

Get Out the Map: Is there a route towards a social license to operate for gene drives?

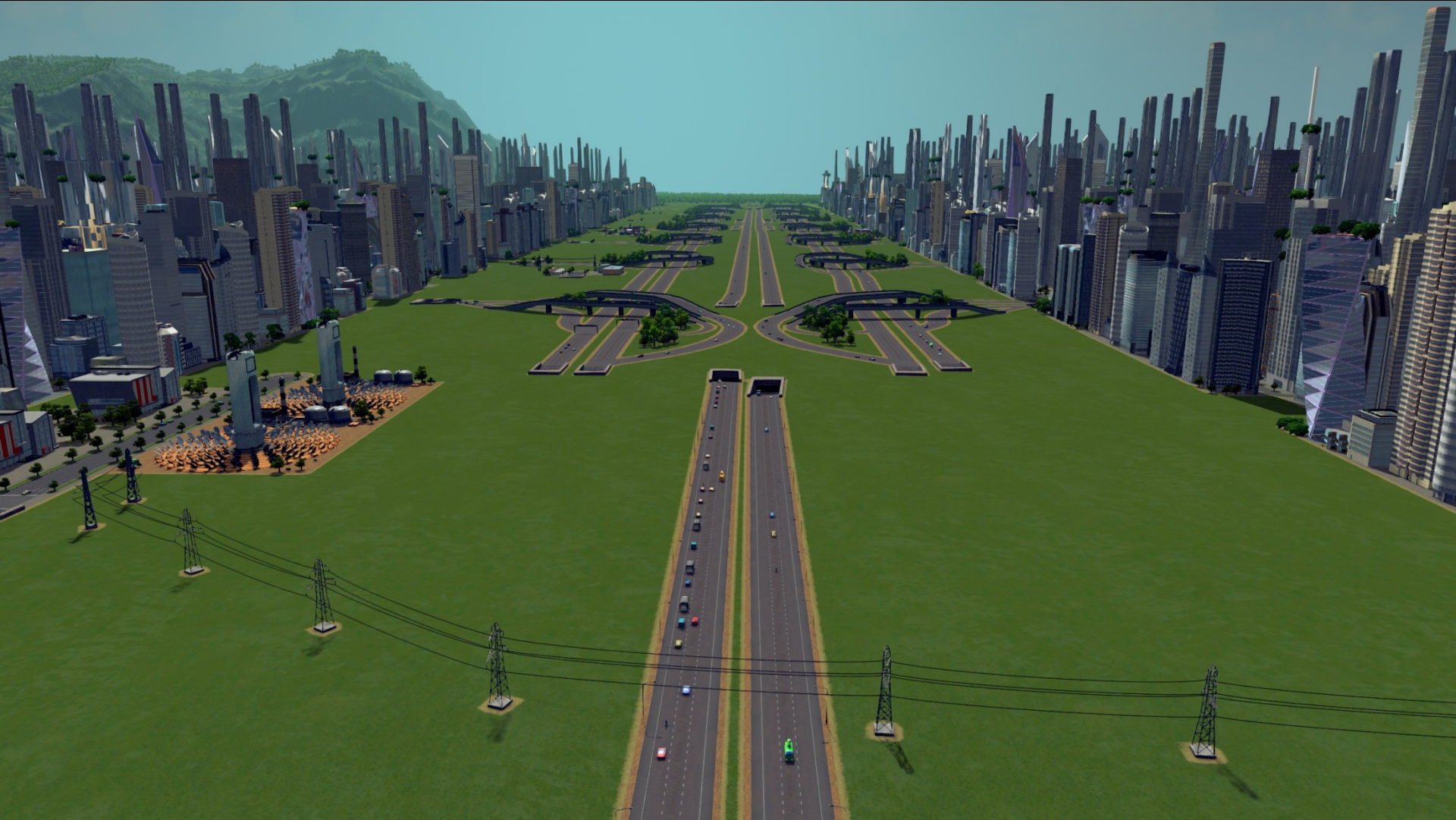


# The story...

- Cultural/Ethical/Philosophical considerations
- Novel ecosystems and value
- Tragedy of the commons
- Issues of justice and regulations
- Potential roadmap











# Cultural/Ethical/Philosophical Considerations

- We need to recognize, understand and respect cultural connections to nature
- Ethic of Species (Sandler, 2012)
  - Because humans have the power to cause mass extinctions, substantially modify existing species, and create novel species
- Instrumental (economic) vs Intrinsic Value
  - Intrinsic still has an anthropocentric view
  - Falling tree in the forest
- Just because a species has value does it need to be treated the same way as another species?

“The highest that we can attain to is not Knowledge, but Sympathy with Intelligence.” (Thoreau, 1862)

# Novel Ecosystems and Value

- Does the manner in which we create/manage ecosystems matter?
- How does the technology impact our value assessments on those ecosystems?
- How will we come to terms with greater complexity in how we manage ecosystems?
- Hubris that may accompany an increased confidence in our ability to appropriately intervene in novel ecosystems?
- Shifting cultural values about natural heritage?

# Tragedy of the Commons

- Tipping point of acceptance
  - Multiple release sites or a moving application that doesn't recognize borders
  - Decision of a single stakeholder can affect another (i.e. individual landholders for ag examples or countries sharing an ecosystem)
  - Critical mass of acceptance makes objections futile because the actions of those who agreed makes perceived/actual risks of those who object unavoidable
- Hybrid consent/justice contract
  - At all levels of government (local, state, national, and international)



# Issues of Justice

- Sustainability justice (Stumpf et al. 2015)
  - Simultaneously address the claims of living humans, future generations and nature while also staying consistent with the core values of sustainability
- Must consider all three as potential claim holders and **give reasons for either including or excluding one group over the other**
- How do you sustain a certain set of conditions in which future generations will be able to fulfill their obligations
  - What are those obligations?
  - What might those future claims be?

# National Laws, International Treaties and Obligations

- Local/State/National
- The Convention on Biological Diversity
- The Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (ENMOD) entered into force on October 5th 1978

# Social license to operate

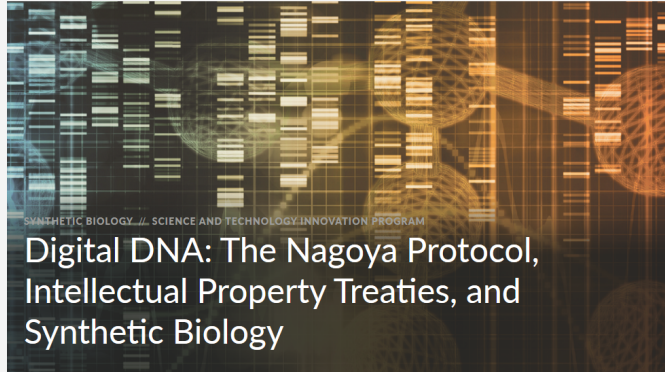
- Impossible to gain acceptance from all affected parties
- Need to decide whether we want “legal” authority or whether we believe we need a social license to operate
- Legal approval  $\neq$  Social license to operate



# Principles to establish as social license to operate?

1. Acknowledge that gene drive applications can have multiple objectives and stakeholders
2. Recognize the importance of intergenerational planning and institutions for long-term adaptive governance
3. Recognize that culture is dynamic, and this dynamism shapes resource use and ecological philosophy and ethics
4. Tailor interventions to the social-ecological context
5. Devise and draw upon novel, diverse, and nested institutional frameworks
6. Prioritize the importance of partnerships and relation building for collective agreement
7. Incorporate the distinct rights and responsibilities of all parties
8. Respect and incorporate different worldviews and knowledge systems into ecological risk assessment, valuation, monitoring and decision making

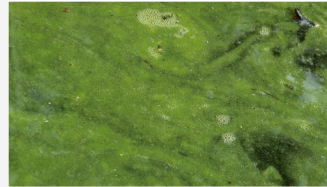
[adapted from “Principles of biocultural approaches to conservation” Gavin et al. 2015]



## Digital DNA: The Nagoya Protocol, Intellectual Property Treaties, and Synthetic Biology

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