

Mainstreaming Biodiversity and Climate Change Adaptation

Steve Hounsell





Climate Change and Biodiversity

- “Too easily forgotten is Gaia’s need: we have to leave enough natural ecosystems on land and in the ocean for planetary self-regulation”.
- “The natural world outside of our farms and cities is not there as a decoration but serves to regulate the chemistry and climate of the Earth, and the ecosystems are the organs of Gaia that enable her to maintain our habitable planet.”
 - From: James Lovelock (2009) The Vanishing Face of Gaia

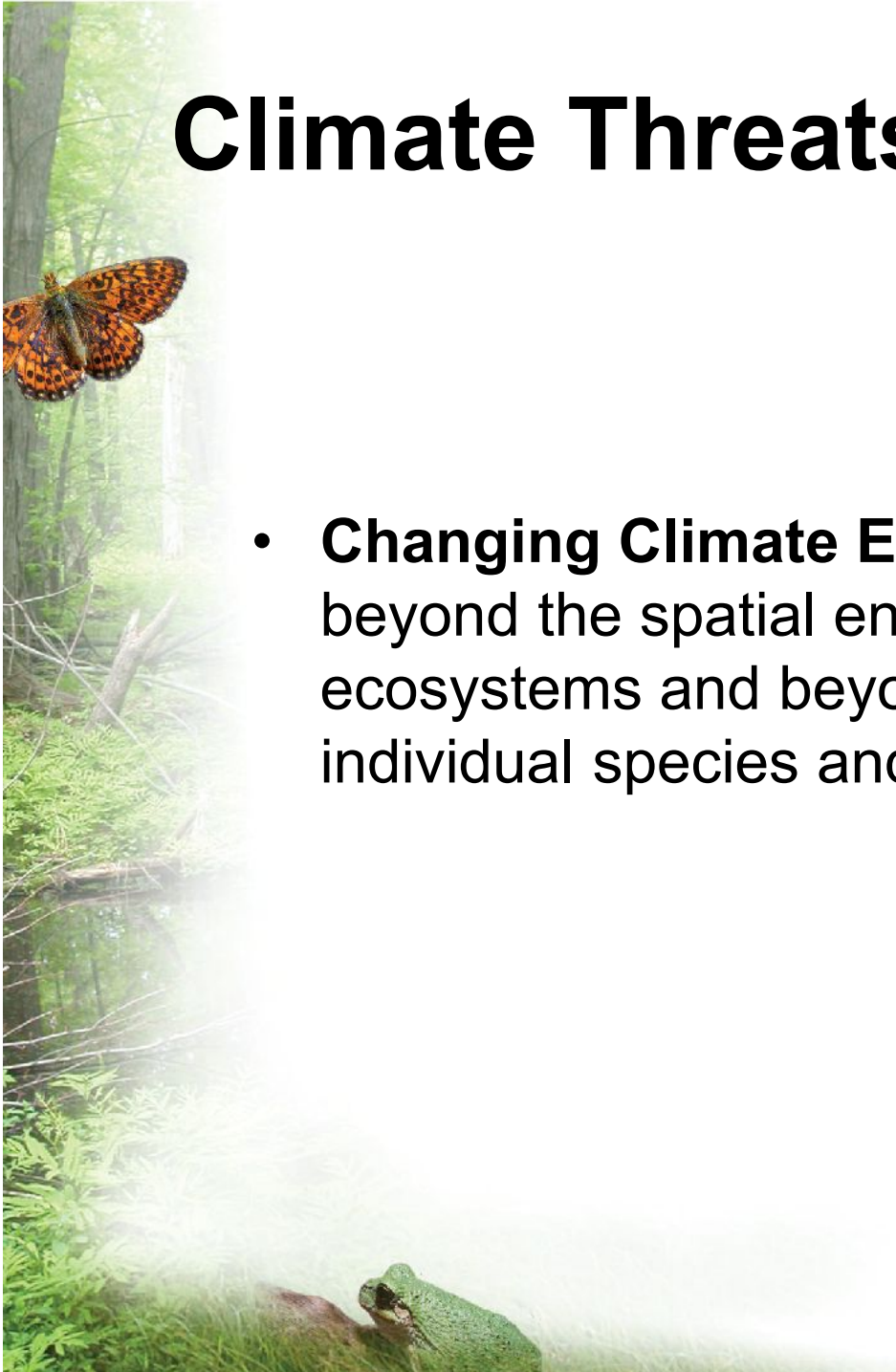


Climate Change and Biodiversity

- *For the good of the planet, the time has come for a major initiative to reunite climate change mitigation and adaptation efforts with biodiversity conservation and wilderness protection.*
 - From: THE CHAIRMAN AND EXECUTIVE COMMITTEE OF WILD9: THE 9TH WORLD WILDERNESS CONGRESS, Nov. 13, 2009

Climate Threats to Biodiversity

- **Changing Climate Envelopes** - rapidly shifting beyond the spatial envelopes of existing regional ecosystems and beyond the tolerance limits of individual species and entire biotic communities.



Bioclimatic Envelope ecoregion 6E (present)



- From: McKenney et al. 2010. CCRR-16. MNR.

Migration of Climatic Conditions for ecoregion 6E (2041-2070)



- From: McKenney et al. 2010. CCRR-16. MNR.

Migration of Climatic Conditions for ecoregion 6E (2071-2100)



- From: McKenney et al. 2010. CCRR-16. MNR.

Migration of Climatic Conditions for ecoregion 3E (2071-2100)



- From: McKenney et al. 2010. CCRR-16. MNR.

Migration of Climatic Conditions for ecoregion 3W (2071-2100)



- From: McKenney et al. 2010. CCRR-16. MNR.

A vertical photograph of a forest scene. In the upper left, a butterfly with orange and black wings is perched on a tree trunk. In the lower right, a green frog is visible on a rock. The background shows a dense forest with green foliage and a stream.

More Climate Threats

- **Altered Disturbance Regimes** (insect, disease, drought, fire, extreme storm events, and floods) - amplifying in intensity, scale and geographic scope.
- **Exotic Invasive Species and Eruptive Native Species** – rapid northward expansions with the removal of “thermal barriers” causing significant ecological and economic impacts.

Biodiversity at Risk

- Canada's arctic ecosystems are most vulnerable with cascading adverse effects at all levels of the food chain, as summer sea ice changes character and recedes.
- Northern forest ecosystems also vulnerable to climate change and will likely undergo major transformation.
- Southern settled landscapes, already stressed from fragmentation, will be further stressed by climate change.



A vertical photograph of a forest scene. On the left side, a butterfly with orange and black wings is perched on a tree trunk. At the bottom of the image, a green frog is visible. The background shows a dense forest with tall trees and green foliage.

Biodiversity at Risk: Northern Forested Ecosystems

- Forested ecosystems, and the economies which depend upon those systems, are highly vulnerable to:
 - Rapidly changing “climate envelopes”;
 - More frequent and intensifying disturbance regimes, including rapid spread of exotic invasive species.
- **Impacts:** Reduced forest health and increased risk of forest community collapse *with immense socioeconomic consequences.*

A vertical photograph of a forest scene. In the upper left, a butterfly with orange and black wings is perched on a tree trunk. In the lower right, a green frog is visible on a log. The background is a dense forest with sunlight filtering through the trees.

Biodiversity at Risk: Human-dominated Settled Landscapes

- Fragmented landscapes are highly vulnerable to changing climates.
- Protected areas will no longer perform the function for which they were intended.
- Species at risk, habitat specialists, species with poor natural dispersal capabilities will be the losers.
- Ecosystem services, including flood attenuation, will be reduced as ecosystem health and integrity is degraded, with cascading adverse effects to human health.



Adaptation Solutions

- **Undertake Vulnerability Assessments**
 - What are the relative vulnerabilities of keystone species, economically important species and species at risk to changing climatic regimes?
 - See: “A Practitioners Guide to Climate Change Adaptation in Ontario’s Ecosystems”. OMNR 2011



Adaptation Imperatives: Northern Forested Ecosystems

- Restoration or reforestation efforts must factor in future climatic conditions. Are we planting species which can cope and thrive in the projected *future* climate?
- Consider (carefully) assisted migration for economically important species or SAR.
- Enhanced management response for:
 - more frequent and intense disturbance regimes;
 - Exotic invasive and eruptive native species.

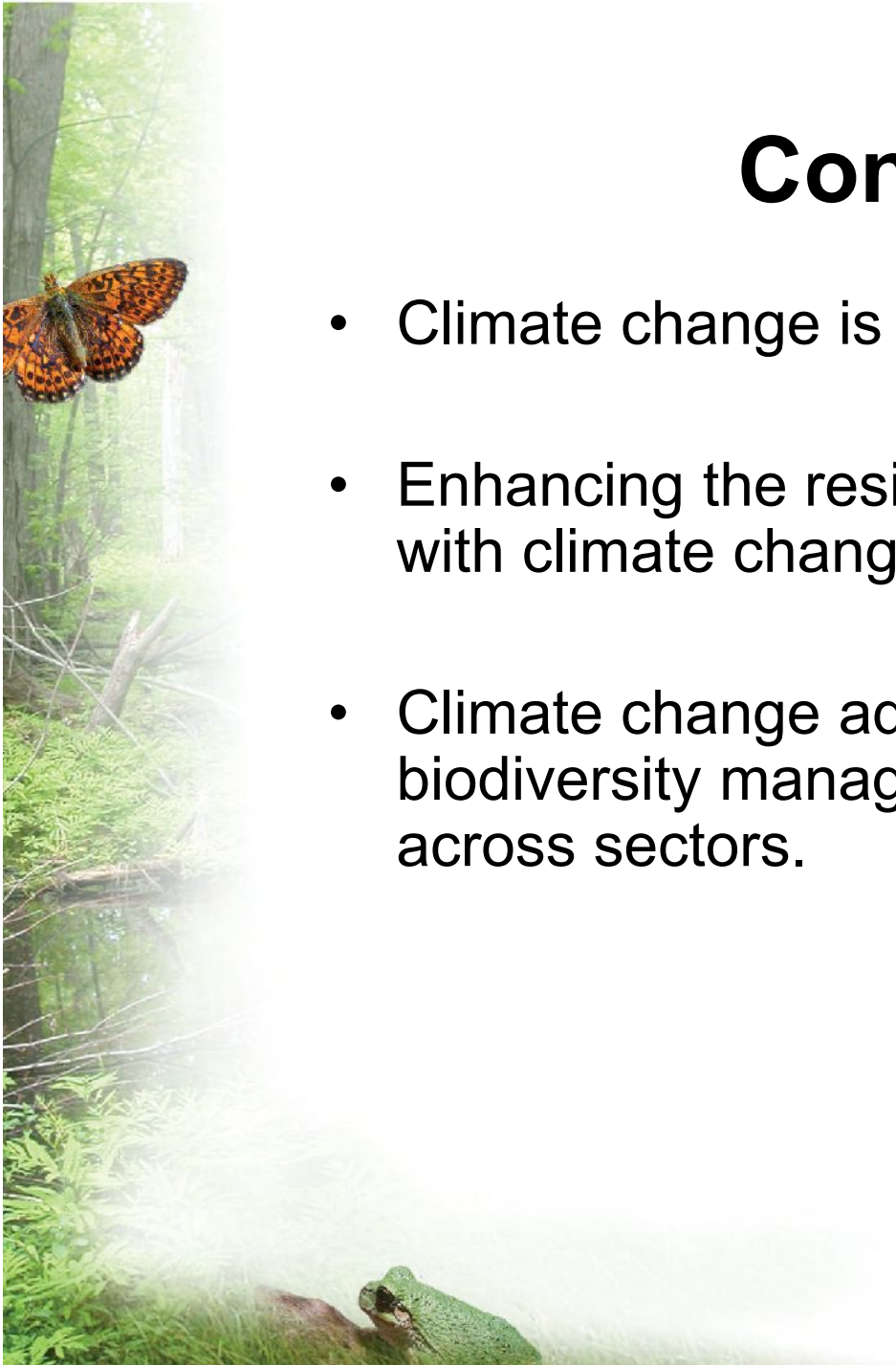
A vertical strip on the left side of the slide shows a forest scene. At the top, a butterfly with orange and black wings is perched on a tree trunk. Below it, a stream flows through a lush green forest. At the bottom, a green frog is sitting on a rock in the foreground.

Adaptation Imperatives Human-dominated Landscapes

- Reconnecting the fragmented landscape, through the establishment, protection and restoration of robust “natural heritage systems”.
- Identification and protection of “climate refugia”, as a part of protected areas management.

Conclusions

- Climate change is here and its effects will increase.
- Enhancing the resilience of ecosystems to cope with climate change is an imperative.
- Climate change adaptation must be factored into biodiversity management plans and mainstreamed across sectors.



Questions?

