

The Climate Changed What do we do now?



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Why did this happen?

We failed and continue to fail to reduce GHG emissions.

Now the climate has changed.

We live on a new planet
and that is a challenge for all of us.

The past does not adequately inform the future.



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We have two problems we must solve simultaneously.

1. Mitigate GHG emissions

Most cities in Canada have net zero plans at this point. What is the timeline? Is it fast enough? To meet our own goals we must move 5X faster.

2. Adapt to the new planet and its conditions

This new planet is based on extremes rather than moderation. There is little middle ground anymore. It goes beyond our understanding of planning and engineering. It decreases tolerances for error and miscalculation.

The past has limited application to our future.

Problem #1 – Mitigation

(to reduce or minimize the problem and negative outcomes)

How do we mitigate destabilizing the climate even more?

We have a critical task over the next few years.

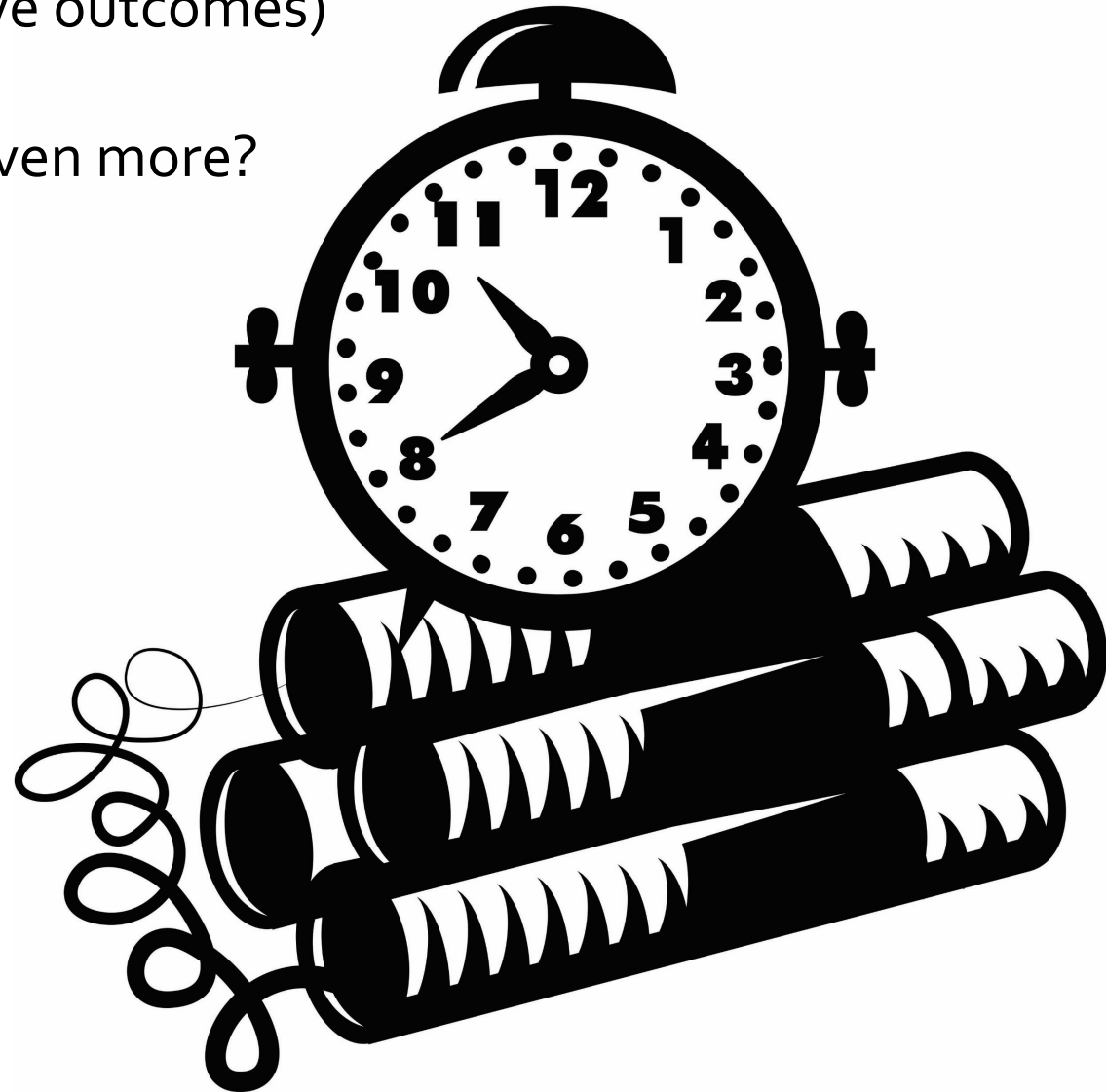
Get to net zero as quickly as possible.

We need to **decarbonize** our lives.

By...

2030

That is 5X faster than 2050



Focus on the right problem

- Is our problem sustainability? What is sustainability? What does it mean?
- Is our problem renewable vs non renewable energy? Are all renewable energy sources also low or no carbon? Does renewable = no carbon?
- Is there any kind of energy that is truly clean? Without pollution? Without problems to solve?
- Note: decarbonization and GHG's are not the same. CO₂ is a GHG. There are others. Will we tackle those? Methane (up to 1/3 of warming due to methane)?

Keep a narrow focus for now – solve this one problem now.

We must decarbonize quickly on a massive scale and choose other GHG's to address.

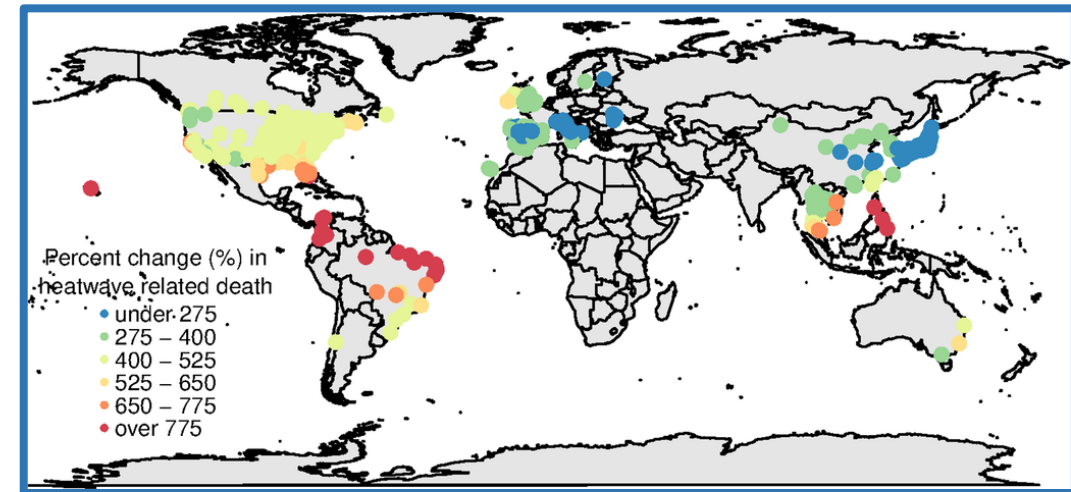
Strategize to solve the right problem quickly

Is any solution to the problem of GHG emissions too expensive?

- Minimally adapting and dealing with impacts will cost \$140-\$300b/year to 2030, rising to \$280-\$500/year to 2050. (UN figures)
- **Cost to stop climate change: varies but lower than not stopping it.**

How much will it cost to live in an unstable climate?

We must deal with reality or it will deal with us.
In fact, it already is.

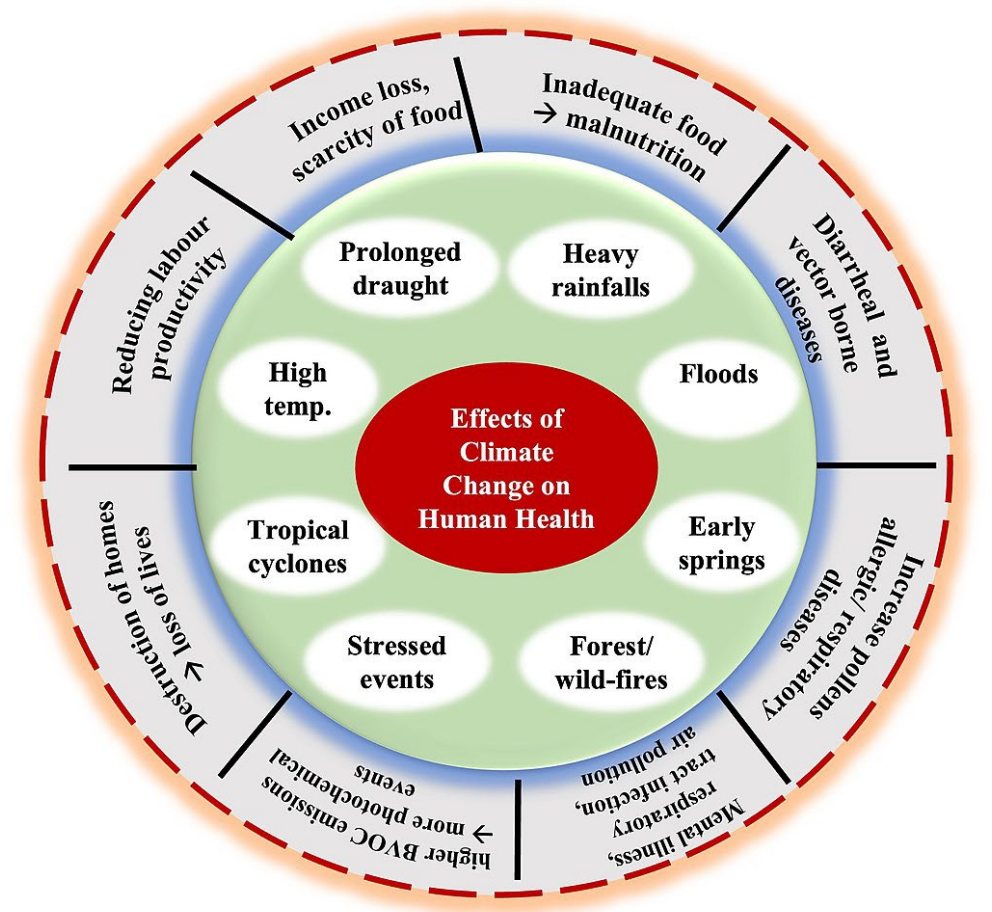


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Problem #2 - Adaptation

Since the climate has already changed and will continue to change we must address the needs for water, sanitation, shelter, food, mobility, infrastructure, energy provision, health, and more under the new conditions.

It is like we arrived on a new planet and are trying to learn how it functions. We cannot assume we know much at this point.



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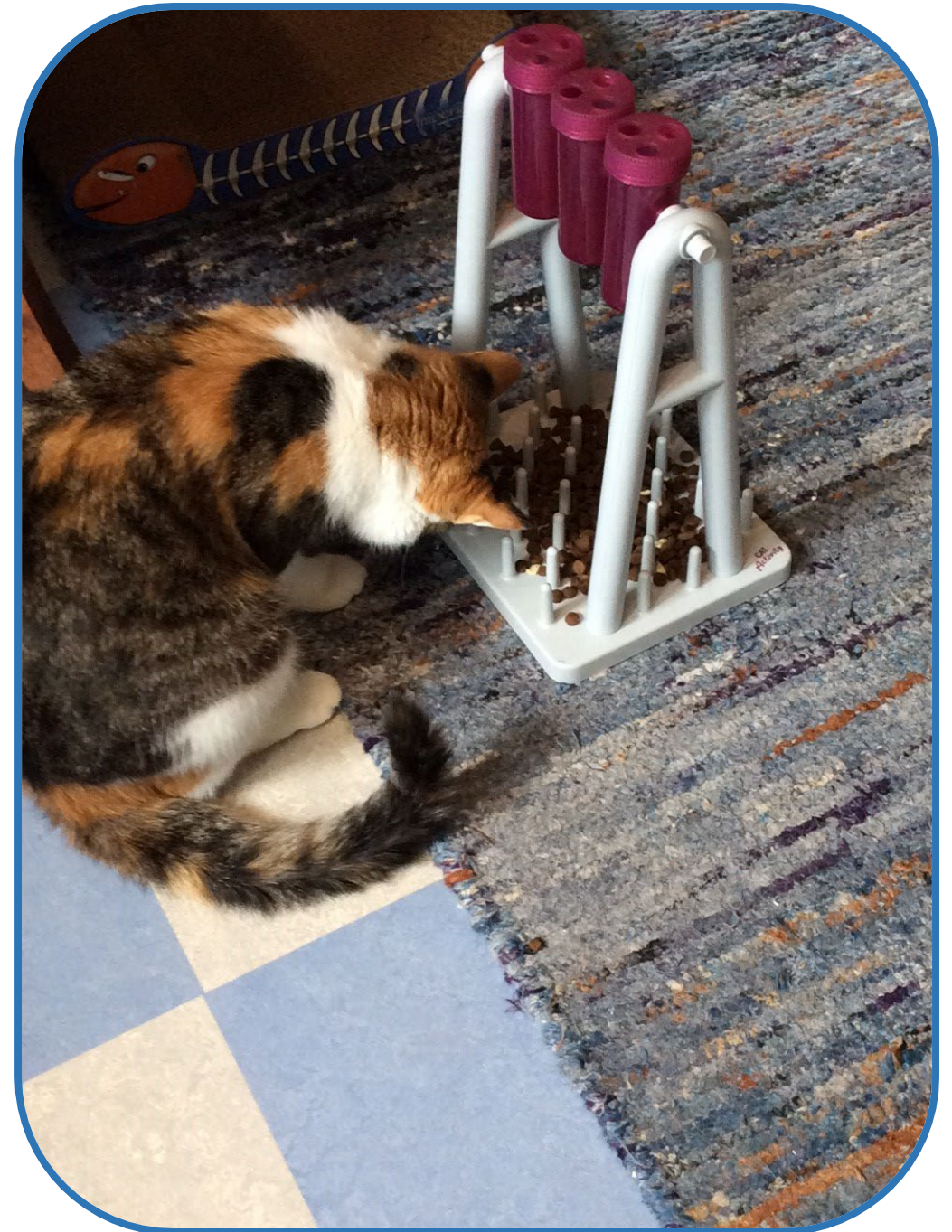
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We are like my cat Lucy. She was rescued at the end of July and brought home.

- New place.
- New rules.
- Lots to learn.

She did not know much about being a cat. So I've taught her to play. I also put her food into food puzzles. That was frustrating to little Lucy. But now she is into it and learning how to do tougher things than she ever imagined.

We are all like Lucy right now. . . on a steep learning curve in this new place.



What does adaptation mean?

- to respond to the current and future climate impacts with real solutions to meet the needs of people and other species.
- Adaptation requires **continual learning** and adjustment. The climate is in flux right now and will continue to be so until we cease GHG emissions. It will still take some time to stabilize after emissions begin to drop.
- Adaptation will mean **repeated failure** as we learn and progress in our understanding of the new parameters we encounter in this new place.
- Adaptation is **specific** to communities
- **Species either adapt, move, or die**



Chris Upson / Half-dead old Beech Tree

What does adaptation produce?

Urban Resilience:

The capacity of a city's systems, business, institutions, communities, and individuals to survive, adapt, and thrive, no matter what chronic stresses and acute shocks they experience (resilient cities network)

Acute shocks are events that cause distress and destruction.

Chronic stresses are reoccurring events or lower level stress that is continual.

We have entered a period of **chronic disasters**. Acute shocks now reoccur continually in some places.

Resilience can be individual but is primarily community



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Risk Analyses

To figure out how to adapt we do risk/vulnerability analyses. They can be useful.

However, we do not really understand the parameters of change we are living through right now.

Almost all risk/vulnerability analyses will be an underestimate of the consequences we will see.



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For example:

Water management and roads. We tend to focus on sizing culverts for a road. We size the amount of water expected in the culvert. We assume that larger storms are less frequent. We seek an economical solution and don't size for extremes.

- What is a 100 year storm? What is a 1000 year storm? Is it economical to ignore extremes?
- Do we know the extreme rainfall events of just this summer are a one and done event?
- We must think holistically in terms of water management and road design or continue to make mistakes



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Another approach – define what you want to avoid the most and plan for it

Events – extreme precipitation, flooding, flash floods, wildfires, droughts, heat waves, wind storms, ice storms, super charged tropical and post tropical storms, landslides and washouts, supercharged tornados. . .

If the event causes damage it becomes a

Disaster – loss of infrastructure, damaged property, erosion, loss of trees, loss of crops

If the disaster results in loss of life for humans and other species it becomes a

Tragedy – untimely loss of life, famine, pandemics, **mass mortality events**

How do we avoid these things?

We avoid escalating **events** by getting to net zero 5X faster. . . by 2030

We avoid **disasters** with

- good planning
- right policies
- appropriate engineering (hard and soft)

We avoid **tragedies** with

- planning
- policies
- engineering
- community organizing
- education/engagement
- communication



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Let's look at a now common events that impact our NB cities

Extreme rainfall



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Heatwaves



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Wildfires (WUI)



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\$1 invested in mitigation to reduce risk = \$6 saved

Key issues for planners

1. Full evacuations – how and where to
2. Food production – climate dependent and independent
3. Energy generation and distribution
4. Water management
5. Infrastructure costs and improvements
6. Expansion, growth, and WUI
7. Community organization
8. Managed retreats
9. Communication and education
10. Community engagement and empowerment



DarrenRD (straightened and enhanced by CoolCanuck), CC BY-SA 4.0 <<https://creativecommons.org/licenses/by-sa/4.0/>>, via Wikimedia Commons

Key issues for engineers

1. Road design
2. Power generation and distribution
3. Water management
4. Extreme event effect on infrastructure
5. Fire safe communities and buildings
6. Water and sanitation infrastructure
7. Transit and mobility especially during extreme events
8. Building design for extreme events
9. Risk assessments especially for managed retreats



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Key issues for all of us

1. Work together to make change
2. Where and how to focus our limited resources
3. Finding funding
4. Educating the community so it supports change
5. Understand our new context
6. Apply that understanding to our decision making
7. Coping with failure, especially if it becomes a tragedy
8. Educating city employees
9. Educating new graduates
10. Coping with feeling overwhelmed or frustrated with the problem

11. Finding our hope



The National Guard Capt. Martha Nigrelle/Texas Military Department, Public domain, via Wikimedia Commons

How should we strategize for this?

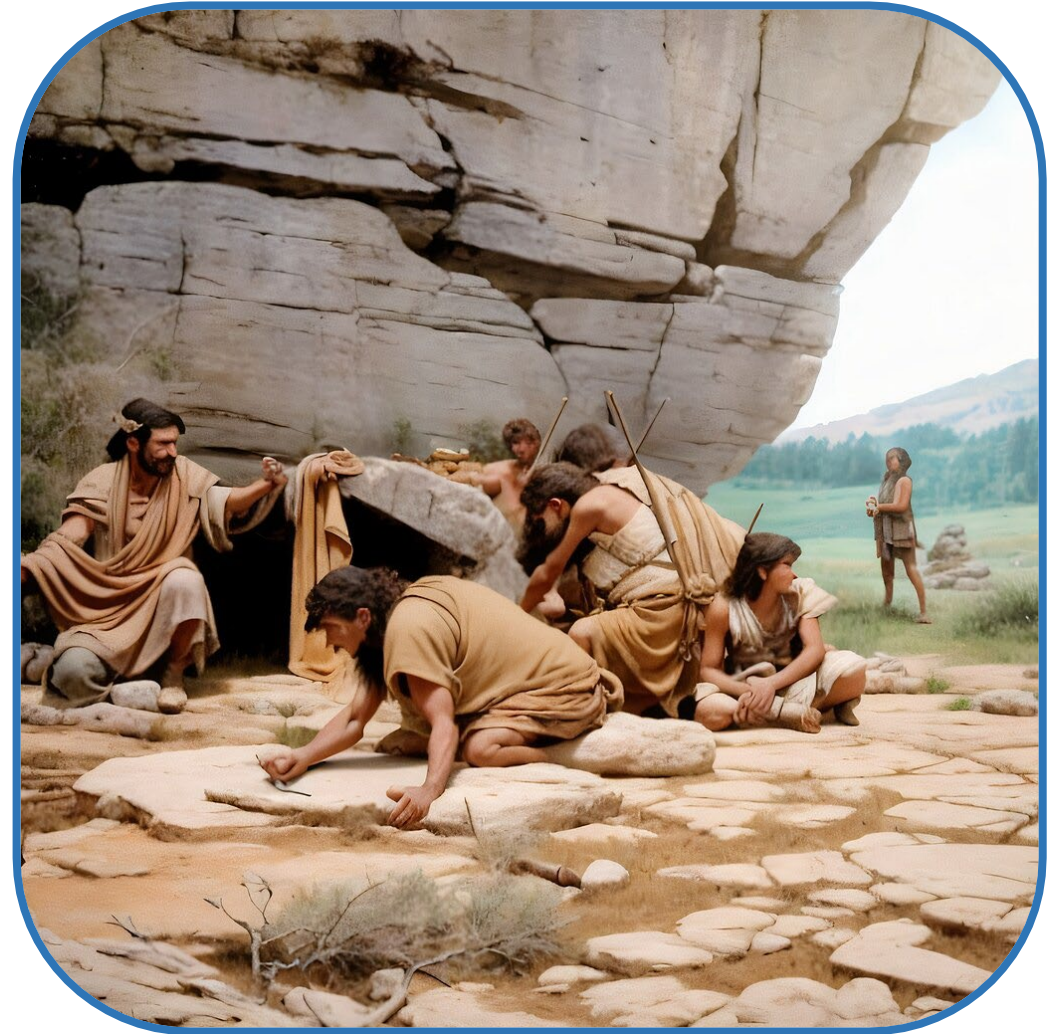
1. Examine our new reality
 - What do we know about it
 - What don't we know
2. Plan a city in this new context
3. Design essential infrastructure in this new context
4. Ensure we are taking this new context into account when making decisions
5. Involve all residents so that they can help and support us
6. Make this conversation normal in our city
7. Find allies and partners
8. Celebrate successes
9. Learn from failures



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Climate instability is a whole new situation for us

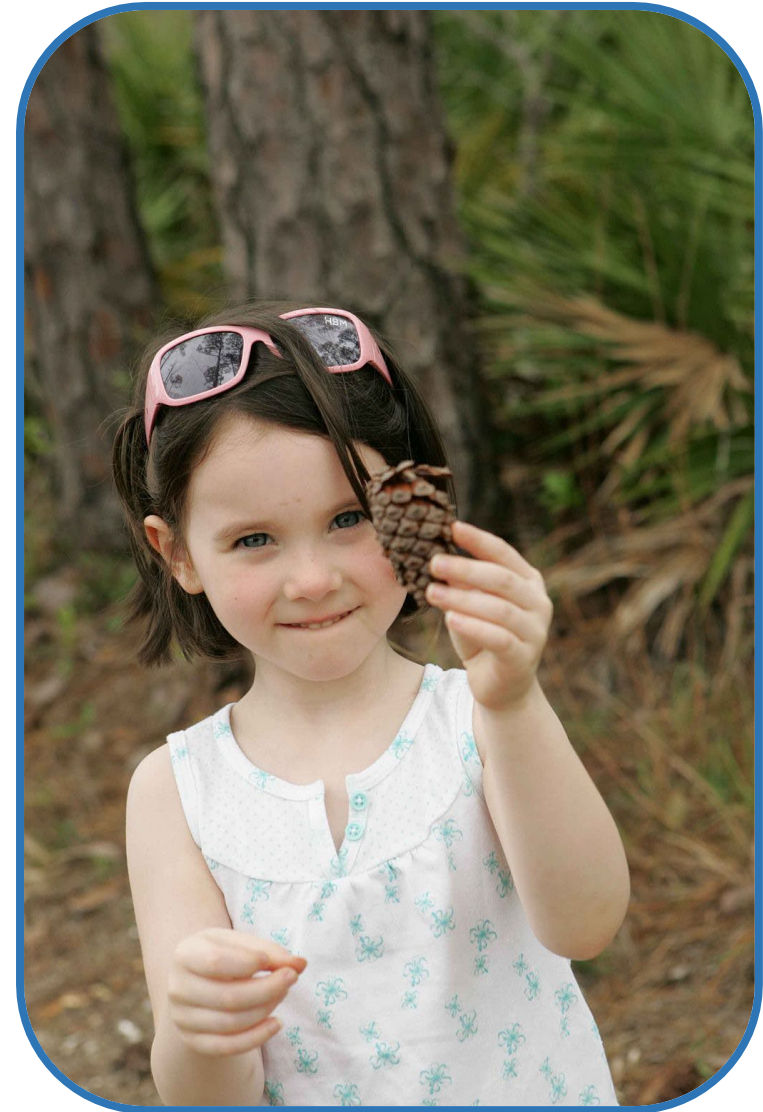
- humans have been around for around 300,000 years.
- in that time the climate has changed over and over again, sometimes quite quickly
- but we have not seen a substantial change since the start of 'civilization' between 5000 and 10,000 years ago
- all the foundations of civilization, the way we think and behave, are built on assumptions challenged by the changed climate



Prototyperspective, CCo, via Wikimedia Commons

This is a moment of transformation.

- it is a moment in which we can choose to progress in terms of equality, care for one another, care for other species, regeneration of ecosystems
- we can choose to move forward in spite of and because of the challenges of the moment
- only if we commit to the work ahead, seize the opportunities, and face the challenges with courage



Hillebrand Steve, U.S. Fish and Wildlife Service, Public domain, via Wikimedia Commons

Our ultimate goals are:

Resilience
Restoration
Regeneration

We have all the tools we need to transform our cities to be more resilient in this new climate of instability.

We lack only imagination and political will



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Hope comes from knowledge followed by right action



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