Peak Oil, Economic Growth, and Wildlife Conservation
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-the planetary limits to growth of human activity seems imminent as does the peaking of energy production and economic growth (that will impact human populations directly)
-in addition, our hydrocarbon-based industrial civilisation has contributed to destabilising our planet's climate and the loss of biodiversity and wildlife habitat
-our population will continue to grow due to demographic momentum in spite of falling reproductive rates in most advanced economies
-reduction in material consumption within these advanced economies can help them move towards sustainability while those experiencing widespread poverty can pursue economic growth[1]

Peak Oil Recap
-humans have squandered their hydrocarbon reserves on all sorts of frivolous things
-oil, in particular, has become indispensable to our industrial-based society especially due to its use as a transportation fuel
-no other form of energy can replace it

Peak Oil Myth
-the best net energy reserves of the U.S. were extracted some 70 years ago
-recent cheers about a new US oil boom and Peak Oil being of no concern is not due to new discoveries of resources but because of new technology to access previously known deposits of tight oil; higher prices have also contributed[2]
-a reminder that "Peak Oil is not about running out of oil, as there will be plenty of oil left following the peak; but, whether or not it can be produced at low enough costs and high enough rates to satisfy the current global economy." (p. 318)
-cheap conventional oil peaked some years ago and focus has shifted to unconventional (e.g., tar sands, shale deposits) and more costly ones (e.g., deep water, arctic regions)
-even if inexpensive, it would be in the planet' best interests to stop extracting and burning hydrocarbons
-reducing their use via taxes should occur as the negative consequences continue to build, especially to our biosphere
-"exponential growth of our fossil-fuel-driven economy is accelerating biodiversity loss, and potentially contributing to irreversible planetary state shifts" (p. 318)

[1] Yes, advanced economies need to reduce their consumption dramatically but I am not so sure that I agree with this suggestion that would require continued (and perhaps significant) material throughputs.
[2] We now know that these deposits deplete very quickly after an initial surge, and that a lot of money was lost in the exuberance around them.

Can We Adapt Or 'Go Cold Turkey'?

-whether we can adapt to an elimination of hydrocarbons depends on a number of factors including the rate of decline and lifestyle changes

-prices are high and may go much higher; the EROEI is low and falling; impacts upon the environment are unacceptable

-it would be in our best interests to wean ourselves off of them

-environmentally-benign substitutes for oil are being pursued but they are not as dense as conventional oil

-technologies are also being proposed to mitigate some consequences (e.g., carbon capture and storage) but cost and scale are of concern

Intermittent Renewables Revisited

-environmentalists have long fought against the coal and oil giants, but they have mostly failed to advocate for energy consumption decreases; and rather than protect against all forms of energy production, they have tended to push for energy efficiency and 'renewables'

-politicians have embraced the 'green' bandwagon as a way of providing jobs and stimulating the economy (while many continue to also support hydrocarbons); they appear more concerned about increasing energy production than what source it comes from, its costs, or the environmental impacts; their actions appear to be mostly about supporting economic growth and business as usual

-many hold that 'renewables' can substitute for hydrocarbons but they fail to consider that industrial-scale 'renewables' are not dispatchable and there does not exist sufficient storage for any excess production to be drawn upon when needed

-the 'solutions' that have been proposed to address the various hurdles are insufficient due to issues of scale and dependence upon non-renewables

-in addition, the rollout of alternatives have been adding to our energy use and not resulting in a decline in hydrocarbon use

-"Many proponents of industrial-scale solar arrays and wind turbines also fail to acknowledge their detrimental impacts on wildlife species and massive alteration of wildlife habitats in many locations (southwestern deserts, forested mountain ridge-lines, prairie and sagebrush habitats); plus, these devices produce electricity, not liquid fuels that are needed" (p. 320)

-liquid fuel 'solutions' carry their own environmental destruction aspects, low EROEI, and have issue of scale

-'carbon-free' electricity might be best addressed via new designs of nuclear reactors

-'solutions' appear to be mostly a result of wishful thinking, delay tactics, and/or for appearance

-any 'solution' must involve many adjustments as we need to reduce dramatically our energy use

-it is doubtful, however, that we will change our trajectory (barring a dramatic event that causes us to) and avoid the worst impacts of Peak Oil and/or climate change

-disentangling our societies (especially economies) from hydrocarbons is near impossible

-convincing society to pay much more for 'renewables' to help us is also near impossible[3]

[3] I sense a lot of conflicting messages here. On the one hand, the significant detrimental environmental impacts of industrial-scale 'renewables' is laid out as well as how they cannot possibly support industrial civilisation; on the other, the advice is we have to pay more for 'renewables' and should pursue them to help us with impending consequences of Peak Oil and climate change.

-if the costs were accepted, lifestyle changes would also have to be significant to accommodate the huge decline in energy available[4]
-hydrocarbons are likely to continue to play a role in the future despite all the negative repercussions as alternatives have not been adopted to the scale required
-as a result, society will have to adjust to a changing climate
-any action in response to possible catastrophic ecosystem collapse or climate system chaos will be too late

Peak Economic Growth and Interest On Debt

Economic Growth

-all world economies are pursuing growth (usually gauged via Gross Domestic Product; based upon personal consumption, business investment, goods and services exports, and government spending)
-GDP is criticised as a measure for a variety of reasons but it does seem to be a good indicator of biodiversity loss
-other metrics have been proposed to address its shortcomings but no government has adopted one of the alternatives
-the US economy is driven mostly by consumption
-anathema to economic growth is a stable or declining population/workforce and/or per capita consumption
-there must exist a limit to economic growth since the materials and energy required are of finite supply
-recycling and energy efficiency can help to a limited extent but limits must be recognised and respected to avoid an extended contraction and/or collapse
-growth rates are not sustainable[5] and current growth has led to a number of negative consequences (e.g., sink overloading, biodiversity loss)

Monetary System

-our credit-/debt-based monetary system is one aspect of our economic system
-most of our money is created via debt/credit with financial institutions holding only a fraction of what circulates; it is loaned into existence
-to maintain this system and GDP growth, new debt must grow faster than old debt (this also ensures that loan principal plus debt is paid off)
-a decline in the rate of growth of the energy required to sustain these systems is resulting in increasing debt defaults with wealth being transferred to the rich (currently in the US, the top 1% of wealth-holders claim 40% of the total wealth)
-such inequality has negative impacts upon social stability
-these systems are also destroying our natural assets

Peak Nature and Earth's Biodiversity

Mass Extinctions

[4] This would indeed be dramatic for 'advanced' economies but not so much for 'undeveloped/emerging' economies.
[5] See Dr. Albert Bartlett's presentation on the exponential function here.

-at the end of the Cretaceous Period about 50% of all species went extinct (ca. 65 million years BP; asteroid impact)
-the planet's biodiversity slowly recovered and may have peaked about 110,000 years BP (last glacial period)
-based upon past species extinctions, many biologists believe we are experiencing another Mass Extinction and caused primarily by human activity
-this event appears to have begun around the time humans migrated out of Africa (ca 100,000 years BP) when larger species began disappearing and then increased dramatically with the introduction of sedentary agriculture (ca 10-12,000 years BP)
-agriculture spurred human population increase
-biodiversity loss again jumped in severity with the beginning of the Industrial Revolution (ca 200 years BP)
-current extinction rates are about 1000-10,000 times higher than typical rates

Threats To Human Health and Well-Being
-extinctions are irreversible and can have profound consequences for humans
-"the loss of one keystone species on which numerous other species are dependent could cause a trophic cascade, resulting in the extinctions of numerous species and compromising the functioning of the entire ecosystem [64]. Many species also provide critical ecosystem services, such as processing wastes and recycling nutrients, at no cost to us. Other species aid in the control of pest species in agriculture and forestry, reducing the use of insecticides and treatment costs to society." (p. 325)
-plant pollinators are one such keystone species
-pollination can be performed by hand but not to the scale needed to feed 8+ billion humans
-while many species may not appear important to humans, they may be quite important to the ecosystems we do ultimately depend upon

Anthropogenic Causes Of the Sixth Mass Extinction
-most, if not all, human activity is contributing to the mass extinction occurring; for example: ecosystem destruction, overexploitation of resources, land system changes, population growth, agriculture, pollution, introduction of invasive species
-many of these activities stem from our pursuit of economic growth
-according to some, efforts to save the planet's biodiversity are now in vain as we've lost the race
-"Our sheer numbers and activities have made us a force of nature that now threatens the functioning of our planet's life-support system." (p. 326)
-in recognition of our impact, geologists have labelled this the Anthropocene Epoch in which human selection has replaced that of Nature
-we can expect an unstoppable loss of 50% of our plant and animal species over the next century as a result

Reconnecting With the Earth
-most ignore this relatively slowly unfolding tragedy given seemingly more-pressing problems
-"Trying to reconcile the cognitive dissonance that occurs in our perceptions of the future, ranging from a utopian, technological paradise to something out of "Mad Max", can cause much mental stress and discomfort." (p. 327)
-it's easier to believe that all these 'problems' will be solved and we can continue with our business-as-usual path

-some are waking up to the issues and planning for a different future via education and showing how all can live with much less energy
-others believe it is too late for this and that a full collapse is underway; as such, they are preparing for their own family's/community's survival
-many more are in denial (some purposeful) or simply unaware, believing the mainstream narratives that all is well
-existence without hydrocarbons would be vastly different than today's modern complex societies
-technological 'progress' would likely have been significantly slower; exponential growth in our population and economies would not have occurred; many larger wars may not have taken place; many of the large environmental issues would not exist
-hydrocarbons have provided the energy to grow our industrial civilisation and the benefits of many 'energy slaves'
-given these are finite, either we will chose to scale them back on our own terms or this will be forced upon us
-it is likely that many/most will not support purposeful contraction of their use and our economies, and will tend to blame the usual suspects when this happens
-some will claim to have 'solutions' if given enough power, and/or technological 'breakthroughs' will be heralded as the answer to Peak Oil[6]
-even if an oil 'boom' were to occur, all this would do is delay our 'reckoning' and exacerbate the negative impacts via continued use and growth
-any 'solution' will involve everyone reducing over-consuming lifestyles based upon finite hydrocarbon energy

Moving Toward Sustainability
-any sustainability movement should attempt to address a number of issues (e.g., resource depletion, biodiversity loss, sink overloading, etc.)
-biodiversity loss should be a prominent component given its importance but it has not been
-current population growth and consumption are not sustainable (i.e., being maintained without exhaustion of resources or resulting in ecological damage)
-"we need to adapt our entire civilization to withstand shocks and roll with the punches of Peak Oil, resource depletion, climate change, and biodiversity loss; in other words, we need to build resilience and redundancy into our human and natural systems to increase their viability, which up until now have been shaped entirely by growth in the human economy." (pp. 328-329)
-to help transition to a shrinking economy, localised self-sufficient communities should be developed with significant rethinking about the many complexities of modern society (e.g., manufacturing, banking, transportation, governance, etc.)
-building communities that can better withstand economic shocks is needed
-greater resilience and redundancy can be achieved via leadership and legislation[7]
-aiming for a steady-state economy is recommended
-certainly our debt-/credit-based monetary system that requires perpetual growth must be restructured; perhaps with a variety of currencies that are designed for use locally, regionally, nationally, or internationally
-a more sustainable economic system is needed and should be founded in ecological economics and aiming to reduce consumption
-a more sustainable agricultural system is also required using methods that protect the environment, human health, and animal welfare

[6] The vast majority of such 'breakthroughs' never materialise and tend to be marketing/hype to attract investment in the project.
[7] Looking to our political systems to steer the establishment of self-sufficient communities is, in my opinion, misguided; as I have written about repeatedly.

-our current industrial food production system uses about 10 calories of hydrocarbons to create a single food calorie, and thus is not sustainable
-shifting to a far more sustainable food system (e.g., permaculture, natural system) is needed
-practices must protect biodiversity and foster healthy ecosystems first and foremost
-these systems require more intensive manual labour as they are less reliant upon hydrocarbons and their adoption would result in far more people being involved in food production
-some relocalisation of food production is occurring
-"However, meeting the needs of a growing population would require producing more food on the same amount of agricultural land—a daunting task without fossil-fuel energy, herbicides, pesticides, fertilizer, and hybrid and genetically engineered (GMO) crops!" (p. 330)

Human Impacts On Earth's Biodiversity
-many environmental organisations do aim to 'save biodiversity', often through the establishment and support of national park systems
-these are not large enough, however, to support our largest carnivorous wildlife
-climate change threatens to nullify most of these efforts through its destruction of habitats
-native species are responding by migrating towards the poles
-plant hardiness zones are also shifting
-human-dominated landscapes restrict such movement
-human activity impacts natural landscapes in a number of ways but especially edge effects that provide routes for invasive species and are created by such things as power transmission corridors, fencing, and roadways
-in many countries, roadways are the most pervasive form of fragmentation (in the US alone, there are over 6 million kilometres of mapped roads)
-the continuing proliferation of this particular activity is leading to increasing edge effect impacts, habitat isolation, and species extinction
-this is resulting in human selection of 'weedy' species (e.g., racoons, squirrels, pigeons, etc.) to the detriment of many others
-while there is "little that can be done at this point in time to save pristine ecosystems and their biota…benign neglect by humans could make it even worse, speeding up extinction rates and causing ecosystems to collapse rather than degrade. Humans need functioning ecosystems to provide the ecological services on which our civilization depends for its continued existence." (p. 332)

Managing the Biodiversity Crisis
-there exist a number of operations actively attempting to address the biodiversity crisis but the challenge is beyond environmental; it is human attitudinal and trying to get people to understand the importance of functioning ecosystems and how they support human welfare
-this need, however, is "often up against powerful, well-connected and ecologically illiterate developers and interest groups, who feel that their way is the only way, particularly if they can cloak their project around economic growth." (p. 333)
-past compromises to provide mitigation have failed with total protection now being the only viable option that must be communicated to decision-makers[8]
-increasing urbanisation is resulting in depopulating rural areas

[8] It would seem that rapid and significant degrowth would be the only remaining option if we wish to 'manage' the 'transition'; otherwise, Nature will respond in ways we probably don't want.

-should human populations stop growing and decline towards the Earth's natural environmental carrying capacity, our ecological footprint should drop dramatically
-conservationists can help ensure wildlife preservation during such a contraction by reconstructing depopulated landscapes as functioning ecosystems (if we've saved the necessary components; i.e., fertile soils, keystone species, etc.)
-preservation will need to engage various stakeholders and provide economic incentives
-large reserves with movement corridors between them will be needed
-encouraging philanthropy from the wealthy should be carried out
-depopulated rural areas can be converted to functioning biodiverse ecosystems
-these reserves will need to be carefully managed, perhaps by moving species to maintain diversity and preventing human selection
-human population growth and its associated consumption must be confronted
-all of these goals are challenging at the best of times, but even more so as we experience energy and resource depletion, economic uncertainty, climate chaos, and social unrest

Hope For the Future
-the hope is to take the steps necessary to save biodiversity but so long as economic growth is pursued that is unlikely to occur
-there do not exist the resources to support continued population growth
-we can attempt to stabilise and then reduce our population now, restructuring the economy as needed to guide its contraction
-"We need to reassess our long-term vision for human civilization and decide what we must do now to move it toward a more sustainable future for the benefit of the planet and generations yet to come." (p. 335)
-once we envision where we want to go, we can begin our work to get there
-"We envisage a future society distinguished by a stable population and per capita consumption, a more equitable distribution of income and wealth, full recycling of materials, waste streams that the environment can easily absorb or reuse in productive ways, and use of alternative, non-fossil-fuel sources of energy. Populations will be much smaller and in dynamic balance with available resources. Improvements in infrastructure by governments will be made without consumption of fossil fuels or piling on more debt and interest on debt." (p 335)
-achieving this may or may not be possible and a balance between consumption and the planet's ability to regenerate resources will eventually occur, either by human choice or Nature's rebalancing processes[9]
-we can do things better and that are ecologically healthier but must reign in the pursuit of wealth/status and develop resilient, sustainable systems
-if we cannot do this, will be confronted by collapse of our modern societies alongside the loss of large portions of our biodiversity

[9] Nature's rebalancing is typically a die-off of a species that has overshot its natural carrying capacity.