



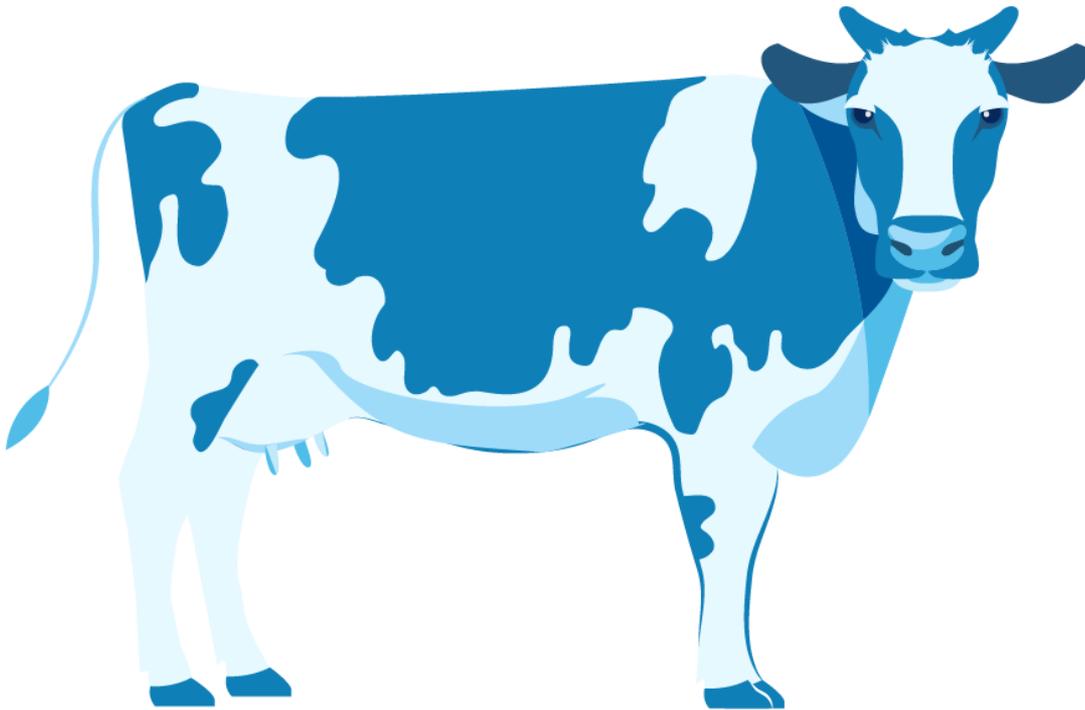
Genetic Frontiers in Conservation

An Assessment of Synthetic Biology and Biodiversity
Conservation

Kent H. Redford, Chair

IUCN Task Force on Synthetic Biology and Biodiversity Conservation

When we think of cows



We think of
products from
cows:

- Leather
- Meat
- Milk

What if we could get 'cow products'without the cows?

Products from cow genes inserted into algae – with the application of the tools of synthetic biology:



Synthetic biology and Agriculture



1. Transform type of photosynthesis
2. Create new domestic crops
3. Increase disease resistance
4. Improve animal production

Synthetic biology changes in human health



1. Develop new drugs
2. Improve drug effectiveness
3. Improved nutrition
4. New vaccines!

But there had been little consideration of synthetic biology and biodiversity

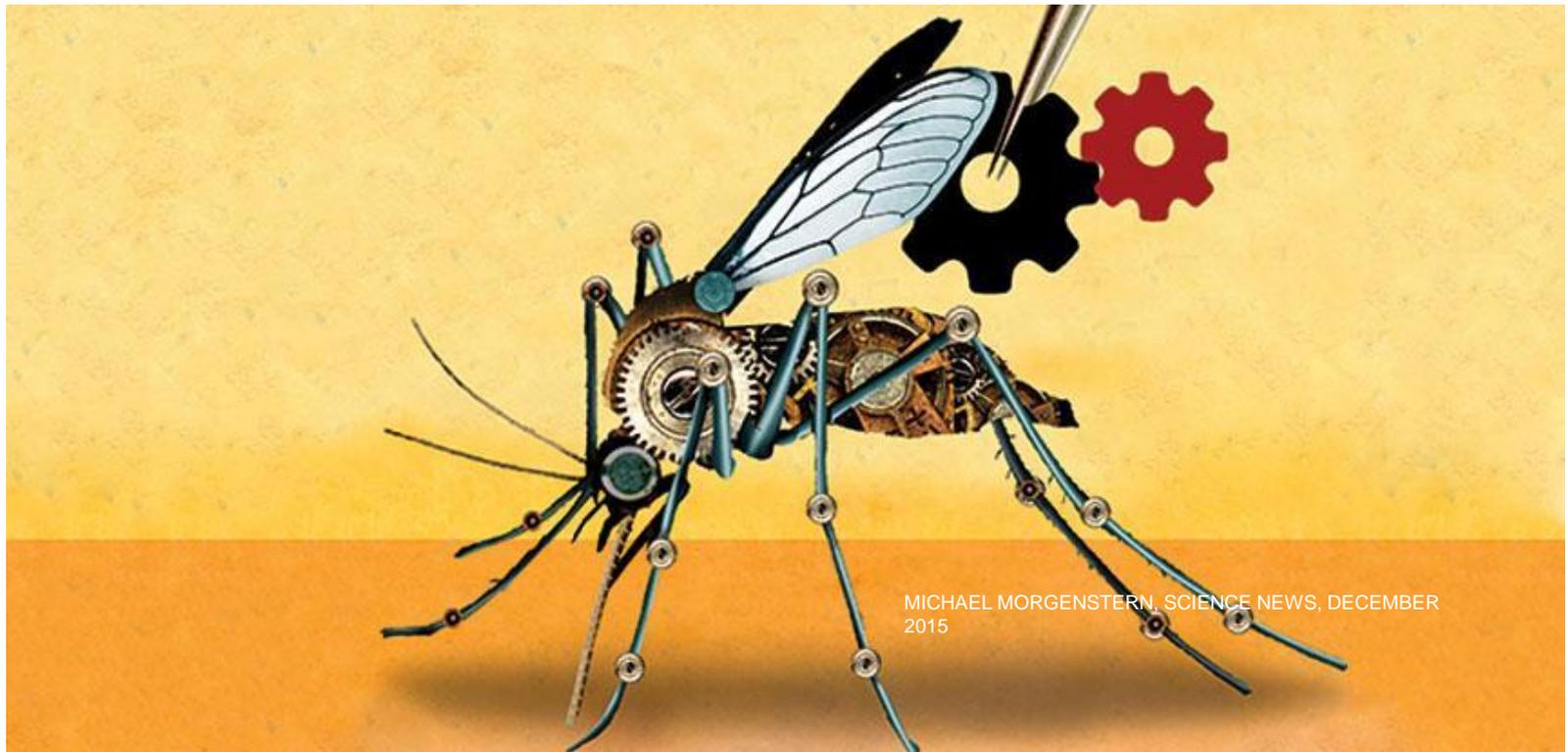


IUCN World Conservation Congress 2016

Resolution 086 – “Development of IUCN policy in biodiversity conservation and synthetic biology....”

- to *undertake an assessment*...
- to *examine* the organisms, components and products resulting from synthetic biology techniques and the impacts of their production and use, which may be beneficial or detrimental to the conservation and sustainable use of biological diversity and associated social, economic, cultural and ethical considerations; and
- to *assess the implications* of gene drive and related techniques and their potential impacts on the conservation and sustainable use of biological diversity as well as equitable sharing of benefits arising from genetic resources

Gene Drive was one of the synthetic biology applications considered



IUCN Task Force

- ❖ IUCN Commission members and Secretariat
- ❖ Natural, social sciences
- ❖ Governments, NGOs, Academia, Business
- ❖ Indigenous Peoples
- ❖ Africa, North America, Latin America, Europe, Asia, Australasia



IUCN Technical Subgroup

Lead authors of Assessment

- ❖ IUCN Commission, Secretariat & Specialist Group members
- ❖ Natural, social sciences
- ❖ Governments, NGOs, Academia, Business
- ❖ Indigenous Peoples
- ❖ Africa, North America, Latin America, Europe, Asia, Australasia



Technical Assessment – May 2019

Genetics Frontiers for
Conservation:

An Assessment of Synthetic
Biology and Biodiversity
Conservation

EVIDENCE-BASED

220+ pages text
English, Spanish, French
Online appendices



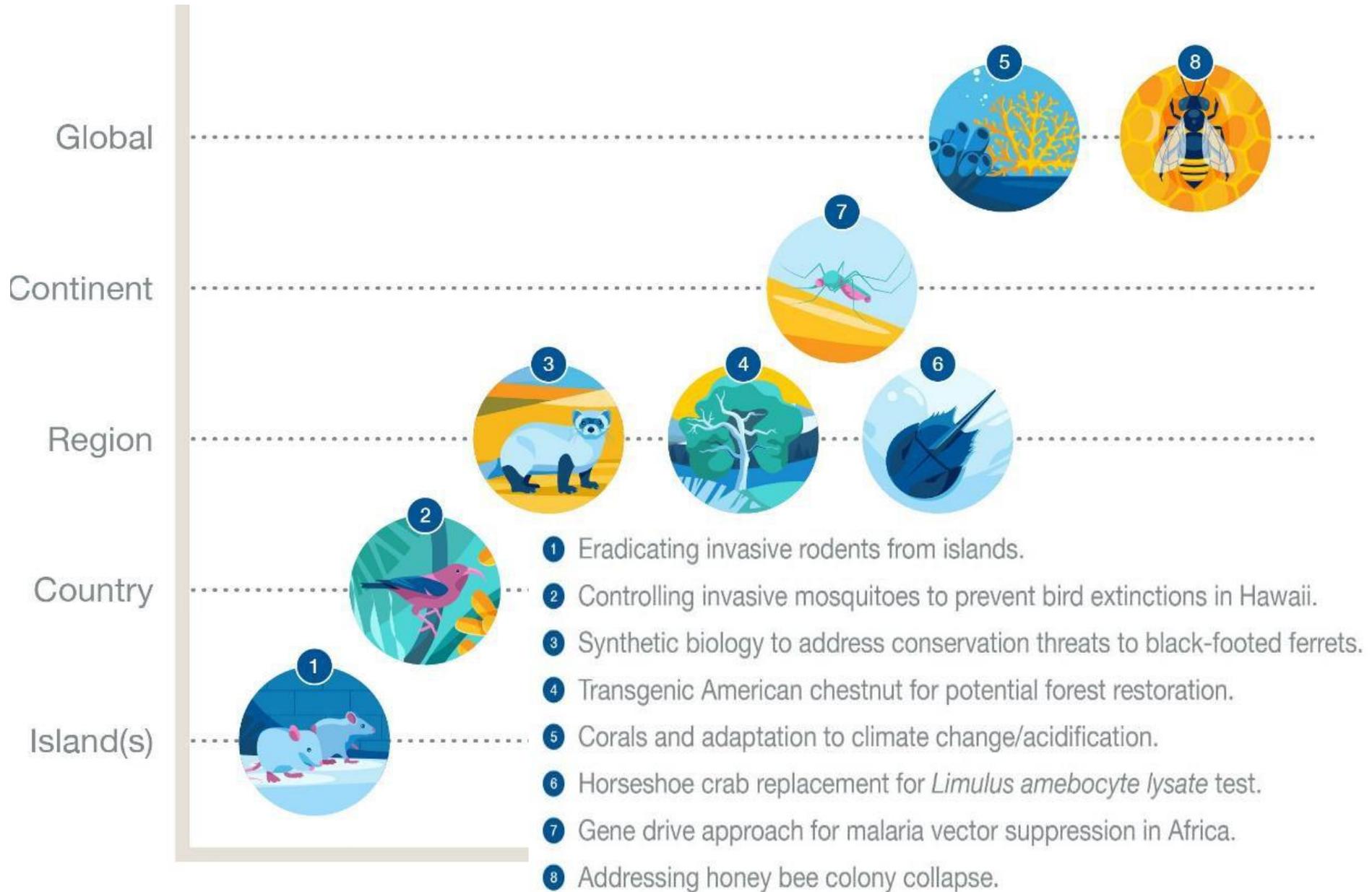
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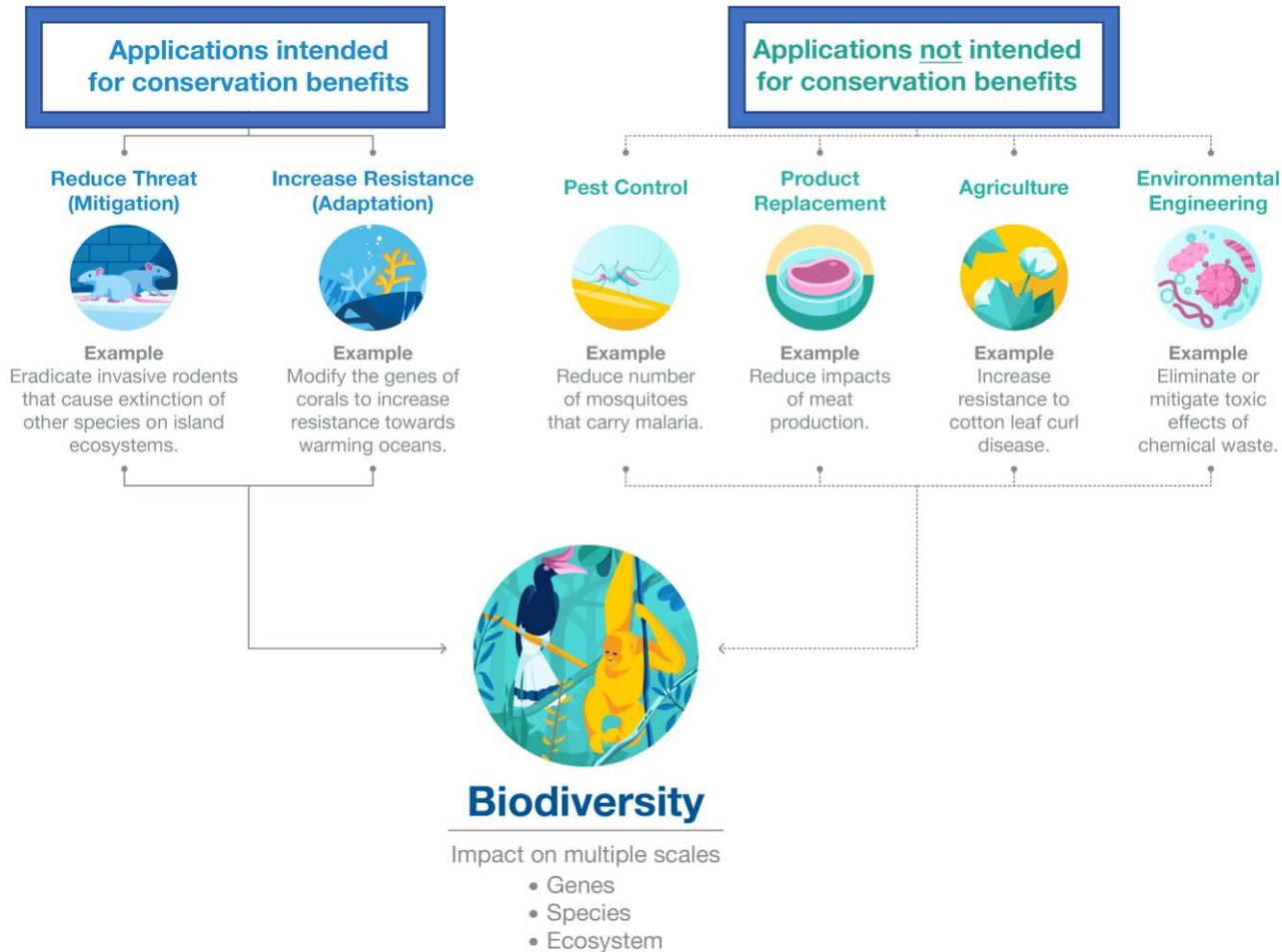
INTERNATIONAL UNION FOR CONSERVATION OF NATURE

Proposed applications of synthetic biology for conservation



Ways that synthetic biology can affect conservation

Ways that synthetic biology can affect conservation



Key Messages

- 1 Conservation implications: *Important implications*
- 2 New tools: *conservation needs them*
- 3 Rapid growth: *of synbio globally - 5x increase*
- 4 Engineered gene drive: *unproven, great potential plus & minus*
- 5 Beneficial conservation impacts: *possible but untested*
- 6 Detrimental conservation impacts: *possible but untested*
- 7 Values and worldview: *influence development and assessment*
- 8 Indigenous and local communities: *key actors in research and decisions*
- 9 Governance: *existing structures may be challenged*
- 10 Risk assessment: *not what Assessment is - for technology or cases*

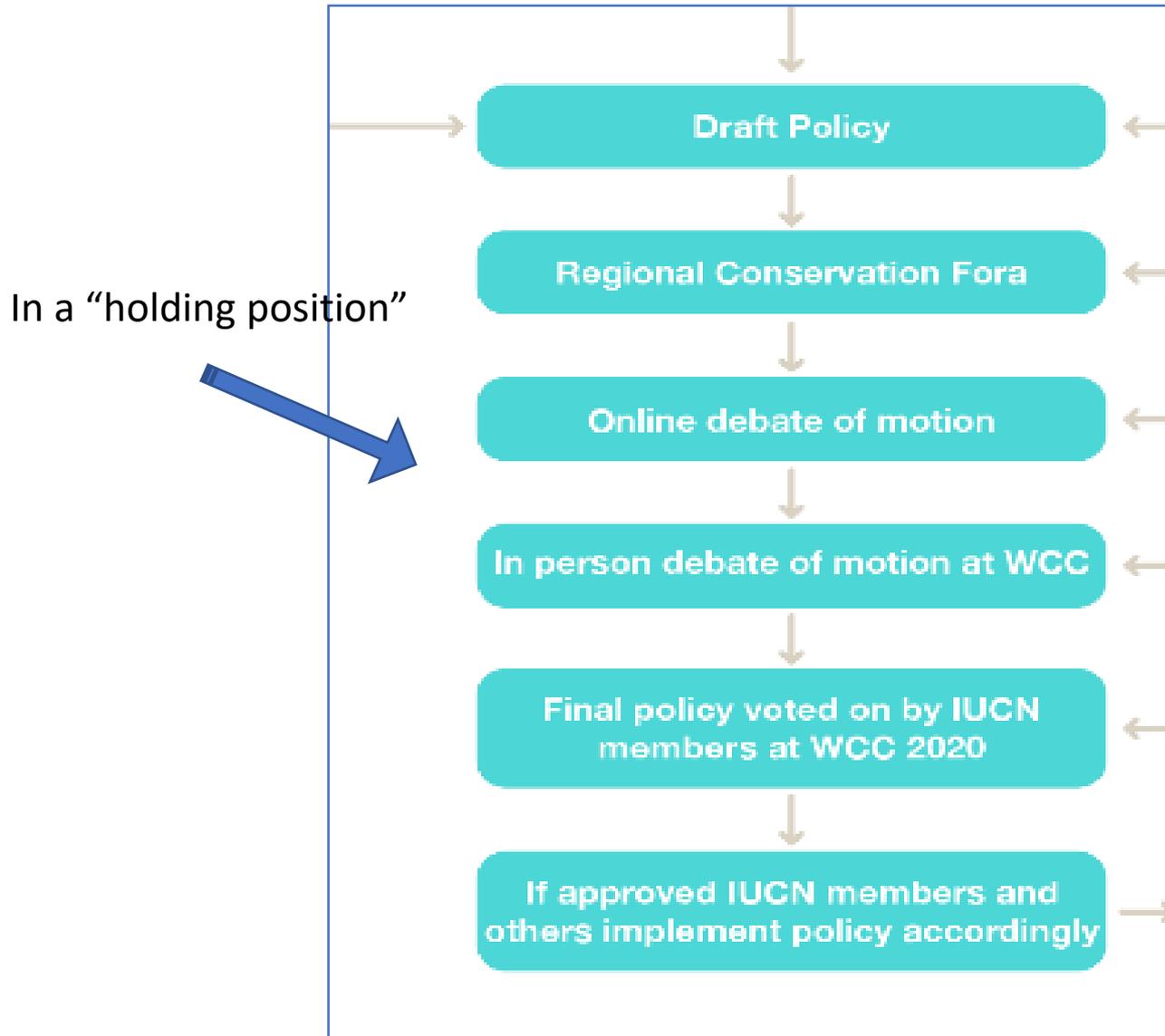


Draft IUCN Principles on the Intersection of Biodiversity Conservation and Synthetic Biology

IV. Key Considerations for applications

- Case-by-case decision-making;
- For applications of synthetic biology intended for conservation goals, evaluation of existing alternatives;
- For applications of synthetic biology intended for purposes other than conservation, steps to ensure that such applications do not threaten biodiversity and its sustainable use;
- Staged assessment of risks and benefits;
- Governance;
- Knowledge gaps and research needs;
- Knowledge transfer and capacity building;
- Potential introduction of moratoria.

Where are we now in the process?





Thank you