The Impact of Global Environmental Change on the Health, Well-Being and Academic Development of Children

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Earth's Children In Crisis

Given the world wide life threatening deterioration of the circumstances in which children are expected to live their lives, it could be argued that the greatest advancement human beings could make in the 21st century is to ensure the survival of their children.

International Center for Everybody's Child: Mission

To advocate that the support of children's emotional and physical well being, and academic development should be a global priority.

To argue that we have an ethical and moral responsibility to provide opportunities for every child to recover from trauma.

To raise awareness of the ways policy decisions made locally, nationally and globally impact the health and well-being of children.

Many Children Experience Lifelong Traumas

There is an urgent need for the global protection of children from armed conflict, exploitation, trafficking, and physical and sexual abuse.

Children are exposed to and more susceptible to contagious disease and chronic infections.

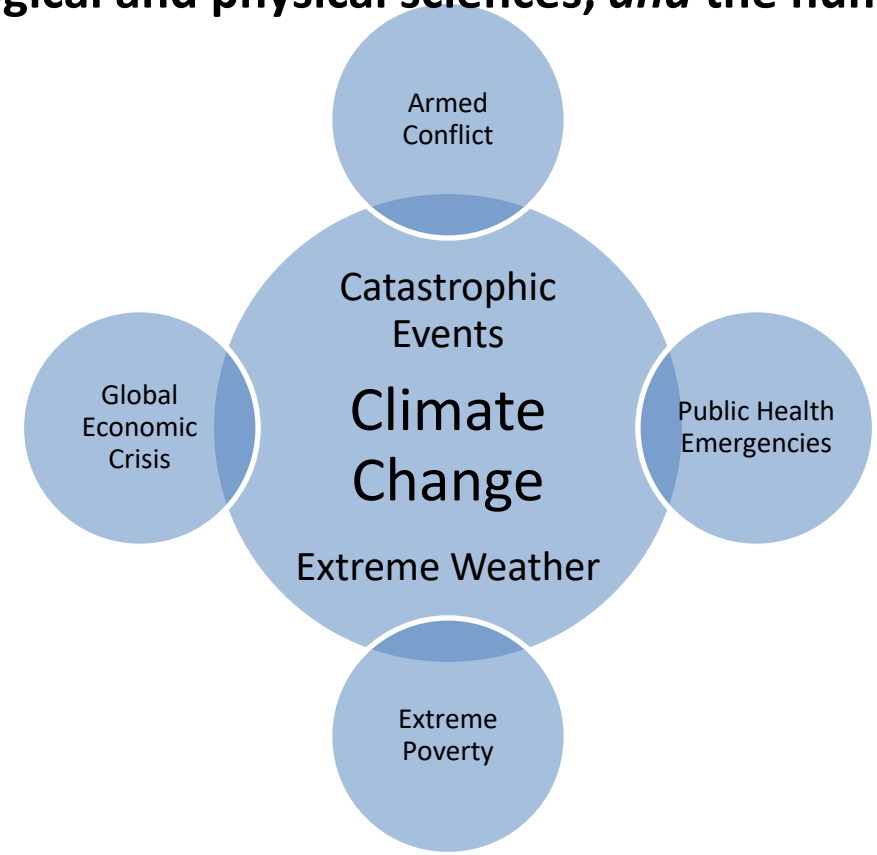
Without water, food, and medicine, many children die, while others are seriously injured.

Children under five are always the most vulnerable when catastrophic events takes place.

The Question that Frames the Research and Humanitarian Response of ICEC

“If we include consideration for the health and well-being of everybody’s child in our response to events that are taking place, how would this affect our present and actions?”

The research of ICEC is transdisciplinary and focuses on the increasing exposure of children to catastrophic events. The research draws on social, biological and physical sciences, *and* the humanities.



Inevitably this work has resulted in the consideration of climate change and the study of Earth system science.

Children are the Most Vulnerable during Severe Weather Events or Seismic Activity

Natural disasters are social disasters, often related to human activity, and exacerbated by climate change and the global economic crises.

Children lose their homes, sometimes their families. They are displaced, migratory, and live for years in refugee camps with no hope of going to school or finding a new place to live.

Reduced access to safe water and sanitation increases endemic diarrhea. Food shortages lead to chronic malnutrition.

The International Council of Science Grand Challenges

On June 22, 2010 at UNESCO in Paris, the International Council for Science (ICSU) called for scientists to reform their own structure. Johan Rockström stated, "We have put ourselves in this position. There have been great advances in science. As scientists it is fundamental that we move towards institutional frameworks to support research for a more sustainable world." He talked of "something profound and new" and of an "historic opportunity."

The Tremendous Message

The scientists at the ICSU forum were in agreement that global environmental change is outpacing the response, that our current path is unsustainable, and that immediate action needs to be taken to change the global impact of people on Earth System functions.

"The tremendous message," one participant said, "is that we don't know how far this will take us."

The terms "scale," "focus," and "intensity" were used in this context for the work of restructuring research institutions – including universities and schools – to respond in this time of global emergency.

The Importance of Social Science and Humanities Participation

There was consensus at the ICSU meetings in Paris that there is an urgent need to mobilize the social sciences – for there to be more deep social science and more global observation.

Large knowledge gaps within disciplines and between disciplines were discussed, and the need for transdisciplinary research was widely agreed upon.

Attention will be given not only to the supercomplexity of the interrelationships between atmospheric and ecosystem stressors and human activity, but also the supercomplexity of the interrelationships between the physical and social sciences.

The Call for Changes for a Sustainable World

There was agreement that we need to educate in a different way, and that we also need to improve the interface between science and policy communication.

There was also agreement that deep transformations in societies are needed.

The International Social Science Council Supports the ICSU Call for Reform

At the meetings in Paris, ISSC was represented by Heide Hackman who spoke of the partnership of ICSU and the ISSC, stating that "the integration of the social sciences and humanities is no longer a choice but a necessity" in framing the global challenges that confront Earth systems science.

She spoke of the urgent need to reach out to the broader social science community. Again the call was for transdiscplinary research.

American Education Research Association "Inciting the Social Imagination"

The theme of the 2011 American Education Research Association's convention is "Inciting the Social Imagination: Education Research for the Public Good."

The call for submissions states, "This focus encourages education researchers to draw on transdisciplinary theories and constructs, integrated methods, and research approaches that aim to answer a breadth of questions from causal to interpretive/descriptive."

AERA – Moving Past the Policy Impasse

The AERA calls for research that "helps us avoid a kind of reductionism, quick fixes, and narrow conceptions of teaching/learning, assessment, curriculum, teacher preparation, and educational reform. … to see through the political and polemical tangles can move us past the current policy impasse toward a new democratic vision of schooling."

Transdisciplinary Research

Thus, there is the agreement between the positions of ICSU, ISSC, and AERA that more integrated research frameworks are required and that there is an urgent need for transdisciplinary research.

Transdisciplinary research merges disciplines and paradigms, creating spaces between disciplines in which new insights can be gained and new perspectives developed -- beyond the possible perspectives that could be gained from within an individual discipline.

Earth Systems Science and Social Science have become Inseparable

What is important here is that the Grand Challenges of Earth systems science and social science – including educational research - are converging.

Ecological justice and social justice have become inseparable, and each scientific organization is calling for transdisciplinary research.

Cataclysms and Kicks

At the ICSU Forum there was also general agreement that while dangerous changes are taking place over time, abrupt changes are most dangerous.

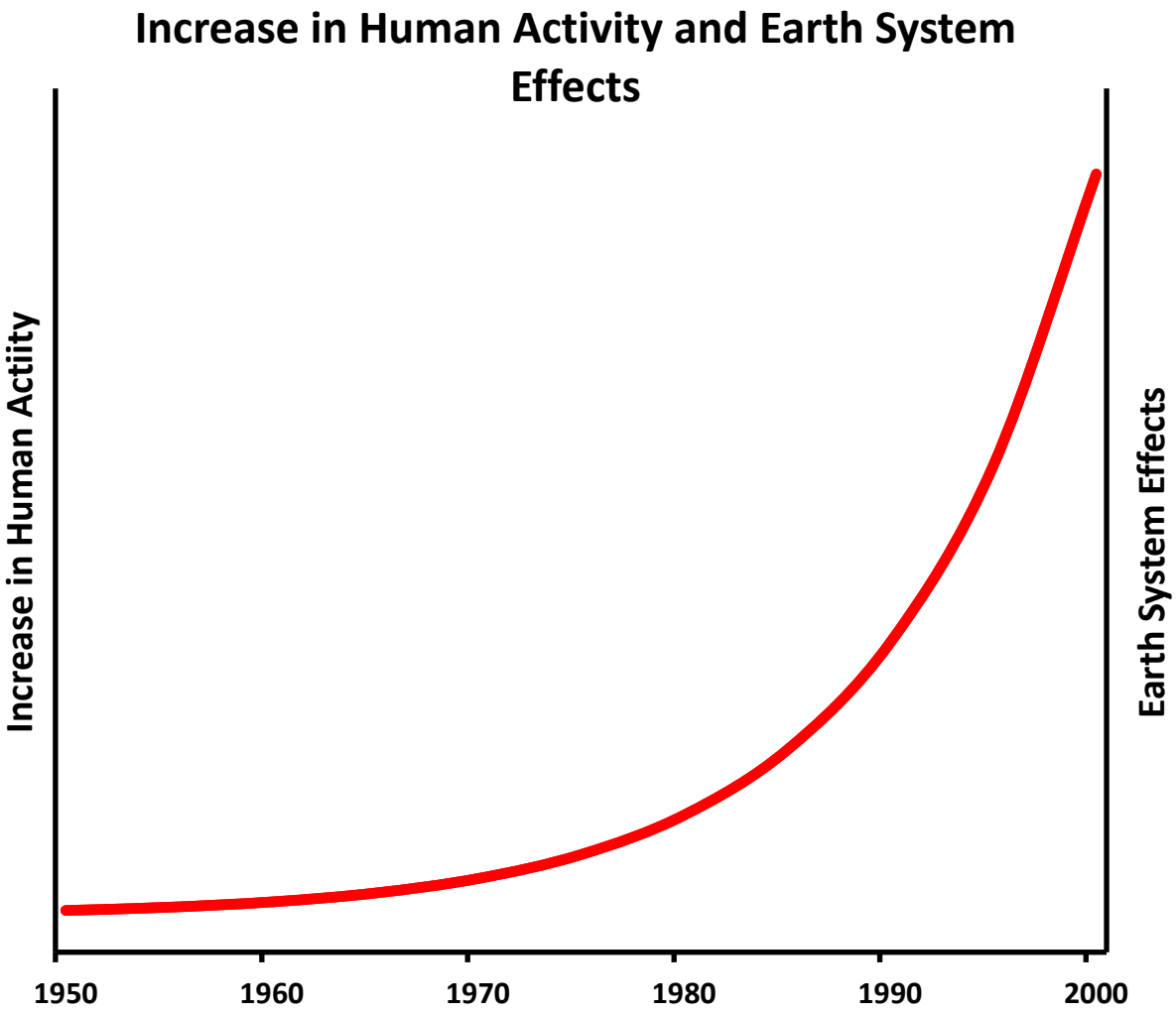
In physics abrupt changes that are unexpected and unpredictable are sometimes referred to as kicks.

In Paris cataclysm and cataclysmic were the descriptors used.

Cataclysm and cataclysmic are beginning to appear in articles published in science journals. Catastrophe has been increasingly used in research reports in recent years, but cataclysm ratchets up the potential for an unprecedented disaster.

The Red Curve as Conceptual Metaphor

In the past fifty years the magnitude and rate of the complex human interacting drivers of Earth system functioning can be represented for social scientists and the public by the following graphic – a single red curve – a conceptual metaphor of the impact of human enterprise on Earth.


Increase in Human Activity and Earth System Effects
Increase in Human Actiity
Earth System Effects
1950
1960
1970
1980
1990
2000

The red curve represents the great acceleration in human activity between 1950 and the year 2000 (Steffen, et al., 2004).

The global increase of the number of people on the planet, the steep rise in people living in urban communities, total real GDP and direct foreign investment can be represented on this curve.

Even the exponential increase in the number of McDonald restaurants are on the curve.

The rapid increases in motor vehicles as a mode of transportation, international tourism, and telecommunications are also on the curve.

The damming of rivers, water use, and fertilizer consumption are on this same curve.

Follow paper consumption increase on the curve by the rapid acceleration in the rate of loss of tropical rain forests and woodlands to make the shift to the impact of human activity on Earth systems.

The increase in average surface temperature in the Northern hemisphere lies on this red curve, as does the frequency of floods.

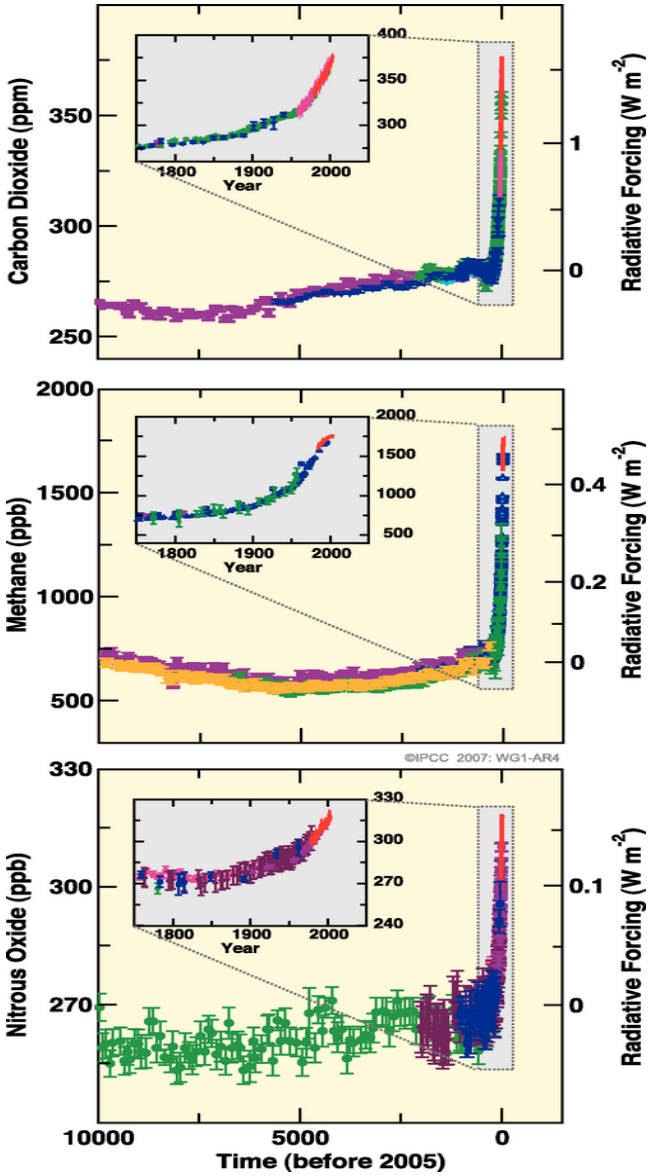
The rate of the loss of ozone, and the rapid rise in concentrations of carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4) are also on the curve.

The geobiochemistry of coastal zones—the nitrogen burden from fertilizer—is similarly represented by the curve.

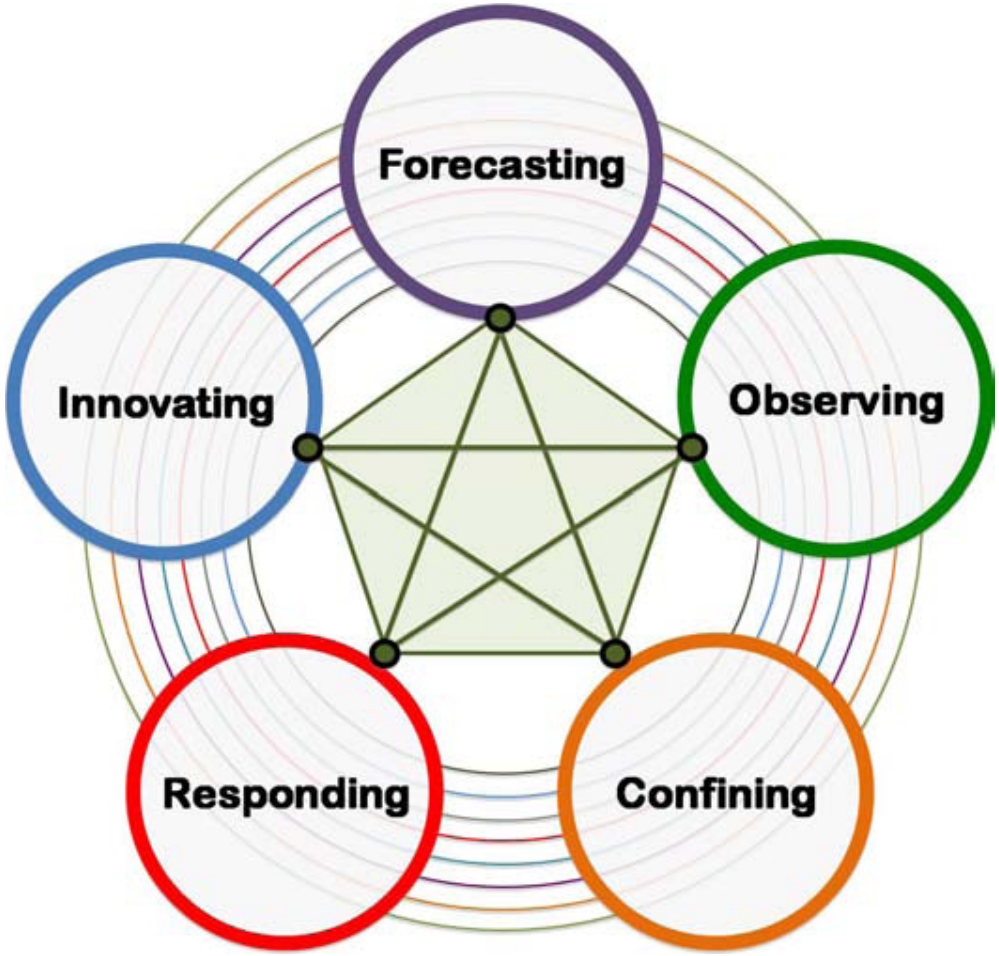
The Red Curve, cont'd

The utilization of ocean ecosystems and the global loss of biodiversity are also on the curve -- the mass extinction of species on the planet due to human activity is irreparable with potentially deadly consequences for all other life forms on Earth.

The Summary for Policymakers for Working Group 1 of the 2007 IPCC Fourth Assessment Report (p. 3).



The Grand Challenges are an Indivisible Package



The Grand Challenges identified by ICSU

Forecasting: Improve the usefulness of forecasts of future environmental conditions and their consequences for people;

Observations: Develop the observation systems needed to manage global and regional environmental change;

Thresholds: Determine how to anticipate, recognize, avoid and adapt to abrupt global environmental change;

Responses: Determine what institutional, economic and behavioral changes can enable effective steps toward global sustainability;

Innovation: Encourage innovation (coupled with sound mechanisms for evaluation) in developing technological, policy, and social responses to achieve global sustainability.

The Challenges are not prioritized by ICSU

The Challenges are presented as an "indivisible package". ICSU states:

The concentric circles represent the disciplinary research needed in the social, social, natural, health and engineering sciences and the humanities that must be carried out alongside interdisciplinary and transdisciplinary research in order to address the challenges.

The lines linking the grand challenges show that progress in addressing any challenge will require progress in addressing each of the others (p. 9).

Bending the Curves

At the ICSU Forum scientists spoke of "bending the curves" and of "risks too high to take." Mentioned specifically were: CO_2 (carbon dioxide), N_2O (nitrous oxide), and CH_4 (methane) concentrations; land degradation; and biodiversity loss.

Concern was expressed about changes in the global ecosystem functioning, and terrestrial and marine carbon. Similarly, concern was expressed about "the robust warming of the global upper ocean."

What are social scientists expected to make of all this? It's not easy for the public to figure it out – especially when the media is filled with misinformation and disinformation.

A Question for Social Scientists, Especially Educators

“How can the world community achieve a shared, new understanding of the complex, interactive and non-linear nature of the Earth system,” the renowned epidemiologist, A. J. McMichael asks, “against the prevailing, misleading and policy-impeding assumption of a mechanistic ‘Newtonian’ world, amenable to reductionist technical fixes applied in incremental fashion?”

Complexities of Communication Within Human Societies

The difficulties that Earth scientists face are compounded by the complexities of communication within human societies.

All knowledge is contested – even when life begins and when life ends - and is highly dependent on the social, cultural, national, religious, and political groups to which people belong.

Human activity is highly dependent on the discourse communities to which people belong, and that are constitutive of their everyday lives.

The Study of Language as a Social Practice Provides a Portal for Analysis

Any global sustainability efforts will be highly dependent on the ability of all those who participate to take into consideration the inter-multi-trans-disciplinary and professional challenges of working with participants who hold different views of science and, quite possibly, humanity.

Language analysis provides a portal to explore research across disciplines on the complex dynamic relationships between the social and physical sciences.

It is imperative that basic research continues, but within broader frameworks that take into consideration perspectives derived from transdisciplinary research.

We Forget the Importance of Language at Our Peril

“Words,” Iris Murdoch writes, “are the most subtle symbols which we possess and our human fabric depends on them. The living and radical nature of language is something which we forget at our peril.”

Murdoch writes, “We learn through attending to contexts,” and “we can only understand others if we can to some extent share their contexts.” She then states, “Often we cannot.”

Conceptual Metaphors and Epistemic Pluralism

Jumping fields, Arnold Modell, the Harvard psychoanalyst, impresses on us that "meaning making" is non-linear and dynamic, requiring emotion as well as reason.

His research has long been transdisciplinary – *epistemic pluralism* he calls it – combining phenomenology and neurobiology, gathering up other disciplines as he needs them.

It is the idea of epistemic pluralism that frames this transdisciplinary response to the ICSU Paris forum and Earth system science.

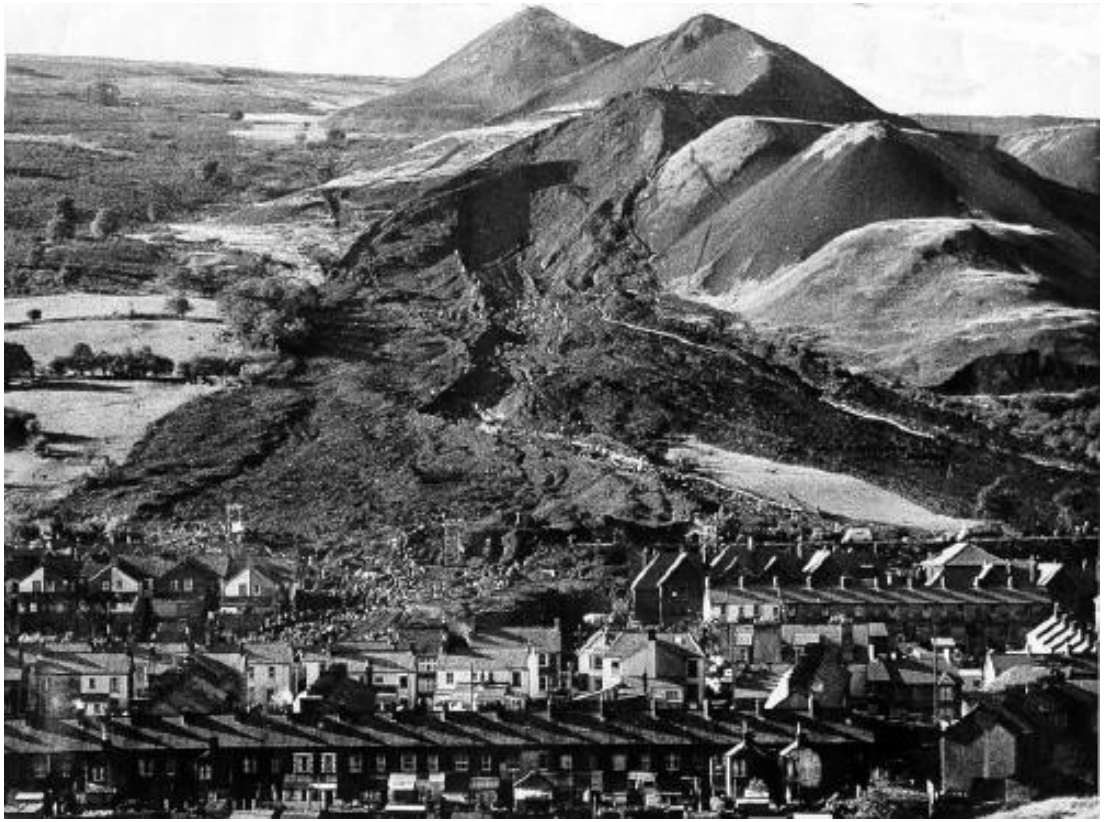
Unpackaging the Impact of "Human Enterprise" on Climate Change

The Social Cost of the Rapid Acceleration in the Production of CO_2

Return to the Red Curve

The red curve which charts the rise in temperature and the increase in CO_2 in the atmosphere also charts the increase in mining activity and the rise in terms of the ascent of human wretchedness and misery.

In *Gravity and Grace,* Weil (1947/99) writes, "The recognition of human wretchedness is difficult for whoever is rich and powerful because he is almost invincibly led to believe that he is something. It is equally difficult for the man in miserable circumstances because he is almost invincibly led to believe the rich and powerful man is something" (p. 122).



Aberfan: 116 children died and 28 adults at the Pantglas Junior School

In October 1966 there were heavy rains, and on Friday October 21st at 9:15 a.m. 150 cubic meters of shale and rocks, mixed with grime and grit from the mines, and saturated with water that formed a slurry, fell like an avalanche down the Mynydd Merthyr tip.


PA

West Virginia Mountain Top Mining

Coal slurry at the edge of the dam above the Marsh Fork Elementary School, March 21, 2009. Source: Ohio Valley Environmental Coalition. Photo Vivian Stockman

What it is to inhabit the world?

We cannot think about the climate change and the possibilities of an increase in temperature of $4^{o}C$ without some acknowledgement of the extremes of human suffering that have taken place and *are taking place* to make the temperature rise. But we do.

We cannot focus on climate change without focusing on the way human societies get and use energy, on how it is produced and how it is consumed.

Veena Das calls this relationship, "the larger possibilities of phenomena and the singularity of lives" (p. 1). She writes, "(M)y concern is with the slippery relation between the collective and the individual, between the genre and individual employment of stories", and in this context she asks, "What it is to inhabit the world?" (p. 2).

This is the coal ash disposal site that belongs to the Yuanbaoshan Power Plant, in Chifeng, Inner Mongolia.

The disposal site is located in a small valley, which the power plant has divided into more than 10 sections. One by one, each section is filled with coal ash and then covered with earth before crops are planted on the surface.

Yuanbaoshan Power Plant, Inner Mongolia.

Coal ash-contaminated grass has severely impacted the health of milk cows at dairy farms near the power plant.

The Pannan Power Plant in Pan County, Liupanshui, Guizhou

The coal ash disposal site is located in Zhaluji village. Zhaluji's fields on the valley floor have already been buried by coal ash, but the villagers still plant crops on the mountain slopes

Social Justice Inseparable from Ecological Justice

Duquesne Fils-Aimé regularly wades into a river of waste in Port-au-Prince, Haiti, to clean out the city's canals.

Damon Winter/The New York Times

Overlearned and Overvalued Acceptance of Our Own Society

Climate change is occurring in the anthropogenic life-spaces that human beings create, but little attention is paid the ways in which people are expropriated to create those spaces.

The lives of miners and their families are bought and sold, weighed and measured according to the price of coal.

Digging deep into the circumstances of their everyday lives provides us with an opportunity to make explicit, what Geertz called "the overlearned and overvalued acceptance of our own society".

His insistence on "unsettling" us pushes us to consider the life-spaces of people whose very existence coincides and collides with climate change in their struggle to survive.

The Unearthing of Human Behavior

We too are fabricated, produced and *re*produced, and *packaged* into ways of thinking, ways of behaving. We are the product of centuries of thinking that has separated our minds from our bodies and quietly *un*mind us, in other words, *un*earthed us.

But there are other ways of thinking – infinite variations of conceptual metaphors made possible by the functioning of the human brain's 100 billion neurons, with every neuron having a potential 10,000 synapses—which Modell calls the "astronomical potential for synaptic connections".

Transdisciplinary Conceptual Metaphors

The five conceptual metaphors — (1) *The Anthropocene*; (2) *Kicks;* (3) *Dead Zones*; (4) *The Great Acceleration*; and (5) *Bridging the Abyss* are each represented by a series of graphics that are constitutive of each other.

Each conceptual metaphor could be thought of as a story – like a cautionary tale. You might imagine that each is a journey through the natural and human world, crossing fields of study, disciplines and paradigms and takes us from the scientific to the public sectors.

Each metaphor combines the physical, biological, and social sciences with the humanities, and pulls from the governmental, economic, and industrial sources, the media and the Internet.

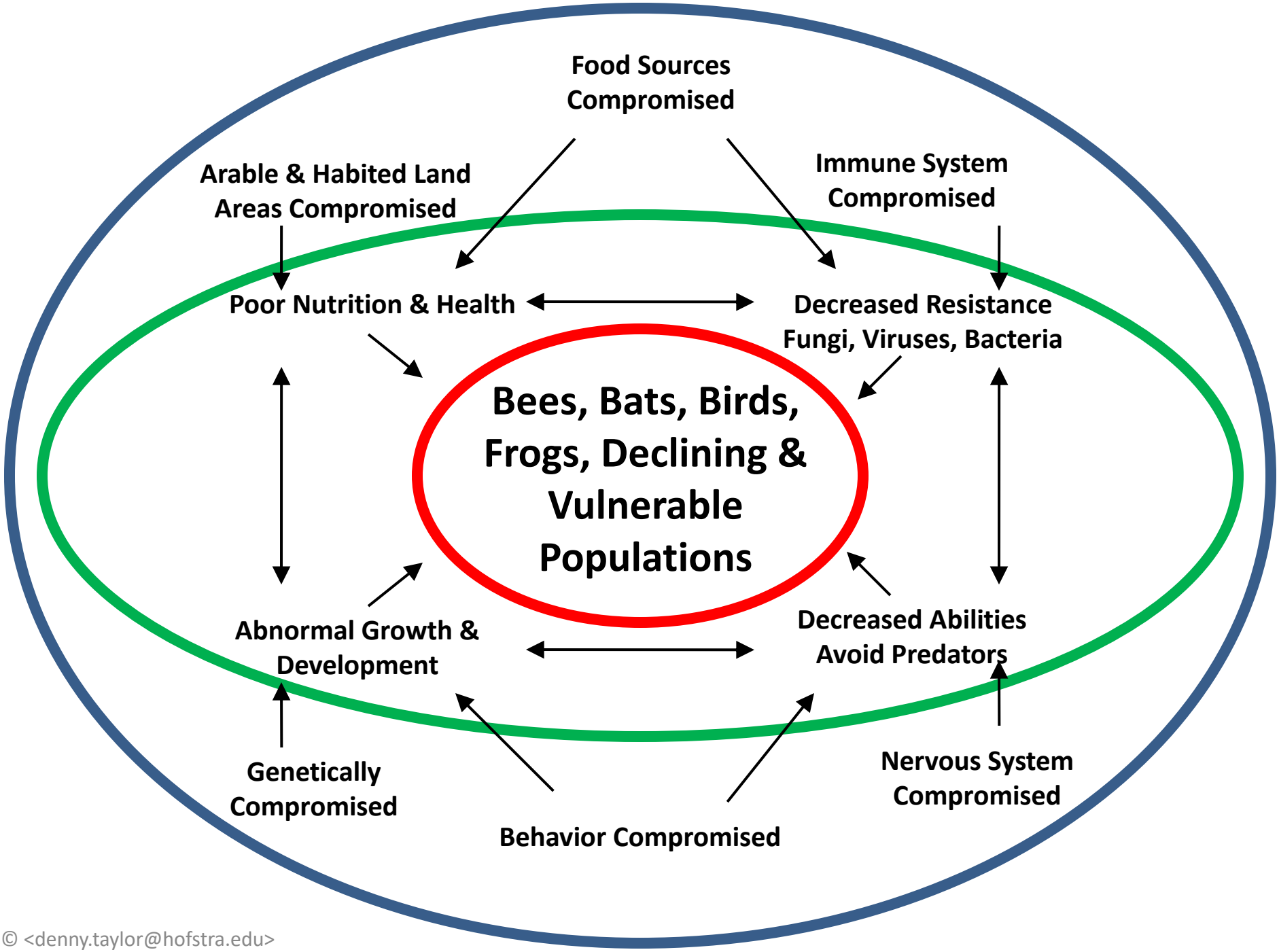
Each conceptual metaphor is designed to create transdisciplinary spaces that encourage situated engagement in research on climate change, biodiversity loss, ecosystem degradation *with* research on the impact of human enterprise on the planet as well as research on human vulnerability and resiliency.

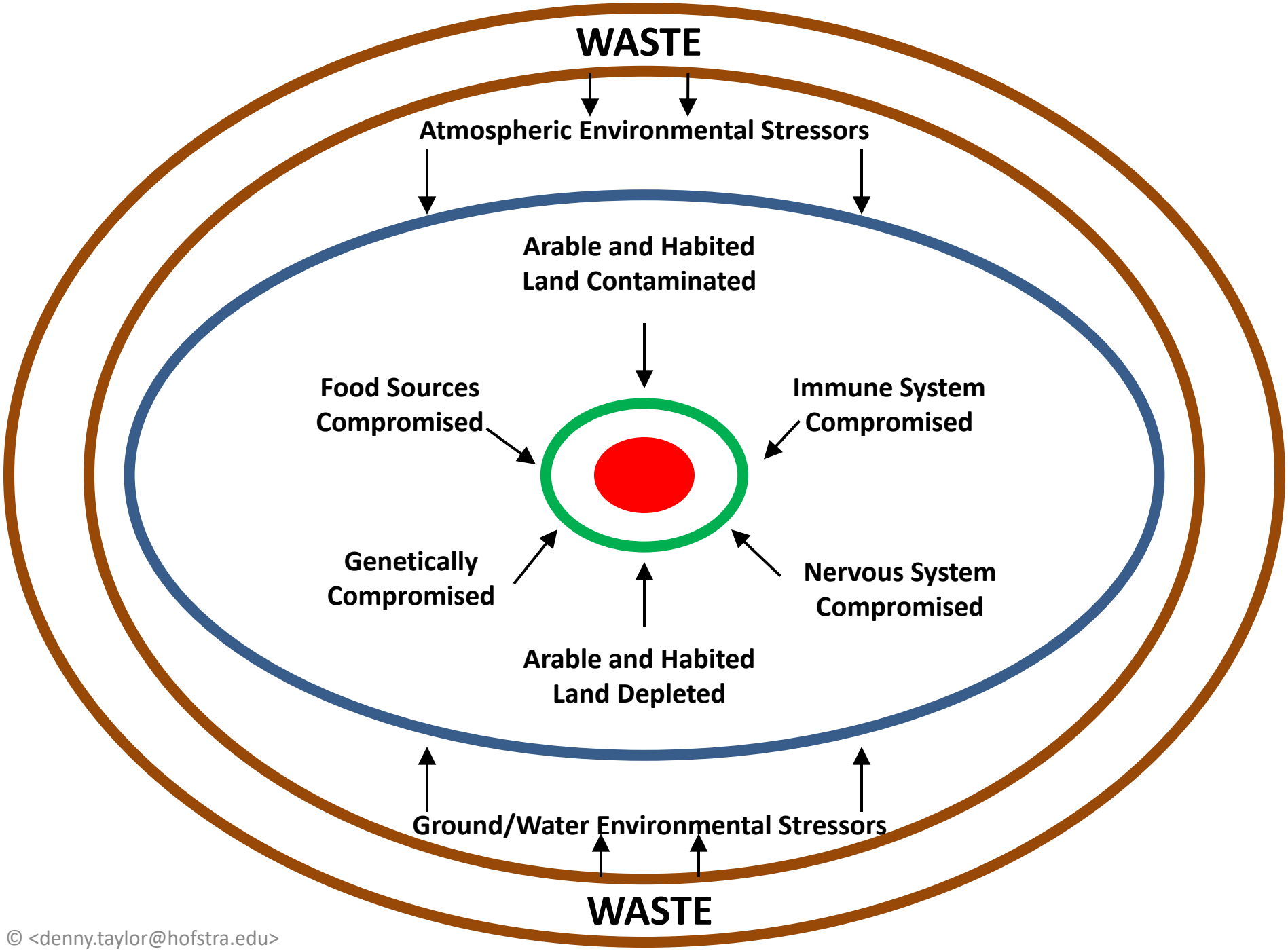
The Anthropocene

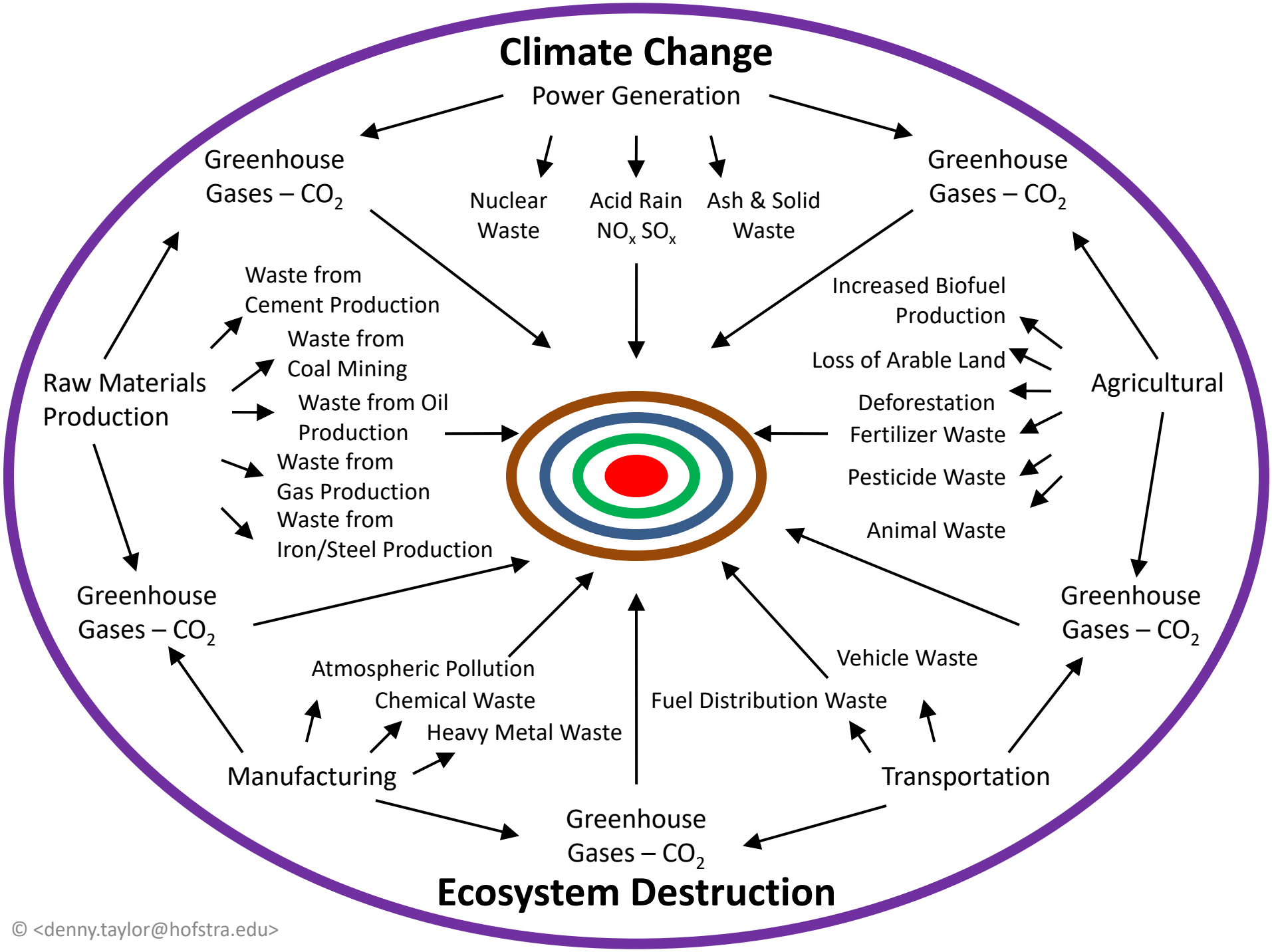
The First Conceptual Metaphor

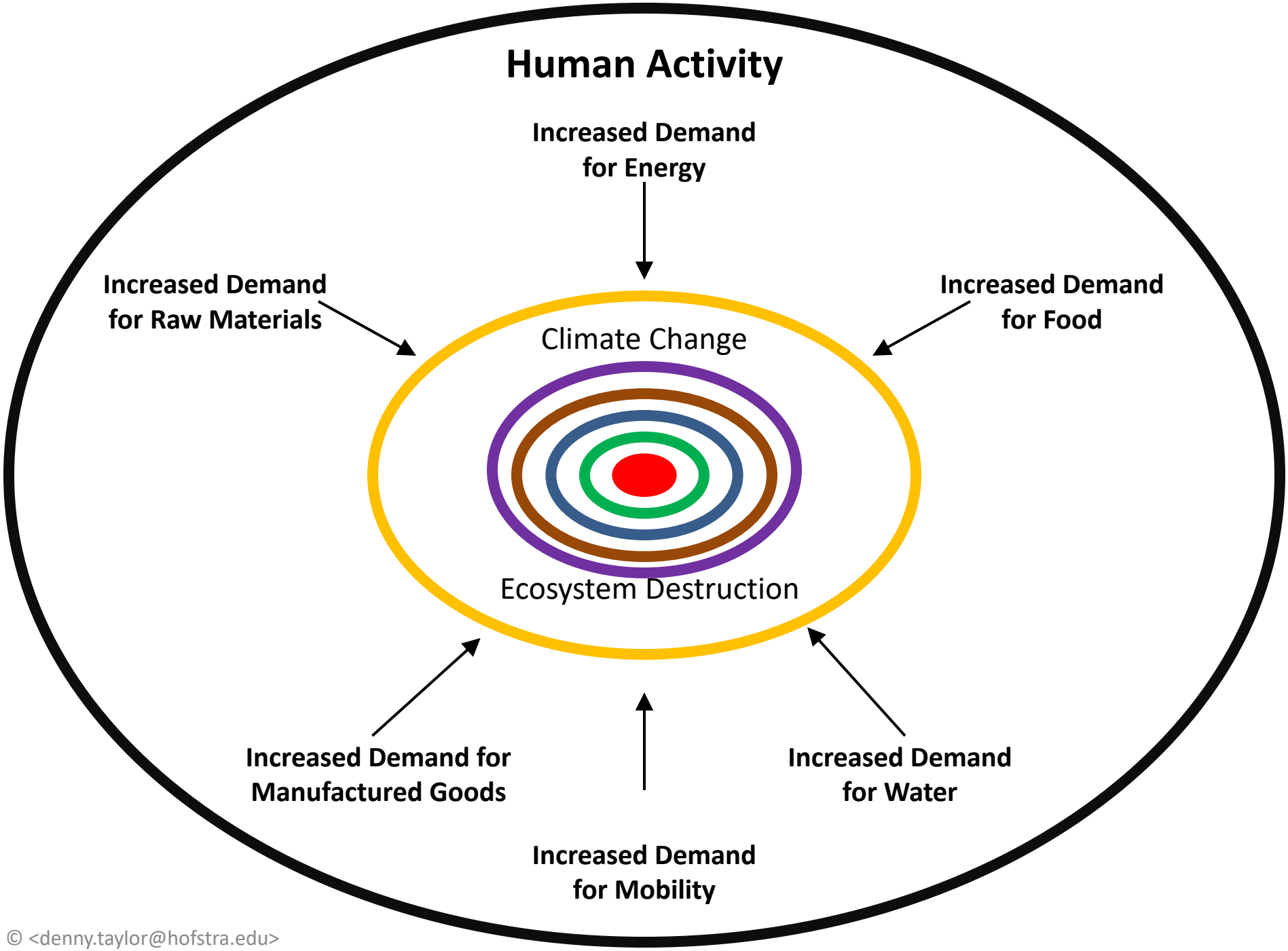
Kihansi Spray Toad (Nectophrynoides asperginis). Extinct in the wild. The IUCN Red List of Threatened Species™ 2009 update. Photo © Tim Herman

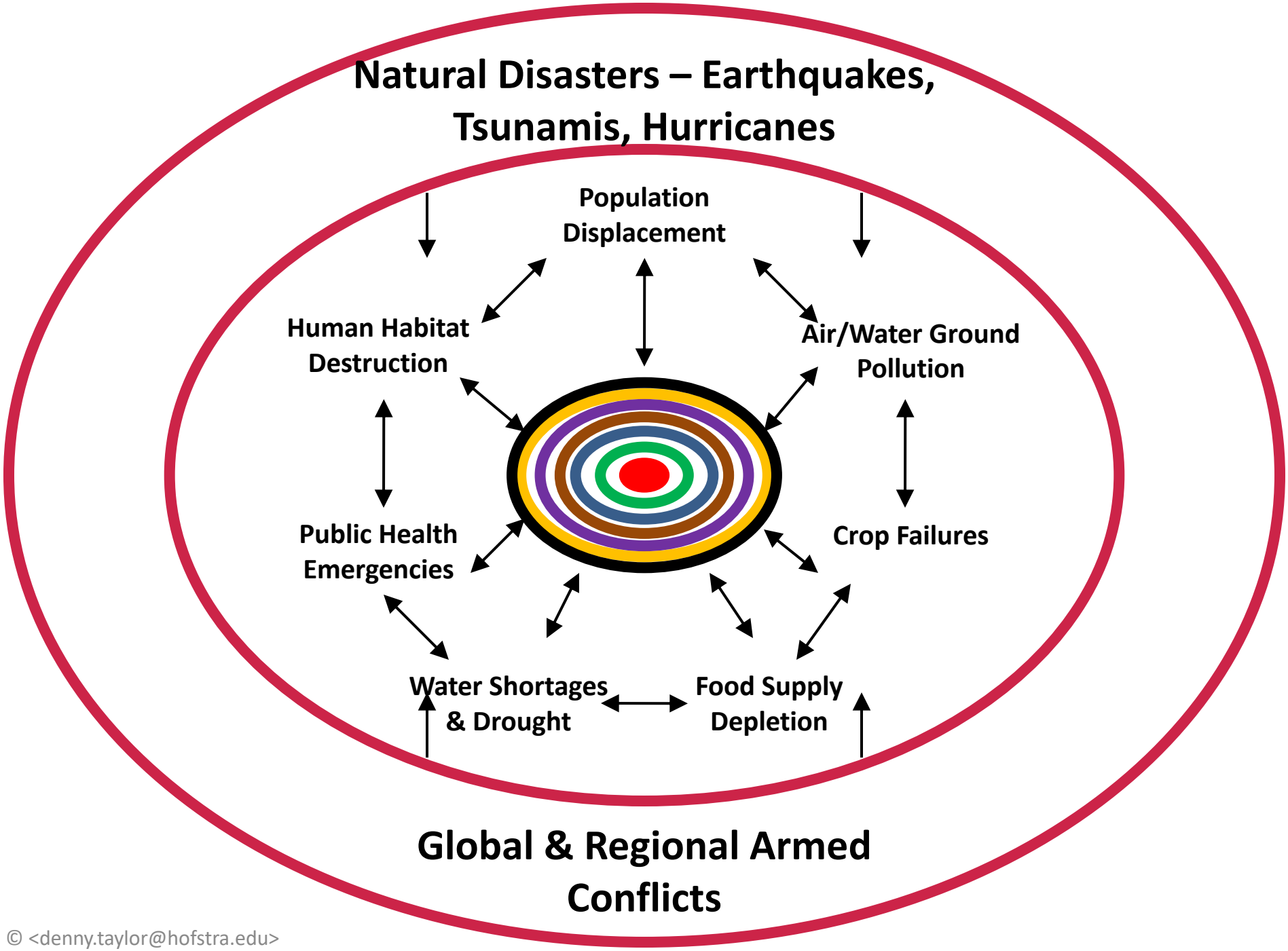
Rabbs Fringe-limbed Treefrog (Ecnomiohyla rabborum). Critically endangered. The IUCN Red List of Threatened Species™ 2009 update. Photo © Brad Wilson

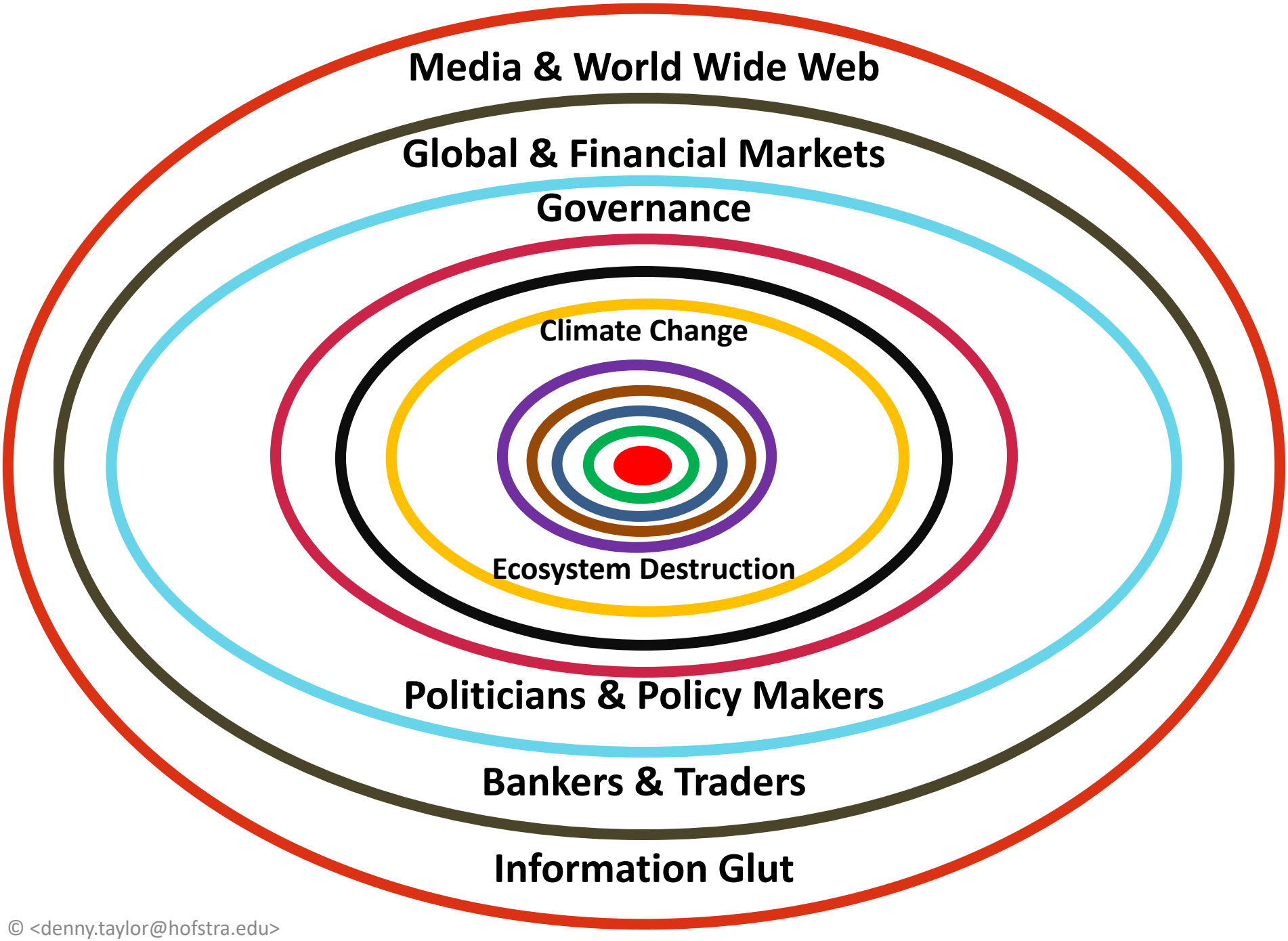


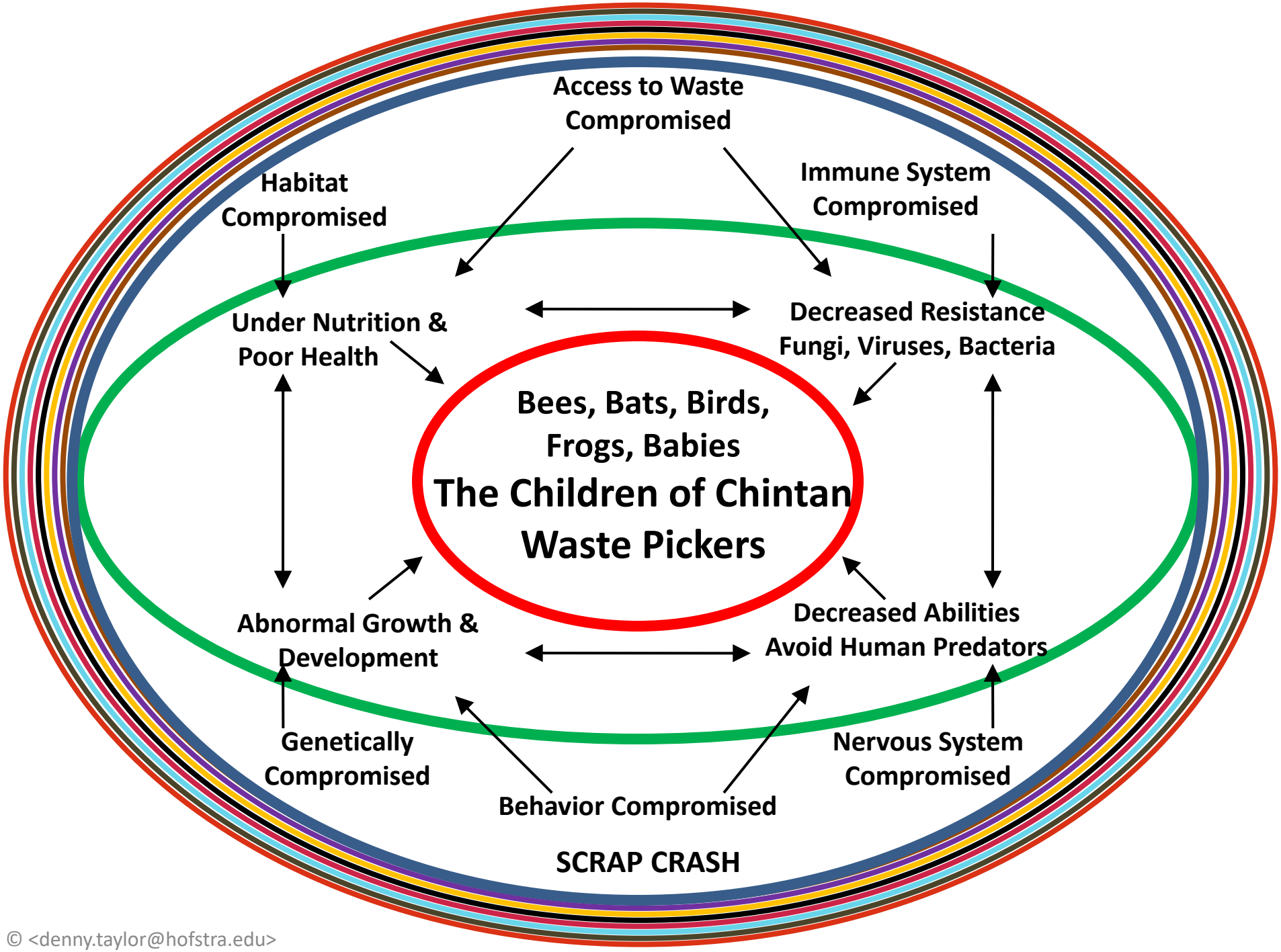


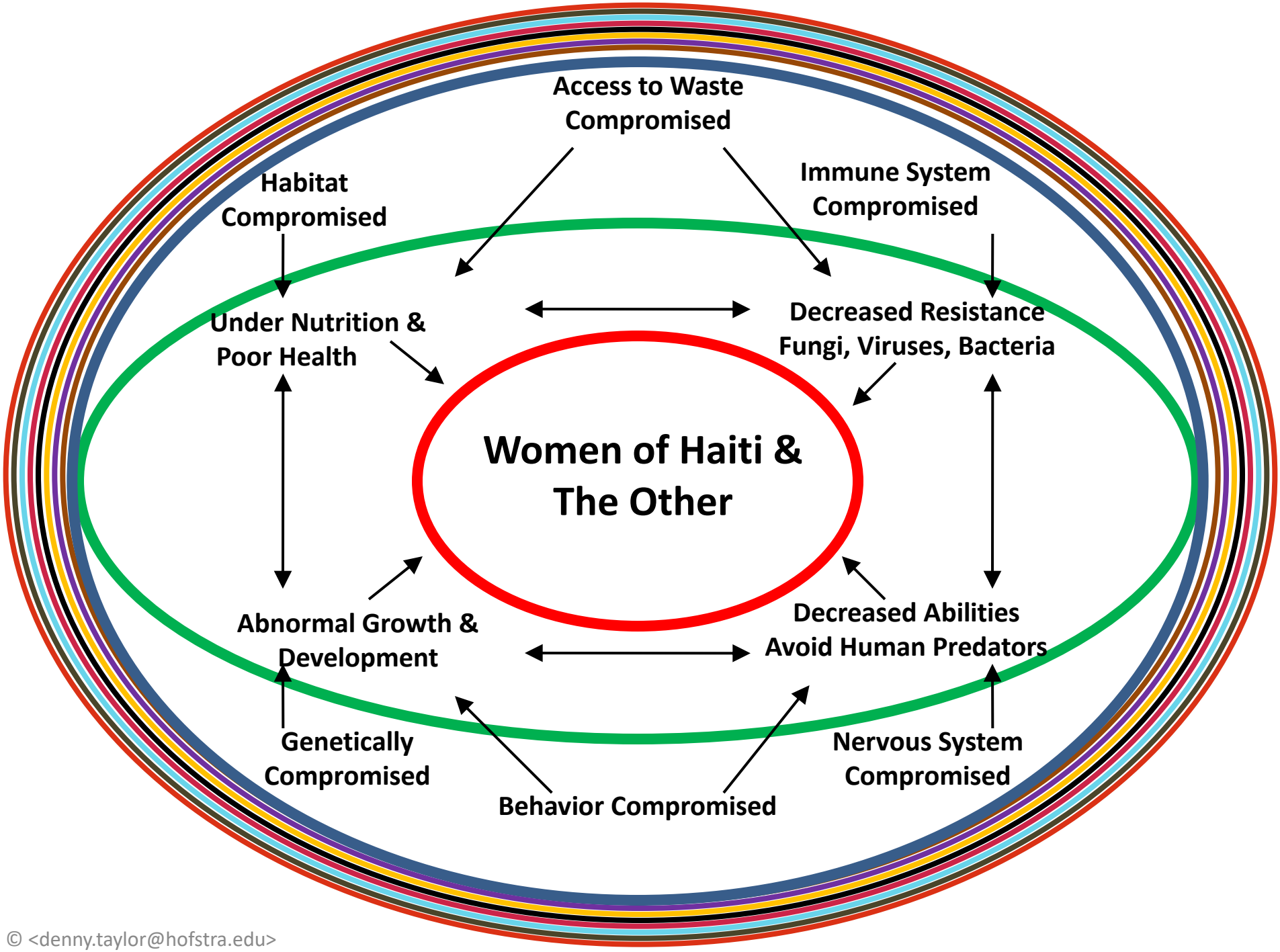


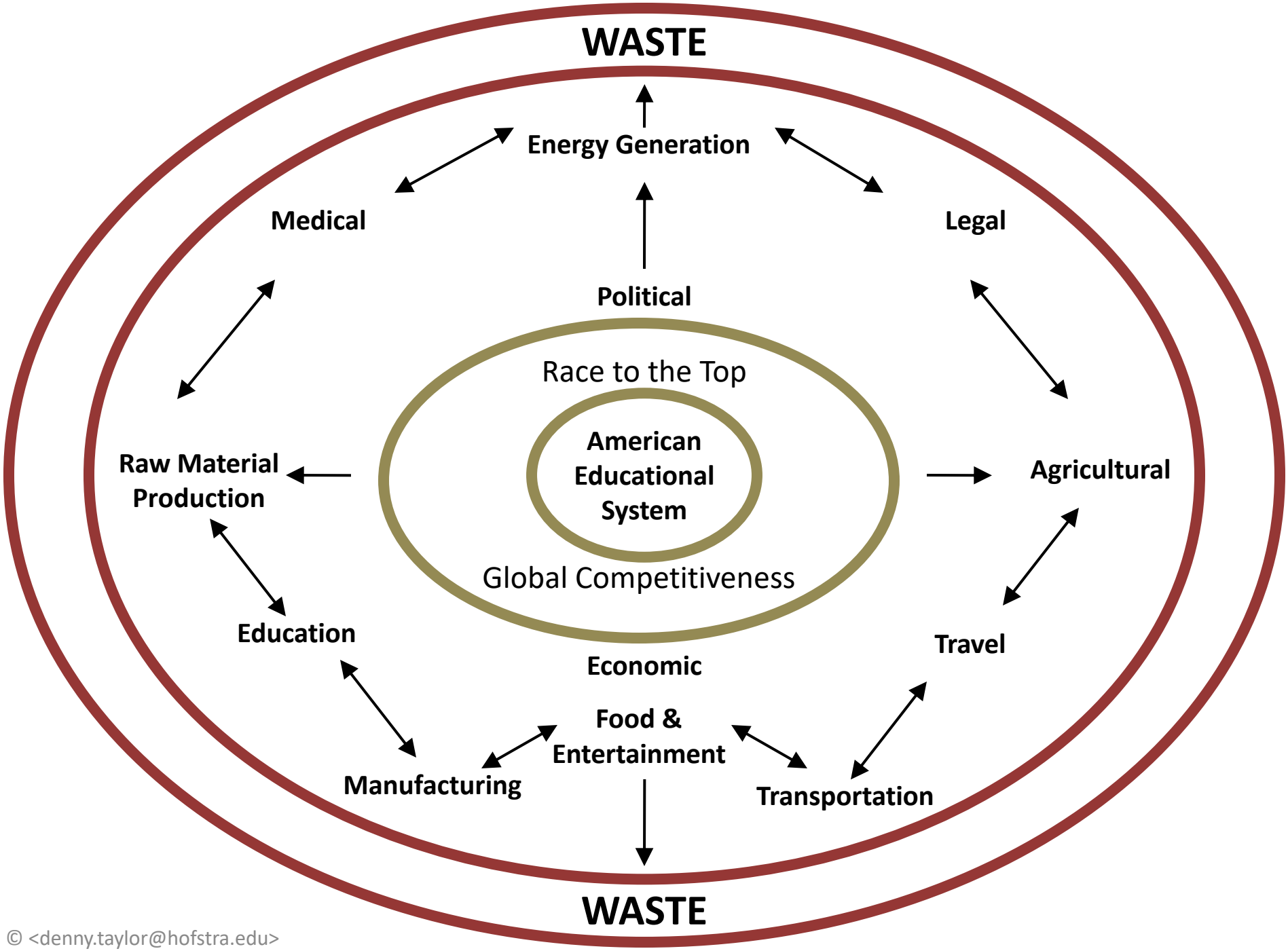


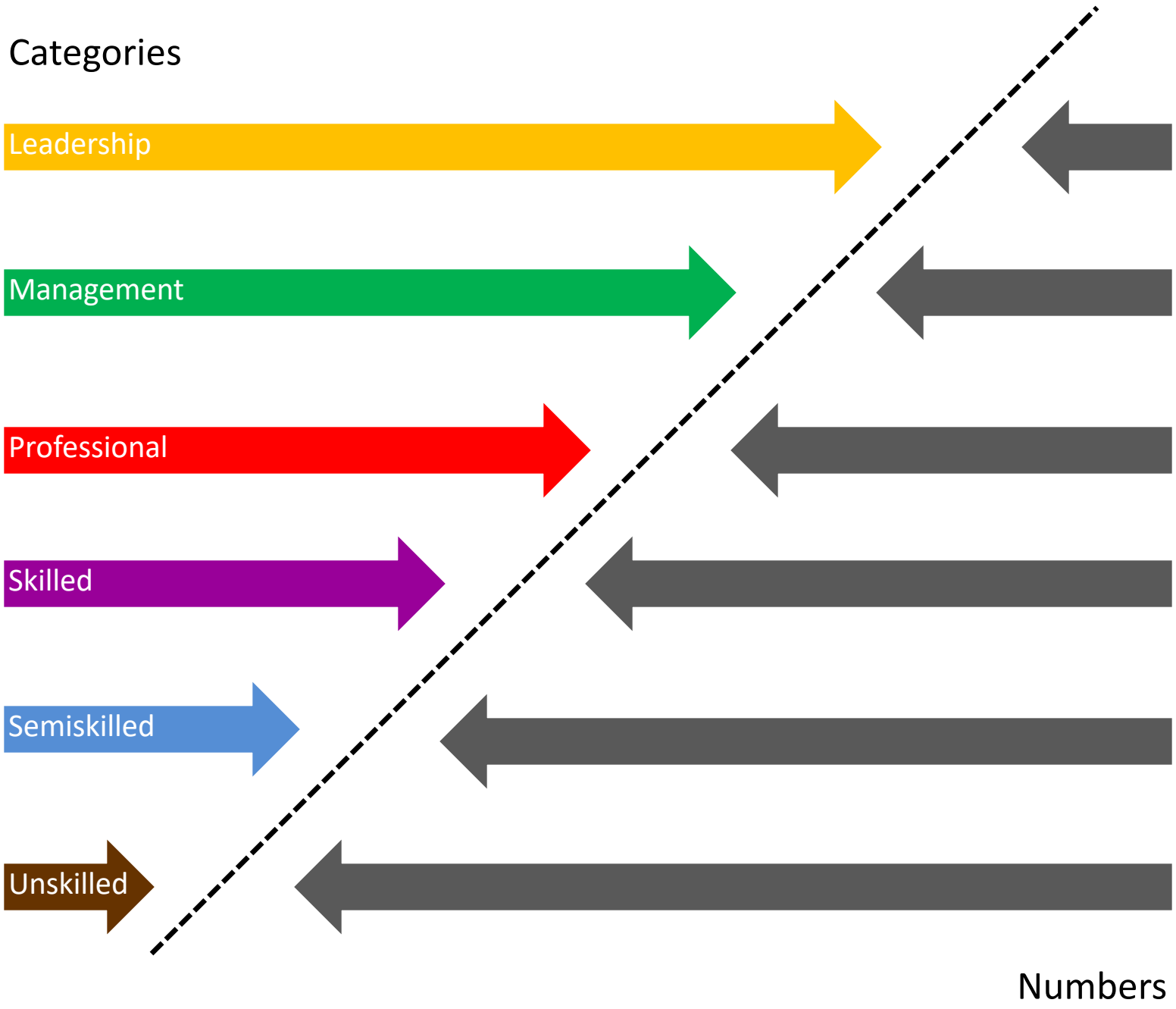











Categories
Leadership
Management
Professional
Skilled
Semiskilled
Unskilled
Numbers


Race to the Top
Leadership
Medical & Legal Professions
Top Universities
Business Management
Private Universities
Private Schools
Private Universities
Science & Engineering
Well Funded Public Schools
Well Funded Public Schools
Media & Entertainment
"Social," Political & Economic System
State Colleges & Universities
Moderately Funded Public Schools
Moderately Funded Public Schools
State Colleges & Universities
Administration & Teachers
Poorly Funded Public Schools
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Community Colleges
Community Colleges
No College
Skilled & Semi-skilled
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Global Competitiveness