a Cosmos only through our minds.
- Humboldt acknowledges that most “cultivated languages” reflect a contrast between nature and mind, but insists that we must not therefore be led to separate the two, lest doing so reduce science to “a mere aggregation of empirical specialties.”
- Humboldt’s point is key: our only access to the world is through the mind, and so “does the external world blend almost unconsciously to ourselves with our ideas and feelings”
- The world is known to us only through our mind, and our mind is known to us only as we engage the world: the two form a phenomenal unity.
- Only in the dance of world and mind, object and subject, does the Cosmos come into being.

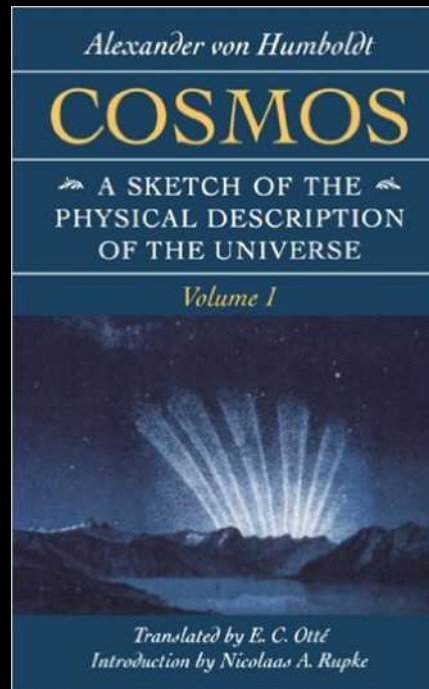
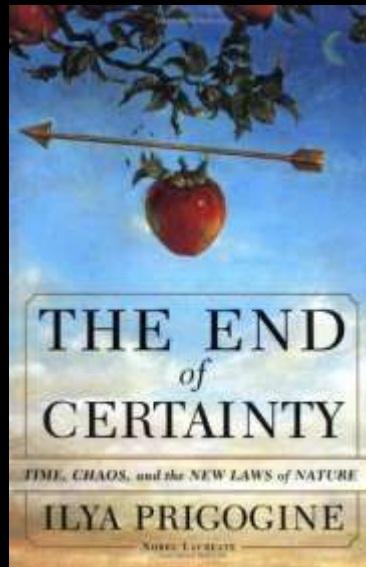


Humanity's Limitations in Comprehending The Cosmos

“The attempt perfectly to represent unity in diversity must ...necessarily prove unsuccessful...If nature be illimitable in extent and contents, it likewise presents itself to the human intellect as a problem which cannot be grasped, and whose solution is impossible.”

The Universe is wider than our views of it.

- Henry David Thoreau



HUMBOLDT.

The One Hundredth Birthday of
the Philosopher.

Celebration Generally Throughout
the Country.

Unveiling of the Bust at the
Central Park.

ORATION BY DR. FRANCIS LIEBER.

Processions, Banquet and Speeches
in this City.

EXTENSIVE OBSERVANCES IN BOSTON.

Eulogistic Address by Professor
Agassiz.

IN THIS CITY.

Extent of the Observances—Decorations
in the City and on the Shipping—
Leading Features of the Celebration.

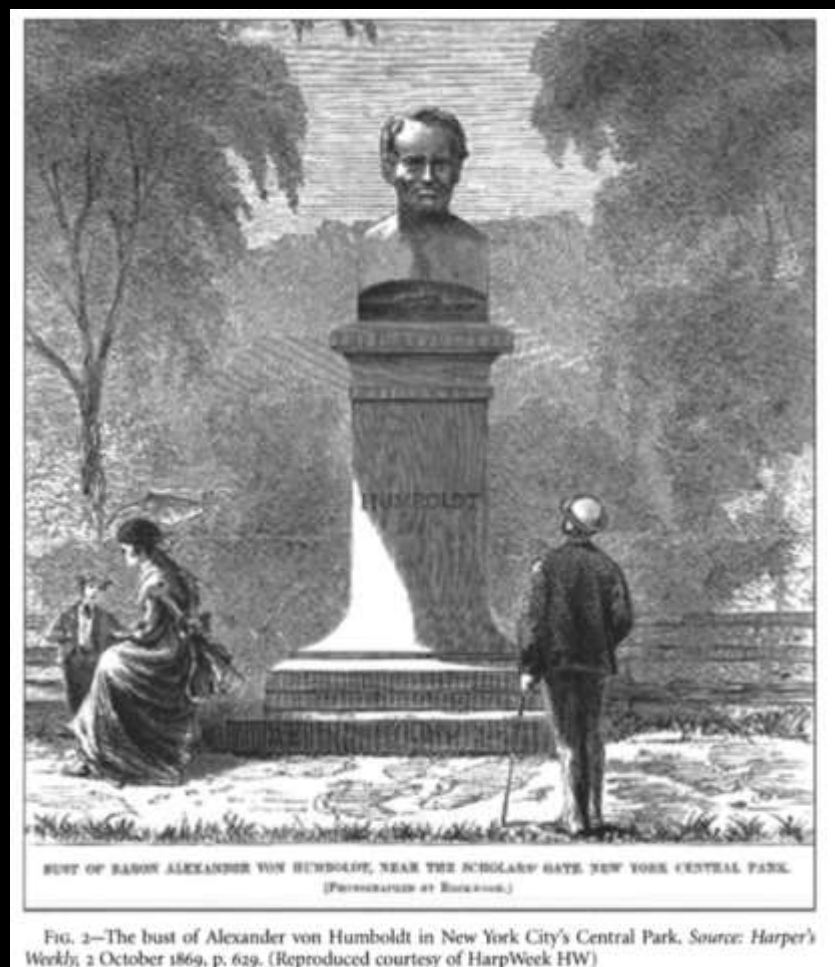
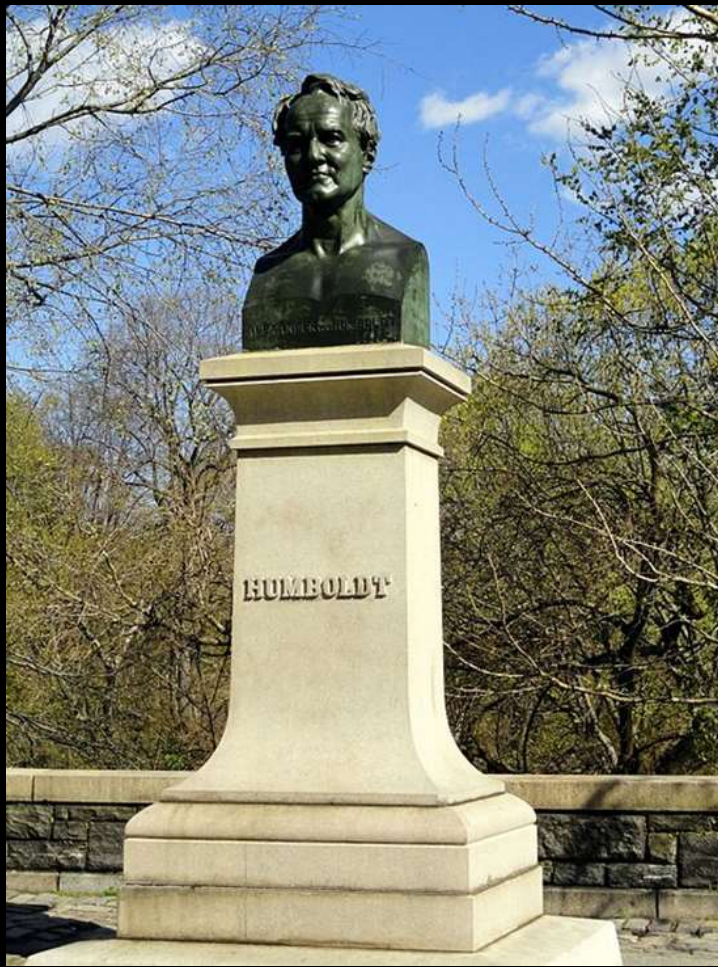
On 14 September 1869, tens of thousands of people crowded the streets of cities across the United States to mark the centennial of Humboldt's birth: Parades, speeches, concerts, monuments, and banquets honored the most famous and beloved scholar of the time. The next day the *New York Times* devoted its entire front page to coverage of the events



In 1869, the centennial of his birth was celebrated across the globe, from Moscow to Mexico City and, in the United States, most cities hosted celebrations, with 10,000 people joining President Grant in Pittsburgh while 15,000 attended the festivities in New York City.

Boston hosted three separate celebrations, among them one at the Music Hall under the auspices of the Boston Society of Natural History. Professor Louis Agassiz set the tone, and in the audience sat "the best culture of New England," including Henry Wadsworth Longfellow and Oliver Wendell Holmes, together with the mayor, senators, the governor, and "many others, almost as equally distinguished"

FIG. 1—The entire front page of the 15 September 1869 *New York Times*, on which these headlines appeared, was given over to coverage of the Humboldt celebrations in New York and other U.S. cities, as was additional space in that day's issue.



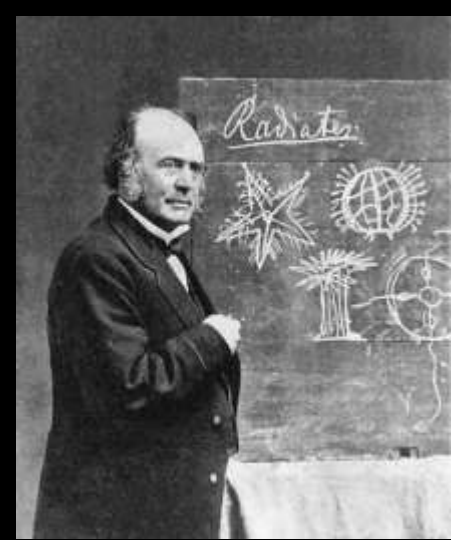
Humboldt Monument – Central Park, NYC

The monument, donated by the Humboldt Memorial Association, was dedicated at its original location at 59th Street and Fifth Avenue on September 14, 1869. Gustav Blaeser knew Humboldt and used his death mask as a reference as he sculpted the bust. In 1981 it was moved to its current location at Explorer's Gate on Central Park West and 77th Street, across from the American Museum of Natural History.

Why was Humboldt forgotten in America?

Louis Agassiz, in his memorial address of 1869: “Every schoolboy is familiar with his methods now, but he does not know that Humboldt is his teacher. The fertilizing power of a great mind is truly wonderful; but as we travel farther from the source, it is hidden from us by the very abundance and productiveness it has caused”

- Humboldt not associated with a university or an individual science
- In America, Agassiz obscures his mentor’s legacy
- Agassiz develops his own school of American science and nature study



Why was Humboldt forgotten in America?

Anti-German Hysteria

World War I and World War II

- Many families anglicized their names to blend in.
- Patriotic fervor wedded to a hatred of all things German prompted restaurants to change their menus to read "liberty steak" instead of hamburgers and "liberty cabbage" in place of sauerkraut.
- A rush to de-Germanize the nation prompted communities to rename their parks, streets, schools, and towns. Germantown, Nebraska became Garland; Berlin, Iowa became Lincoln. In Cincinnati, Hanover Street was changed to Yukon Street; Schumann Street to Meredith Street; and Humboldt Street became Taft Road

WANT NO GERMAN IN JERSEY

State Board Urges Local Schools to Eradicate Every Trace.

TRENTON, N. J., June 1.—A most sweeping recommendation for the exclusion of everything German from the public schools of New Jersey was adopted unanimously today by the State Board of Education here. The text of the resolution follows:

"The State Board of Education recommends to the Boards of Education throughout the State that they rigidly exclude from the schools under their administration any teaching of any kind, or any textbook, magazine, newspaper, or publication in any language that in any way, either directly or indirectly, tends to establish German propaganda or exalts German Kaiserism or kultur or existing German aims or ideals."

The recommendation was presented by Dr. John C. Van Dyke of Rutgers College, a member of the Advisory Committee of the State board.

The personal clash between Colonel D. Stuart Craven, member from Salem County, and John P. Murray of Jersey City, which took place at the May meeting, was patched up. Colonel Craven apologized to Mr. Murray. His apology was accepted.

FIG. 3—Less than fifty years after cities across the United States had joined the German American community to celebrate the Humboldt Centennial, the country was gripped by anti-German hysteria. *Source: New York Times, 2 June 1918,*

By 1920, the number of German publications was a third of what it had been in 1894, as readership and subscriptions continued to decline.

World War II continued the persecution of German-Americans and more.



LIBRARIES ASKED TO WITHDRAW BOOKS

Volumes Known to Certain
German Propaganda;
Away With Them.

(State Council of Defense.)

INDIANAPOLIS, IND., Feb. 1.—In an effort to weed out all "insidious poison" from the library shelves of the state, the Indiana State Council of Defense today addressed a special bulletin to county councils of defense asking that they search their libraries for certain books and pamphlets known to contain German propaganda, which the state council suggests be withdrawn from circulation for the period of the war.

The list follows:

Books.

"The Book of Truth and Facts," by Fritz von Frantius.

"England or Germany," by Frank Harris.

"Neutrality," by Ivor Stevens.

"The War in America," by Hugo Munsterburg.

"The Issue," by J. W. Headland.

"The History of Twelve Days," By J. W. Headland.

"The German Spirit," by Kuno Francke.

Pamphlets.

"Militarism and the Emperor," issued by the Germanic Society of Chicago.

"By Their Works Ye Shall Know Them," from the same source.

"The Destruction of Louvain," by Edward Emerson.

"Morocco and Armageddon."

"Nationalism in Europe," by Dr. Frantz Boas.

"The Following—A United Nation," a speech by Charles Nagle.

"Justice in War Times," by W. W. Hyde.

"The Northern Review" always contains the usual misinformation.

"Germans as Exponents of Culture" by Fritz von Frantius.

"A Slander" by Dr. Theodor Schieman.



ROOSEVELT BARS THE HYPHENATED

No Room in This Country for
Dual Nationality, He Tells
Knights of Columbus.

TREASON TO VOTE AS SUCH

DON'T SPEAK THE ENEMY'S LANGUAGE!



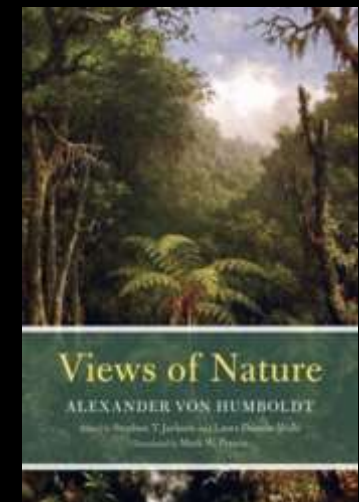
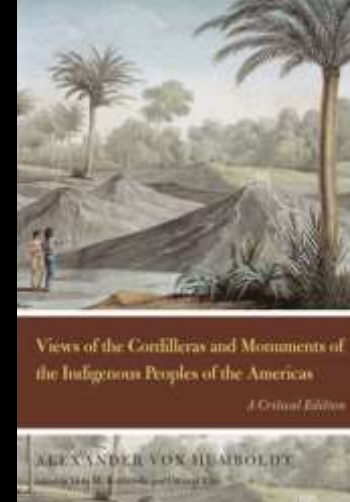
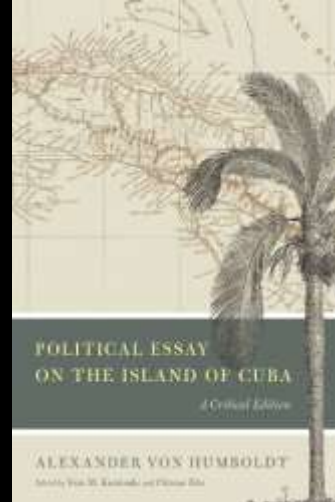
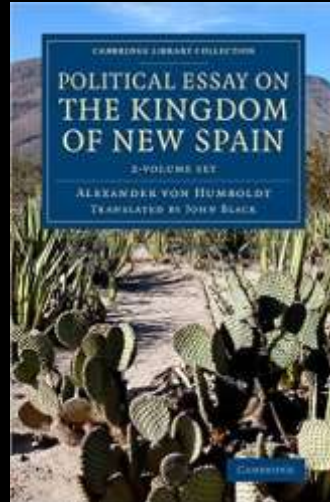
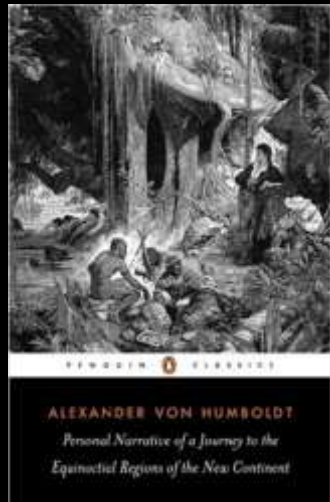
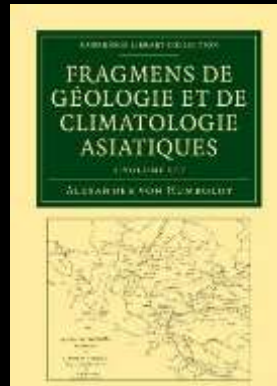
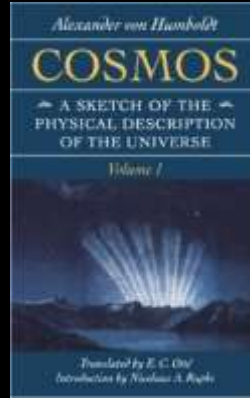
The Four Freedoms Are Not In His Vocabulary

SPEAK AMERICAN!

Why was Humboldt forgotten in America?

Literature and Translating

- Humboldt's writing style – complexity, hyper-text
- Literary genre? romantic? aesthetic science?
- Before his time?
- Poor translations and limited translations over time



Why was Humboldt forgotten in America?

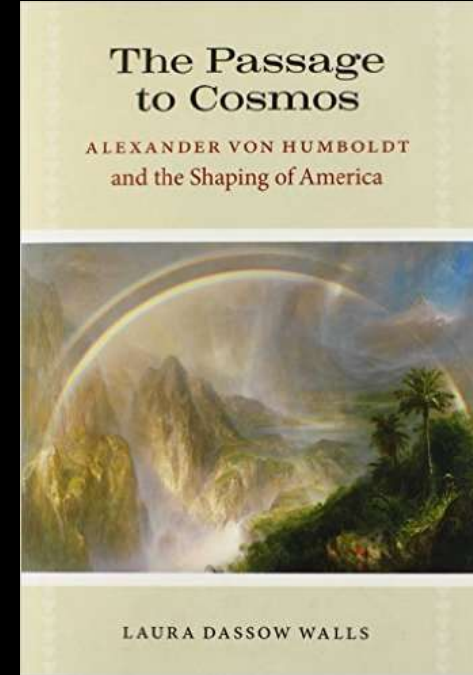
- Development of Professional, Institutionalized Science/Academia
- Humboldt a “meta-scientist” – Charles Sanders Peirce
- Specialization vs. Comprehensive/Holistic Science

Specialization would seem a logical response to a rapidly expanding knowledge base; it yielded tangible results and ever-greater capacity for human manipulation and control of nature. As scholars and researchers raced down their separate disciplinary pathways, though, knowledge became increasingly fragmented and communication across major disciplinary boundaries more the exception than the rule. Nowhere was reintegration a discipline.

Humboldt championed aesthetic forms that emerged from the particulars of nature, and scientific forms that embraced, rather than excluded, the subjectivity of the observer.

This put him on a collision course with the emergent concept of “objectivity” and “reductionism” such that Humboldt’s bold, experimental texts were absorbed, reshaped, and, in large part, silenced by the split we have come to know as “the Two Cultures.”

- Walls, *Passage to Cosmos*

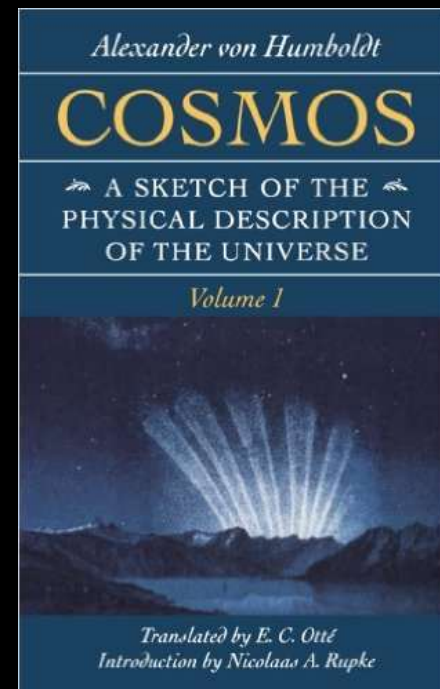
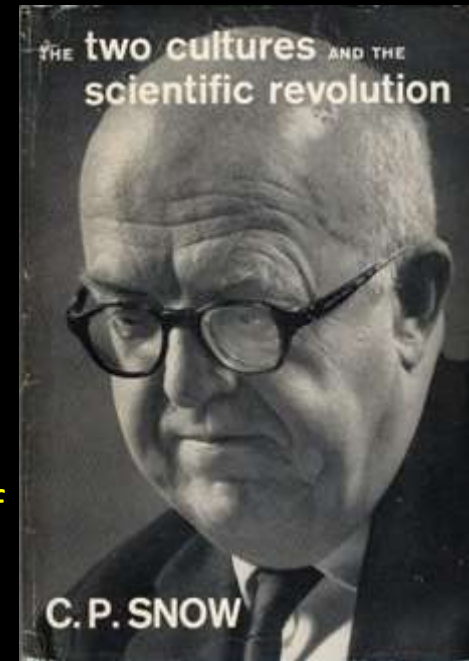


Why was Humboldt forgotten in America?

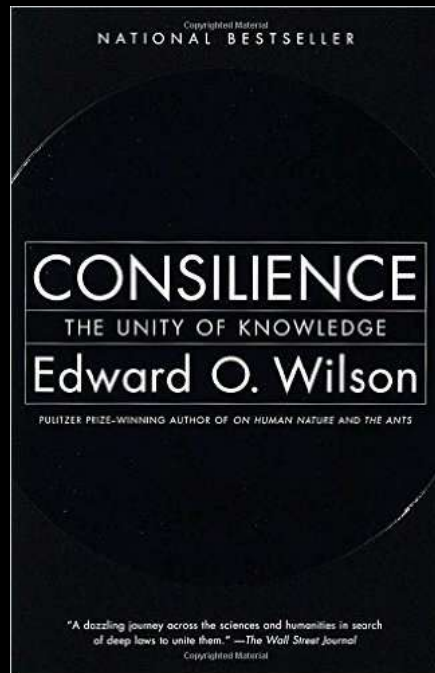
The Two Cultures (1959)

A good many times I have been present at gatherings of people who, by the standards of the traditional culture, are thought highly educated and who have with considerable gusto been expressing their incredulity at the illiteracy of scientists. Once or twice I have been provoked and have asked the company how many of them could describe the Second Law of Thermodynamics. The response was cold: it was also negative. Yet I was asking something which is about the scientific equivalent of: 'Have you read a work of Shakespeare's?'

I now believe that if I had asked an even simpler question – such as, 'What do you mean by mass, or acceleration, which is the scientific equivalent of saying, 'Can you read?' – not more than one in ten of the highly educated would have felt that I was speaking the same language. So the great edifice of modern physics goes up, and the majority of the cleverest people in the western world have about as much insight into it as their Neolithic ancestors would have had.



Reductionism vs. Holistic Science



Using the natural sciences as his model, Wilson forges dramatic links between fields. He explores the chemistry of the mind and the genetic bases of culture. He postulates the biological principles underlying works of art from cave drawings to *Lolita*. Ranging the spectrum of human knowledge and synthesizing it into a dazzling whole, *Consilience* is science in the grand visionary tradition of Newton, Einstein, and Feynman.



We are drowning in information, while starving for wisdom. The world henceforth will be run by synthesizers, people able to put together the right information at the right time, think critically about it, and make important choices wisely.

(E. O. Wilson)

izquotes.com

The Sociobiological Reductionist Solution to Knowledge

“The love of complexity without reductionism makes art; the love of complexity with reductionism makes science.”

Wilson’s ‘central idea’, that “all tangible phenomena, from the birth of stars to the workings of social institutions, are based on material processes that are ultimately reducible, however long and tortuous the sequences, to the laws of physics” (p.193).

Consilience and Reductionist Biology

The word consilience was originally coined as the phrase "consilience of inductions" by William Whewell ("consilience" refers to a "jumping together" of knowledge).

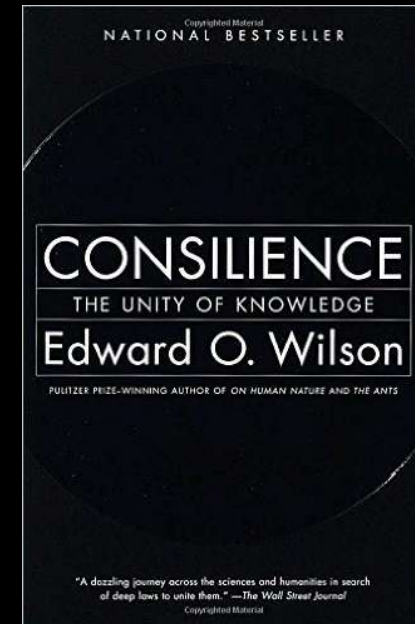
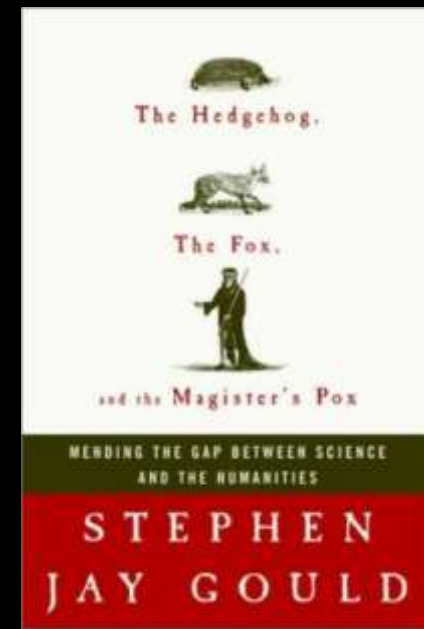
The word comes from Latin com- "together" and -siliens "jumping" (as in resilience). unexpected, serendipitous discovery of interconnections

Whewell's favorite example of consilience was Newton's theory of universal gravitation, because it brought together Kepler's three laws, which until then had not been seen as connected.

Gould vs. Wilson

While acknowledging that reduction is "a powerful method that should be used whenever appropriate", Gould argued that Wilson extends this method in a way that violates both Whewell's notion of consilience and his own.

He points to the phenomena of emergence, which involves laws arising from interactions among constituent parts that are not explainable in terms of the parts alone; and of contingency, "the growing importance of unique historical 'accidents' that cannot, in principle, be predicted" – although they can be explained after the fact.



Humboldtian Science – Particulars and Patterns – Empirical Holism

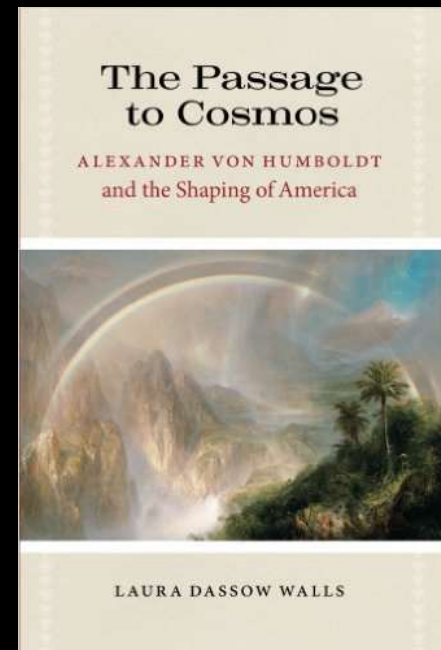
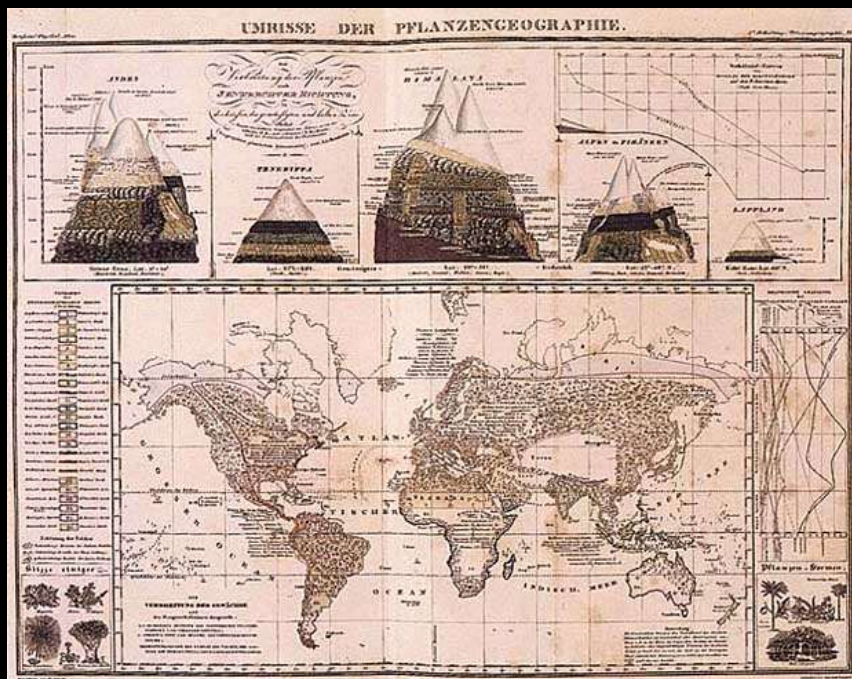
Unity in diversity, and of connection, resemblance, and order, among created things most dissimilar in their form, one fair harmonious whole...

Kosmos, 1845

The Rational Holist starts with a concept of the whole and thinks down to the necessary parts.

The Empirical Holists starts with the pieces and particulars as they present themselves to our ordering intelligence and works upward and outward seeking connections and drawing them into patterns.

As a sense of the whole emerges, it guides a deepening understanding of the interrelationship of the parts in a reciprocal spiral of ever deeper and wider knowledge.



Humboldtian Science – The Systematic Universe

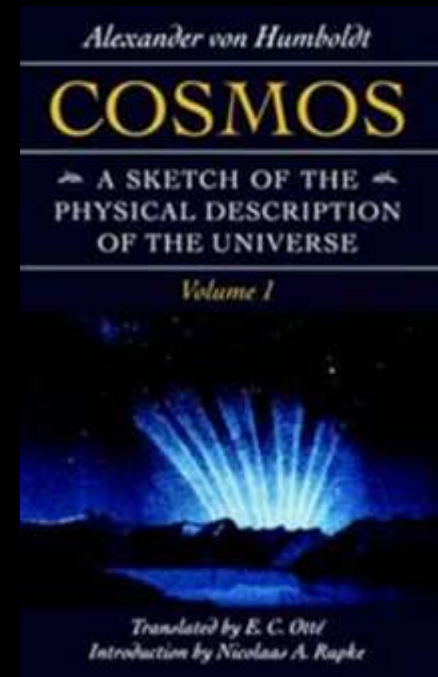
1. Explore – “Nature speaks and the scientist must go out and listen”
2. Collect – gather data for or against an idea/theory
3. Measure – widespread, accurate, collaborative
4. Connect – detect patterns that point to underlying laws
5. Cosmopolitan science – international collaboration

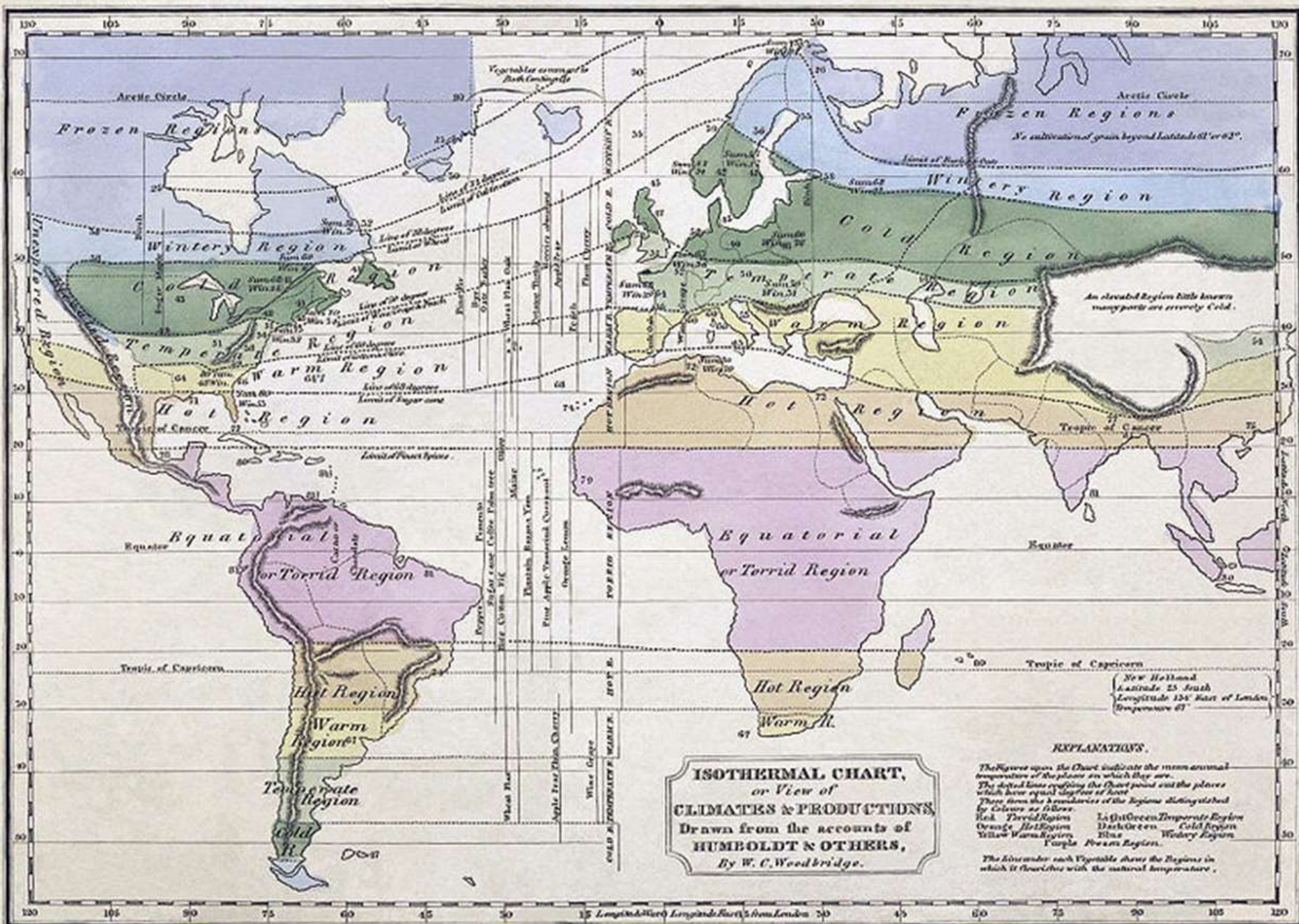


The Systematic Universe “the accurate measured study of widespread but interconnected real phenomena in order to find a definite law and a dynamic cause”

Earth’s magnetic field – advocated global monitoring network

Scientific Collaboration, Friendship, Mutual Support, Mentorship





ISOTHERMAL CHART,
or View of
CLIMATES & PRODUCTIONS,
 Drawn from the accounts of
HUMBOLDT & OTHERS,
By W. C. Woodbridge.

EXPLANATIONS.

The figures upon the Chart indicate the mean annual temperature of the places on which they are.
 The dotted lines crossing the Chart point out the places which have equal lengths of day.

These form the boundaries of the Regions distinguished by Colors as follows.

Red	Torrid Region	Light Green	Temperate Region
Orange	Hot Region	Dark Green	Cold Region
Yellow	Warm Region	Blue	Wintery Region
Purple	Equatorial Region		

The lines under each Vegetable show the Regions in which it flourishes with the natural temperature.

Printed according to an engraving by J. S. of January 1820 by William C. Woodbridge of the State of Connecticut.

Permanence and Change

- to discern the constancy of phenomena in the midst of apparent changes

Humboldtian Science – Science of Dynamic Change

One concept that is central to Humboldtian science is that of a general equilibrium of forces amidst change.

Not balance and stability, but ordered dynamic change.

“The general equilibrium which reigns amongst disturbances and apparent turmoil, is the result of infinite number of mechanical forces and chemical attractions balancing each other out.” so that the universe persists amidst constant change

“to recognize unity in the vast diversity of phenomena, and by the exercise of thought and the combination of observations, to discern the constancy of phenomena in the midst of apparent changes.”



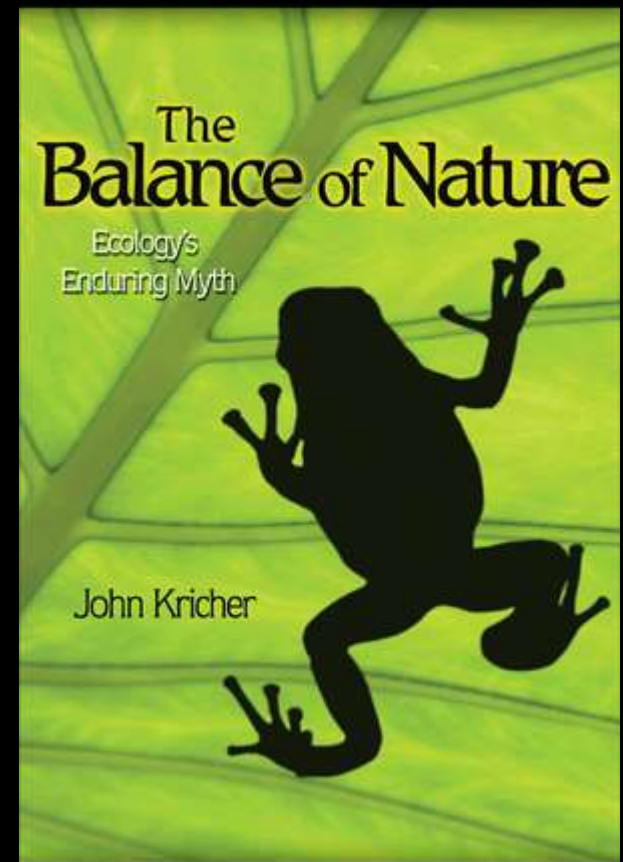
“The existence of a balance of nature has been a dominant part of Western philosophy since before Aristotle.

But the science of ecology and evolutionary biology together demonstrate that there is no balance of nature—not today and not at anytime in Earth’s long history.

The paradigm is based on belief, not data; it has no scientific merit.

Nature is constantly in flux varying in scales of space and time, and most of that flux is due entirely to natural causes. At this time of extraordinary human influence on Earth’s ecosystems and biota, I argue that it is essential for humanity to understand how evolution occurs and why ecology is far more dynamic than static.”

Nothing Endures But Change
Heraclitus 540-480BC



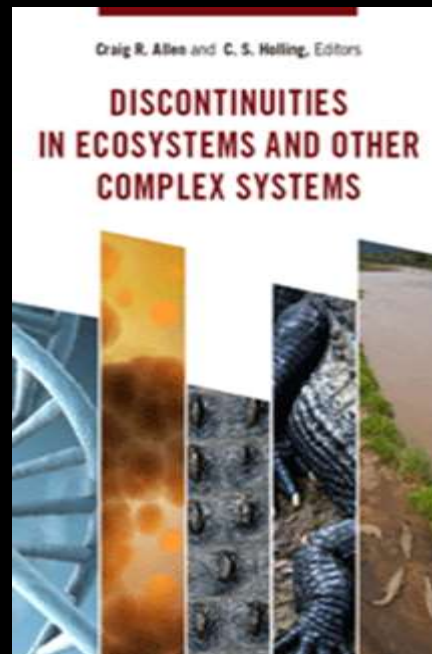
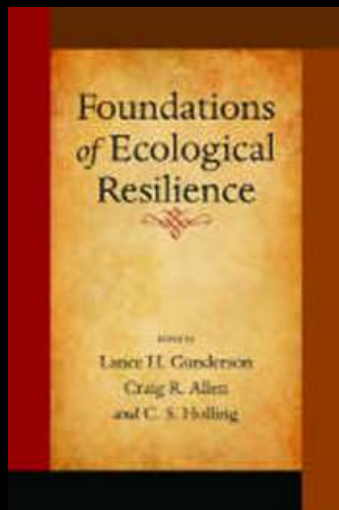
The New Ecology of Change - Ecological Resilience

The general meaning of resilience, derived from its Latin roots 'to jump or leap back', is the ability to recover from or adjust easily to misfortune or change.

The concept of resilience in ecological systems was first introduced by the Canadian ecologist C.S. Holling in order to describe the persistence of natural systems in the face of changes in ecosystem variables due to natural or anthropogenic causes.

Holling argued that complex adaptive systems did not tend toward equilibria, but toward maximizing diversity over deeper evolutionary time.

Holling, C.S. (1973). "Resilience and stability of ecological systems". *Annual Review of Ecology and Systematics* 4: 1–23.



Adaptive Cycle

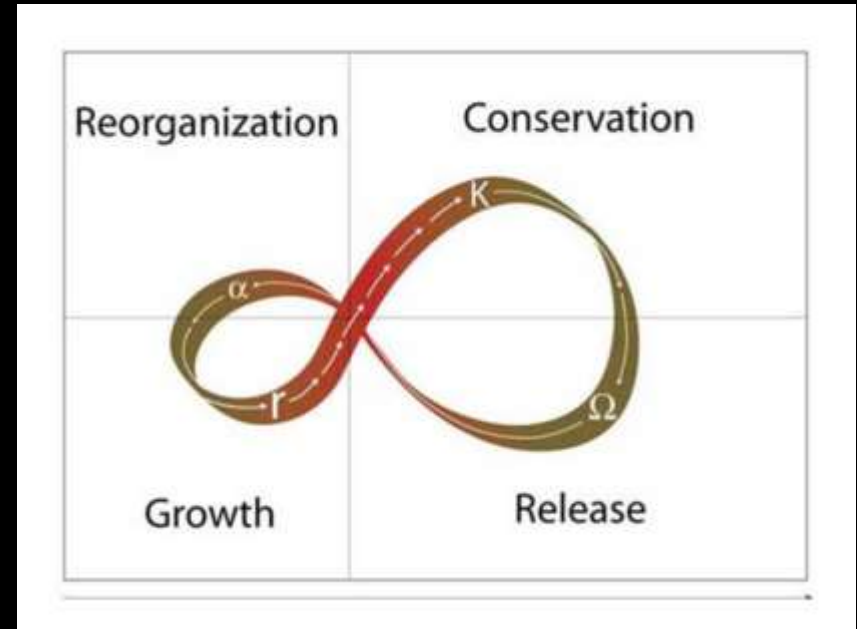
An adaptive cycle that alternates between long periods of aggregation and transformation of resources and shorter periods that create opportunities for innovation, is a fundamental unit for understanding complex systems from cells to ecosystems.

Growth - where species and systems grow and diversify to exploit new opportunities and develop entirely new ecological ways of being.

Conservation - where climax species are tightly connected and organized, and systems stabilize into mature, often hierarchically nested systems, where there is little or no room for innovation or growth.

Release (the “backside” of the mobius strip) - where mature systems destabilize and collapse, and become increasingly discontinuous and chaotic which opens the field for...

Reorganization – where systems return in completely new ways, which creates a new field of conditions and possibilities for the next growth phase

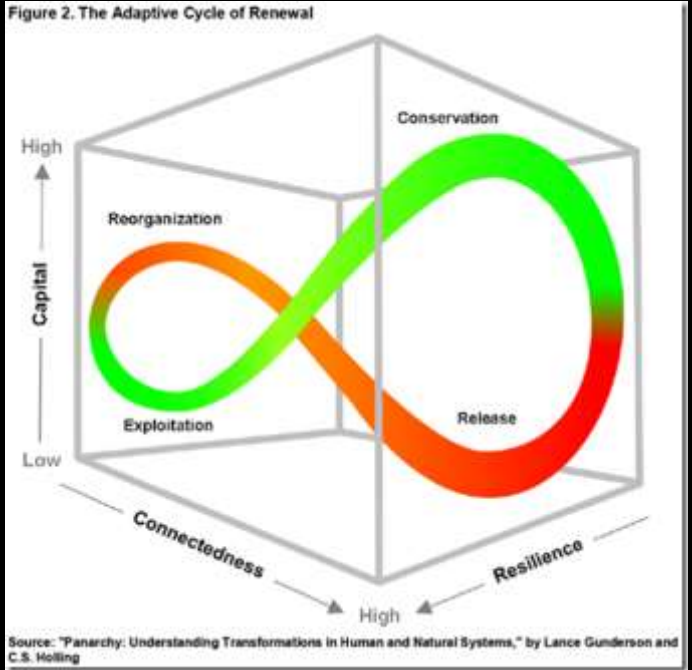
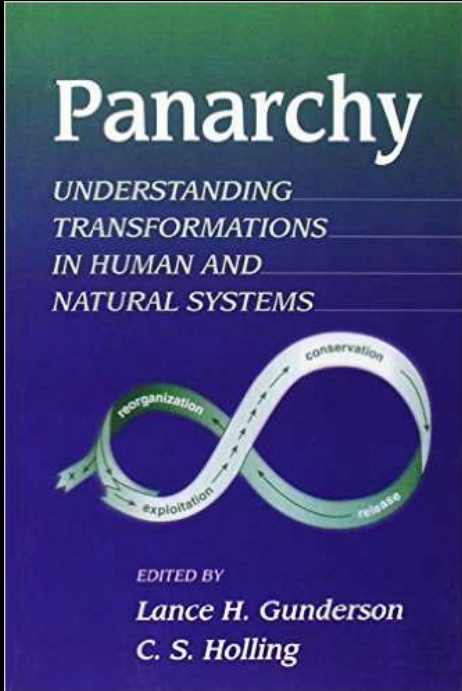
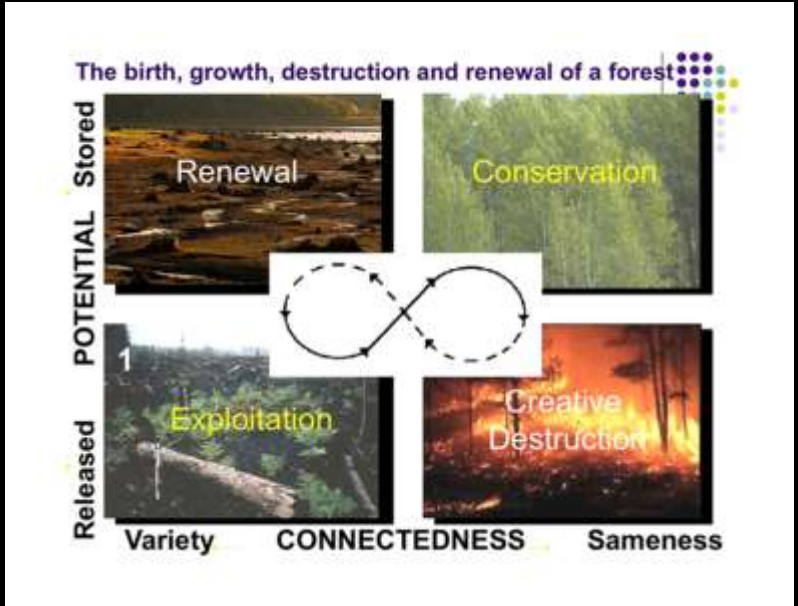


Adaptive Capacity and Social-Ecological Systems

Systems with high adaptive capacity are able to re-configure themselves without significant declines in crucial functions in relation to primary productivity, hydrological cycles.

A consequence of a loss of resilience, and therefore of adaptive capacity, is loss of opportunity, constrained options during periods of reorganization and renewal, an inability of the system to do different things.

And so the effect of the loss of resilience is for the social-ecological system to emerge from such a period along an undesirable trajectory.



Source: "Panarchy: Understanding Transformations in Human and Natural Systems," by Lance Gunderson and C.S. Holling

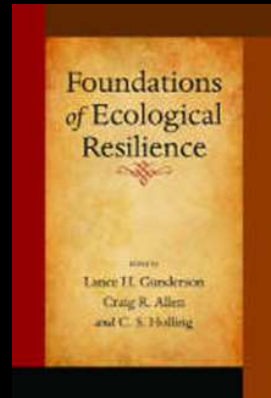
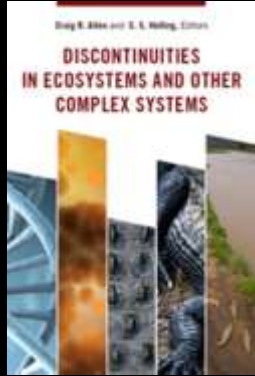
Resilience is...

...the ability to absorb disturbances, to be changed and then to reorganize and still have the same identity (retain the same basic structure and ways of functioning).

As resilience declines the magnitude of a shock from which an ecosystem cannot recover gets smaller and smaller.

Ecosystem resilience is the capacity of an ecosystem to tolerate disturbance without collapsing into a qualitatively different state that is controlled by a different set of processes.

A resilient ecosystem can withstand shocks and rebuild itself when necessary.



2005



2007



2009



2012

New Nature - Novel Ecosystems

Assemblages of species in a given area that have not previously occurred.

Novel ecosystems are not under human management, but they are mostly the result of direct or indirect human activities.

They lack natural analogs

Ecology (like evolution) has a strong historical dimension. Pristine or near pristine ecosystems are historically and culturally important just like cathedrals and castles. Just like cathedrals and castles, they need to be preserved and restored as best they can.

Novel ecosystems are not really all that novel, except in their species composition.

We need to develop a new ecology that is not prejudiced by the human-nature dualism that resulted from demarcation disputes among early ecologists and sociologists.

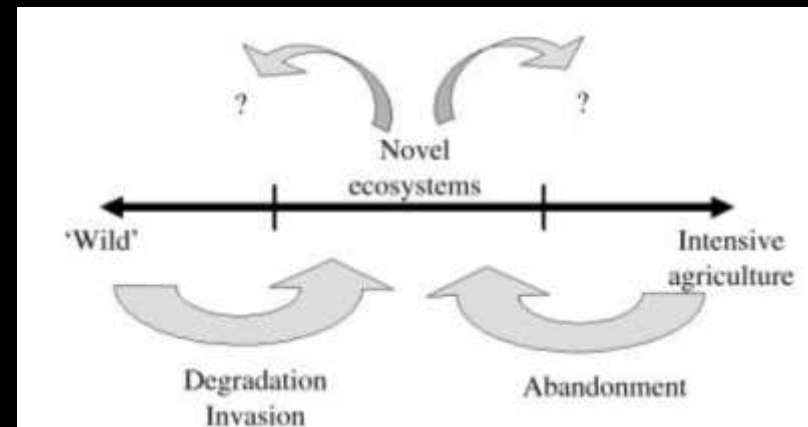
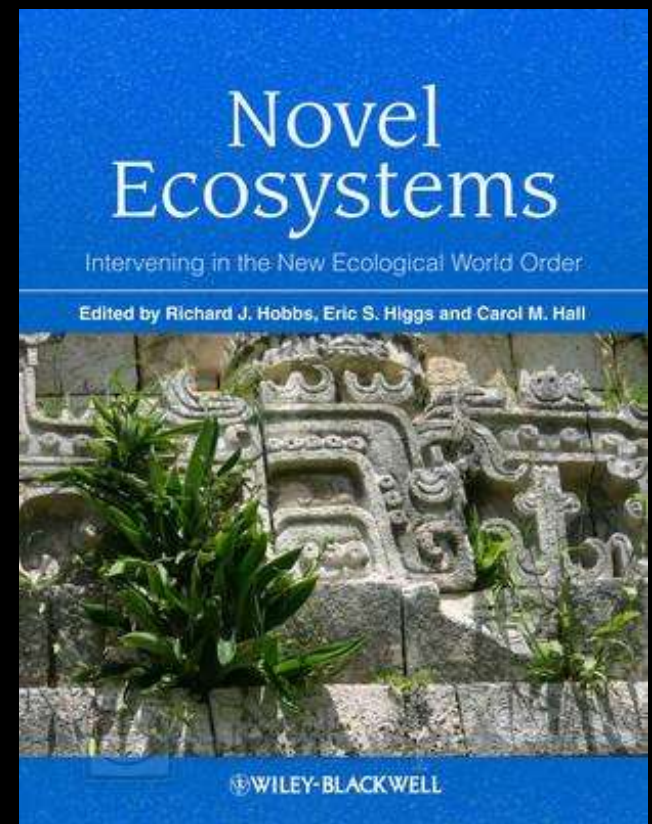


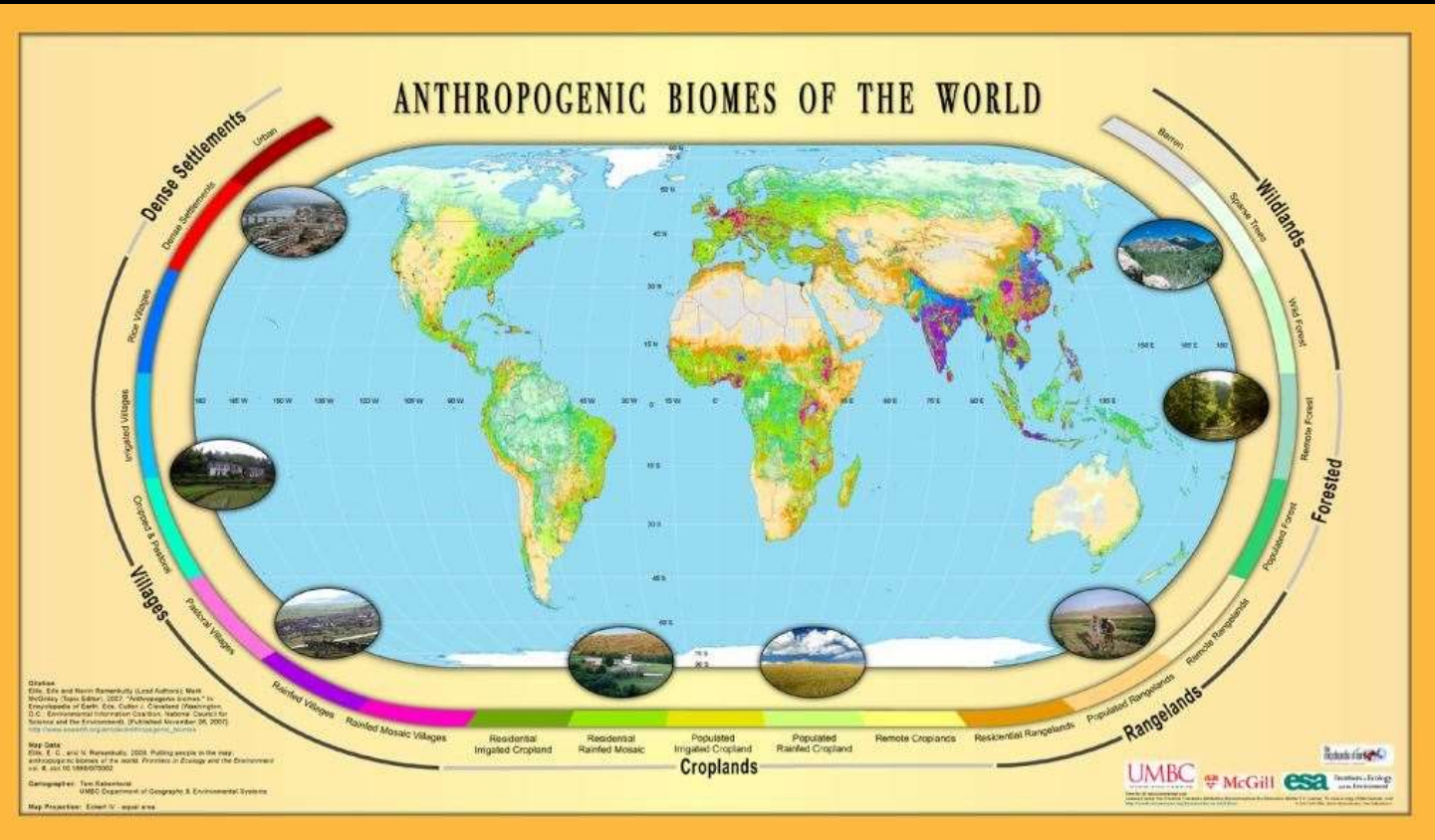
Figure 1 Novel ecosystems arise either from the degradation and invasion of 'wild' or natural/seminatural systems or from the abandonment of intensively managed systems.

Anthropogenic Landscapes, or "Human Landscapes"

<http://ecotope.org/> Dr. Erle Ellis

areas of Earth's terrestrial surface where direct human alteration of ecological patterns and processes is significant, ongoing, and directed toward servicing the needs of human populations for food, shelter and other resources and services including recreation and aesthetic needs.

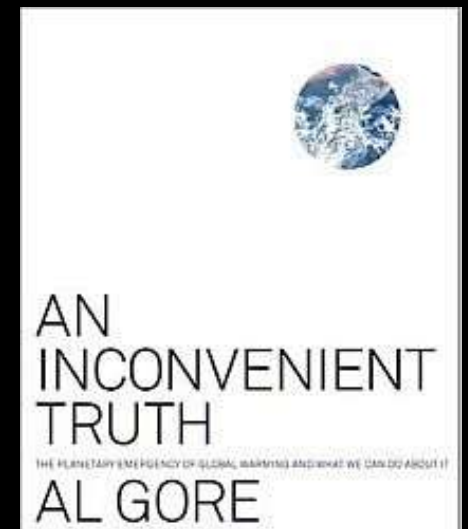
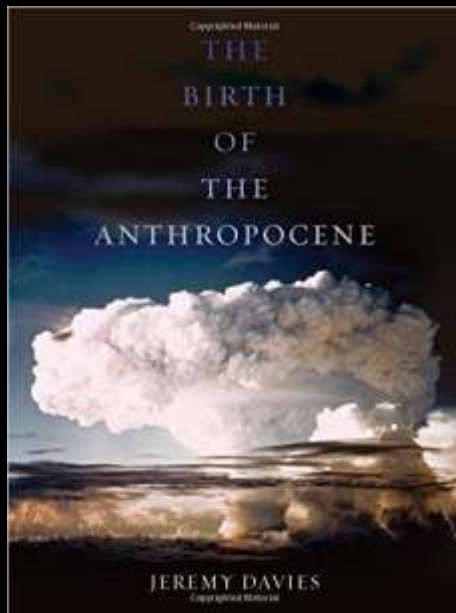
Anthropogenic Biomes ("Anthromes"), describe the globally-significant types of anthropogenic landscapes.



YOU CONTROL CLIMATE CHANGE.



TURN DOWN. SWITCH OFF. RECYCLE. WALK. **CHANGE**

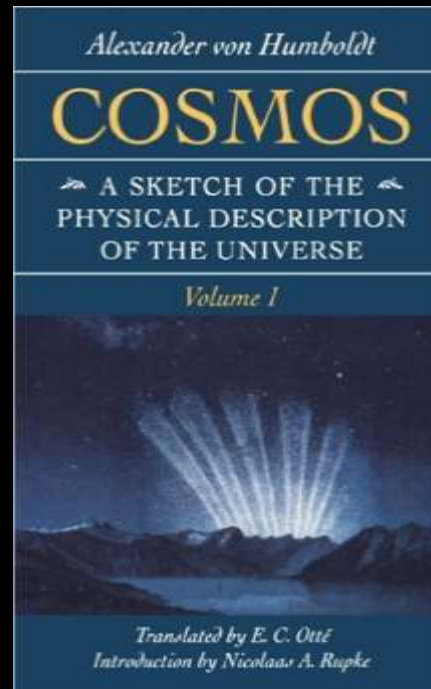
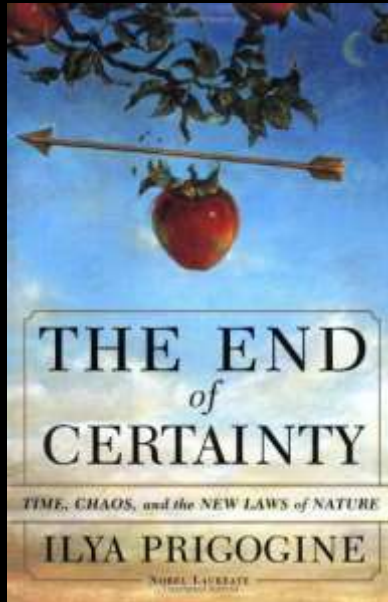


Humanity's Limitations in Comprehending The Cosmos

“The attempt perfectly to represent unity in diversity must ...necessarily prove unsuccessful...If nature be illimitable in extent and contents, it likewise presents itself to the human intellect as a problem which cannot be grasped, and whose solution is impossible.”

The Universe is wider than our views of it.

- Henry David Thoreau



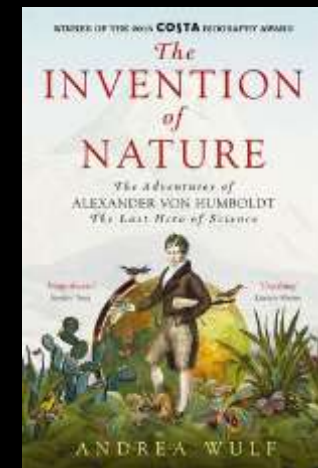
“I am sad to say that at the age of eighty I am reduced to the banal hope that the noble and ardent desire for free institutions is maintained in the people and that, though from time to time it may appear to sleep, it is as eternal as the electromagnetic storm which sparkles in the sun.”



“Nature is the domain of liberty,’ Humboldt said, because nature’s balance was created by diversity which might in turn be taken as a blueprint for political and moral truth. Everything, from the most unassuming moss or insect to elephants or towering oak trees, had its role, and together they made the whole. Humankind was just one small part.

Nature itself was a republic of freedom.”

Wulf Invention of Nature



The Consolation of Nature

The earnest and solemn thoughts awakened by a communion with Nature intuitively arise from a presentiment of the order and harmony pervading the whole universe, and from the contrast we draw between the narrow limits of our own existence and the image of infinity revealed on every side, whether we look upward to the starry vault of heaven, scan the far-stretching plain before us, or seek to trace the dim horizon across the vast expanse of ocean.

Cosmos 1:3

