

# Carrying Capacity – Limitations for Future Growth



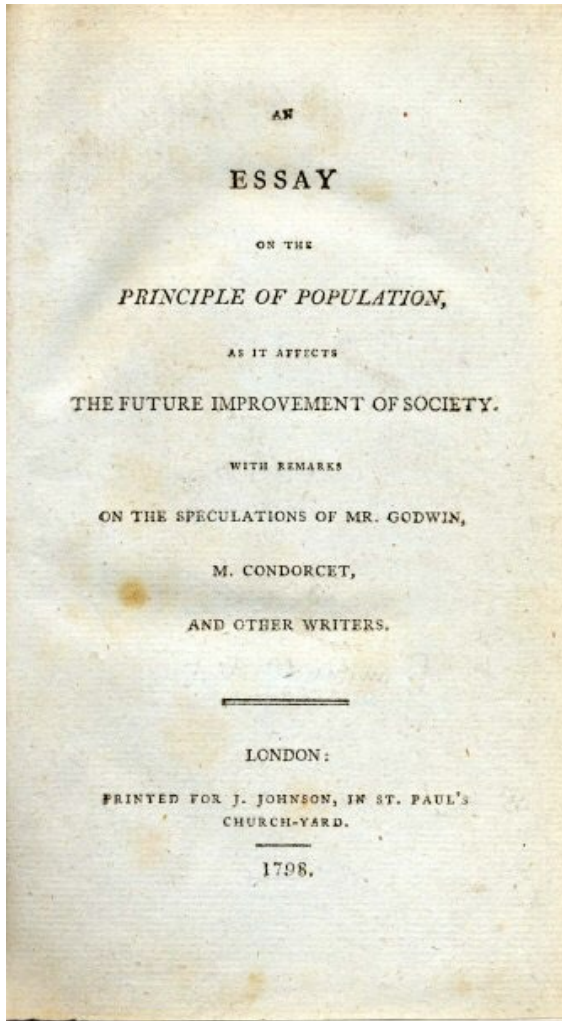
Ramón Filgueira

# Outline

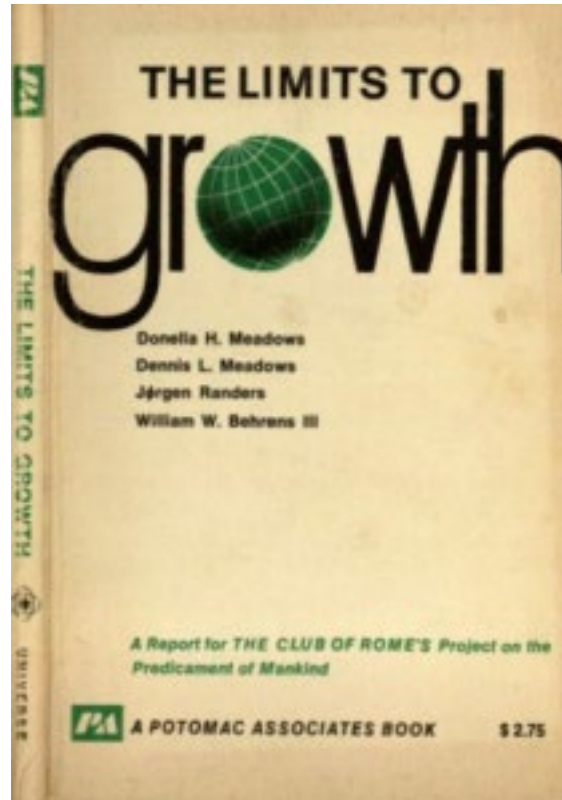
- History and definition of carrying capacity (CC)
- CC as a tool to implement the Ecosystem Approach to Aquaculture
- Defining indicators and thresholds
- Building trust through communication
- Acknowledging the dynamic nature of social-ecological systems
- Take-home messages



# The history of carrying capacity



Thomas Malthus (1798)



Meadows et al. (1972)  
CC in political agenda

## Aquaculture

Yashouv (1963)

Fish ponds/fertilizer

Incze et al. (1981)

Bivalve aquaculture

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Inglis et al. (2000)

Social carrying capacity

Byron et al. (2011)

Stakeholders in CC

# Social perceptions of aquaculture

Canada



<https://www.google.ca/url?sa=i&url=https%3A%2F%2Fwww.ctvnews.ca%2Fcanada%2Fbritish-columbia-court-grants-injunction-to-fish-farm-ending-protests-1.3737045&psig=AOVvaw2QgGjFk4NX-lLqhdNeVs&ust=1635941791004000&source=images&cd=vfe&ved=0CAsQJRxfwoTCPDePanLU-MCFOAAAAAdAAAAABAD>

Chile



<https://www.theguardian.com/environment/2019/aug/30/salmon-farming-in-the-beagle-channel-enters-troubled-waters>

Scotland



<https://donstanford.typepad.com/my-blog/2012/11/stushie-for-scottish-salmon.html>

Ireland

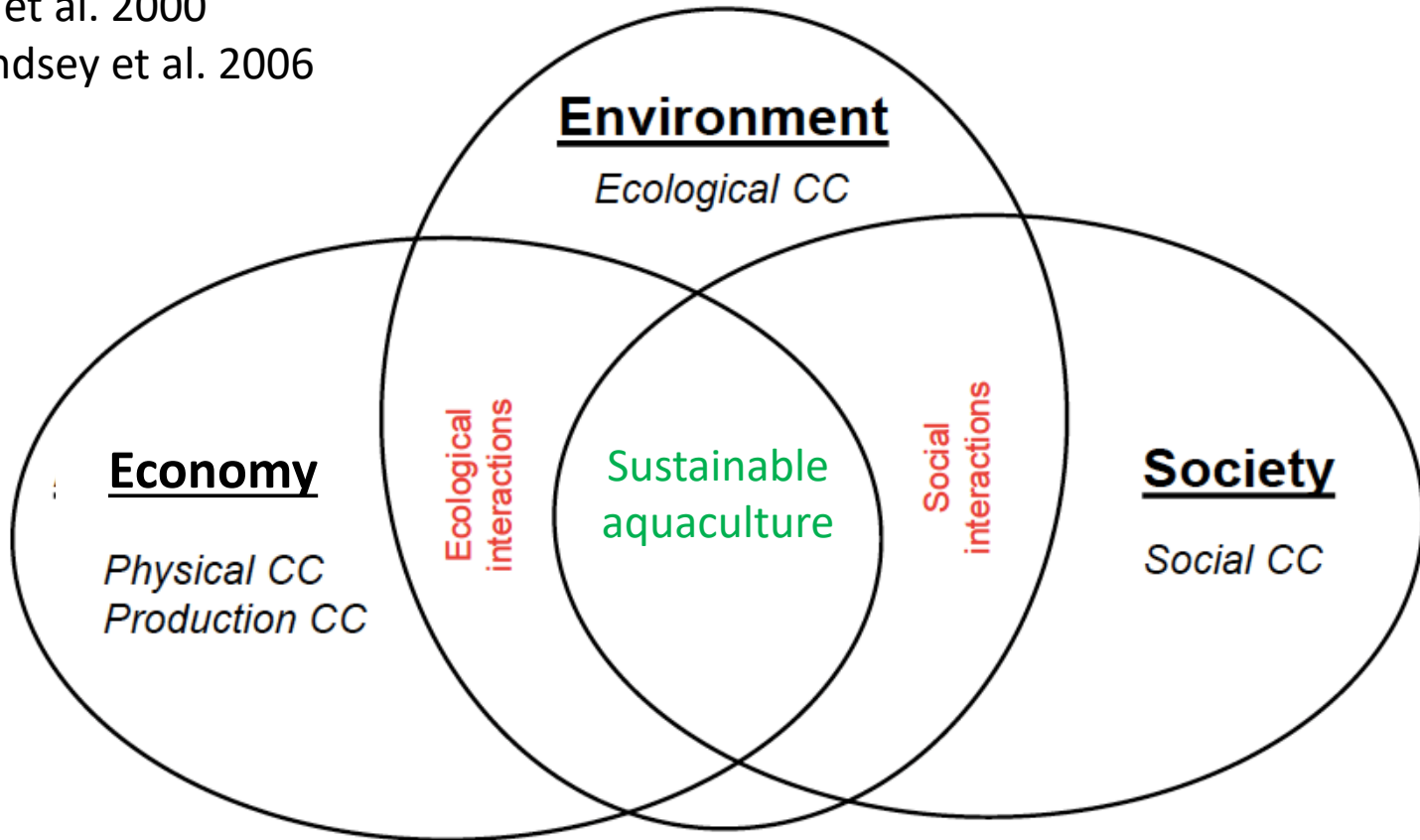


<https://www.irishtimes.com/news/march-over-proposed-100m-aran-islands-salmon-farm-1.1317006>

# The complex definition of carrying capacity

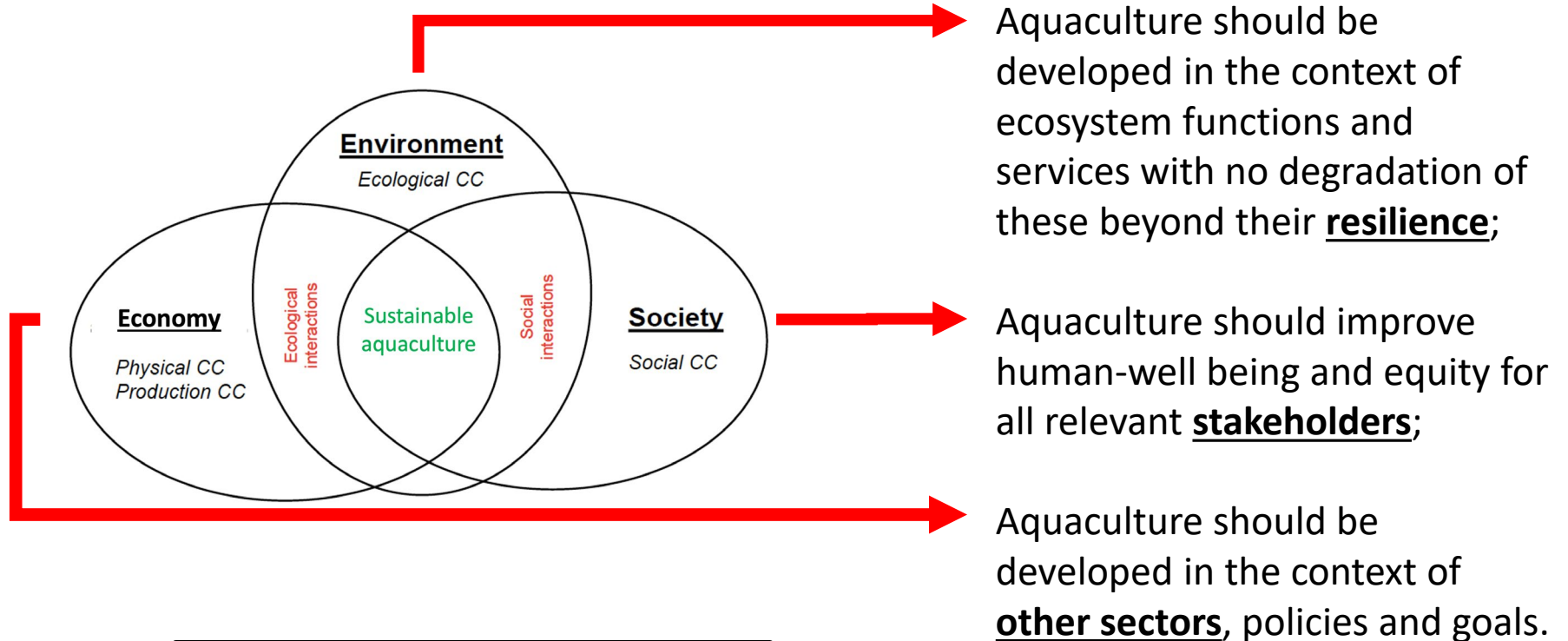
Inglis et al. 2000

Mckindsey et al. 2006



Modified from Ferreira et al. 2013

# Carrying Capacity as a tool to implement the EAA



Scoping priorities and identifying stakeholders

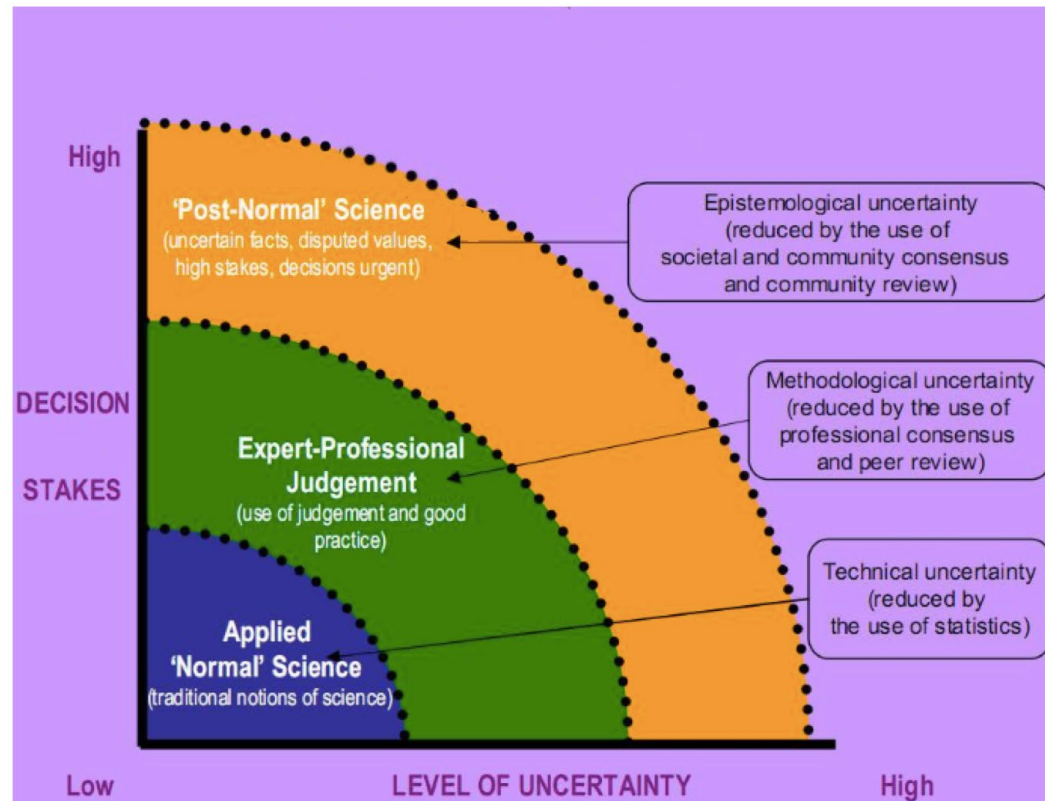
Soto (2008)  
<http://www.fao.org/3/i0339e/i0339e.pdf>

# How to assess CC? Indicators and thresholds

Carrying capacity assessments should focus on selecting as few, important indicators as relevant to the assessment objectives and priorities

Indicators to include should be selected by balancing trade-offs in cost, relevance, reliability, and complexity

Weitzman et al. 2021

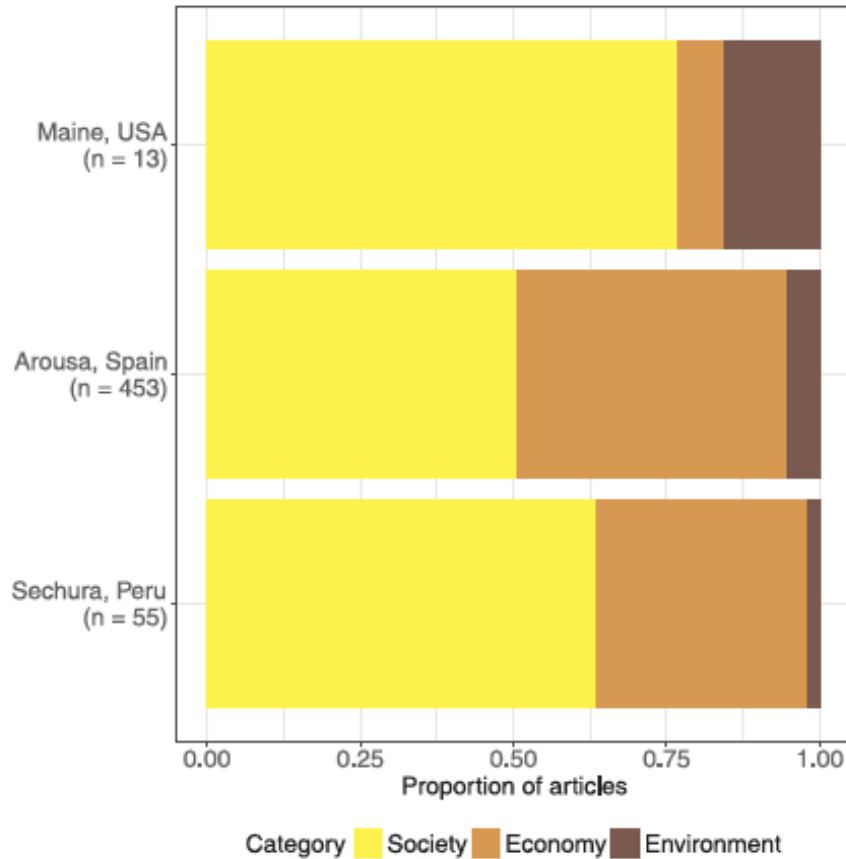


Picture Source: [Shaping Science Policy](#)

Does this complexity reflect our "applied normal science" mindset?

- **Transparency**
- **Communication**
- **Co-production of knowledge**

# The relevance of local settings



Identifying relevant indicators and thresholds

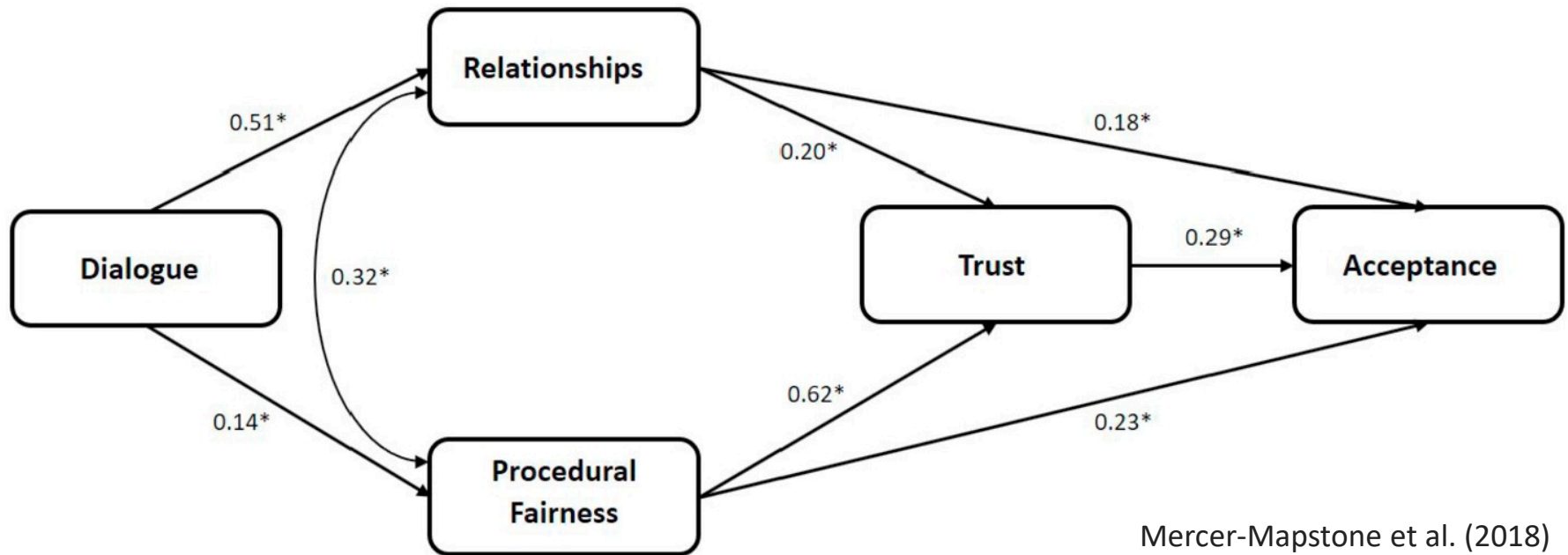
Fig. 2. Proportional distribution of articles per topic category (society, economy, environment), as based on media analysis of newspaper articles. Number of articles per country is given in parenthesis.



# The dynamic nature of social-ecological systems

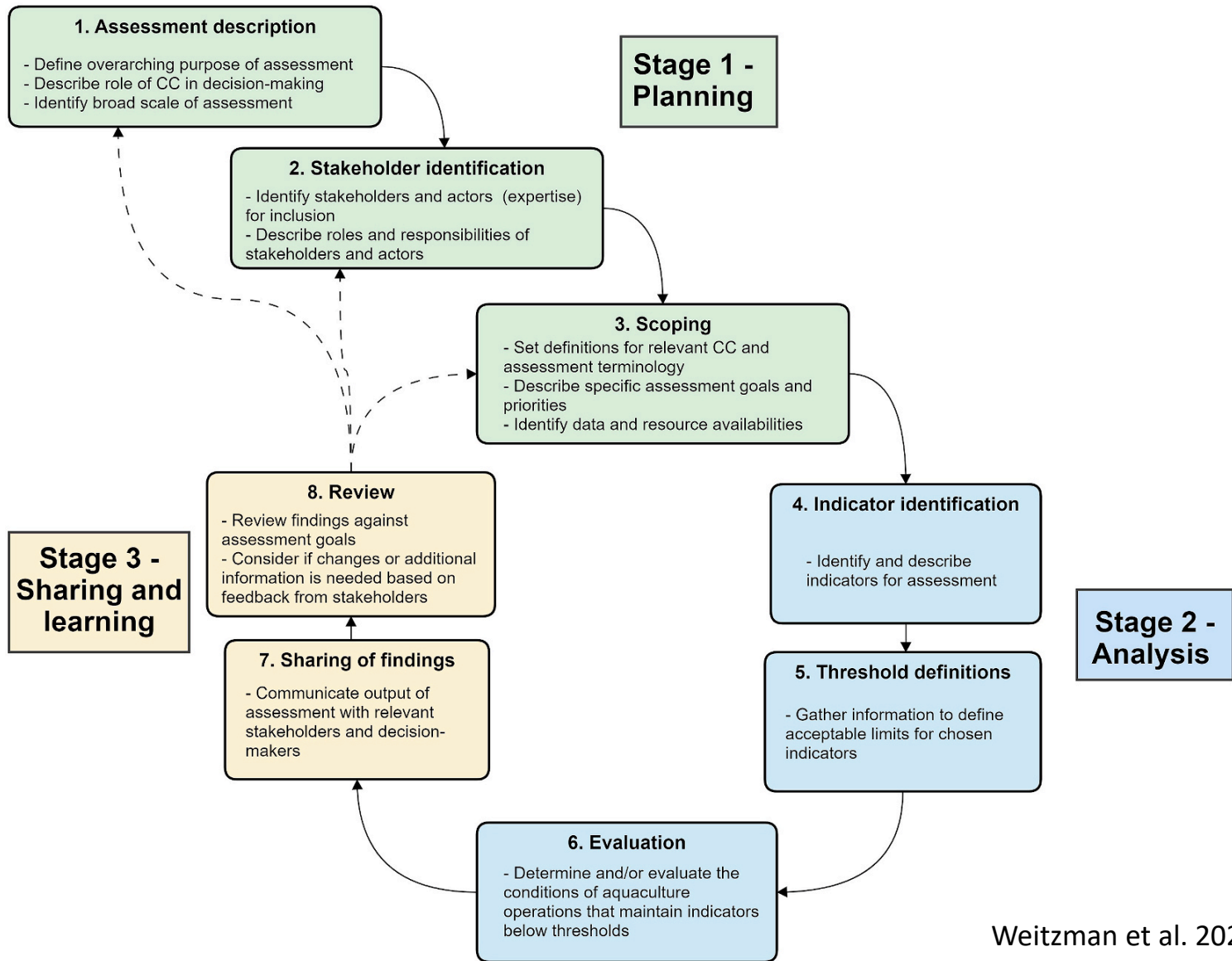


# Transparency, communication and co-production as precursors of trust

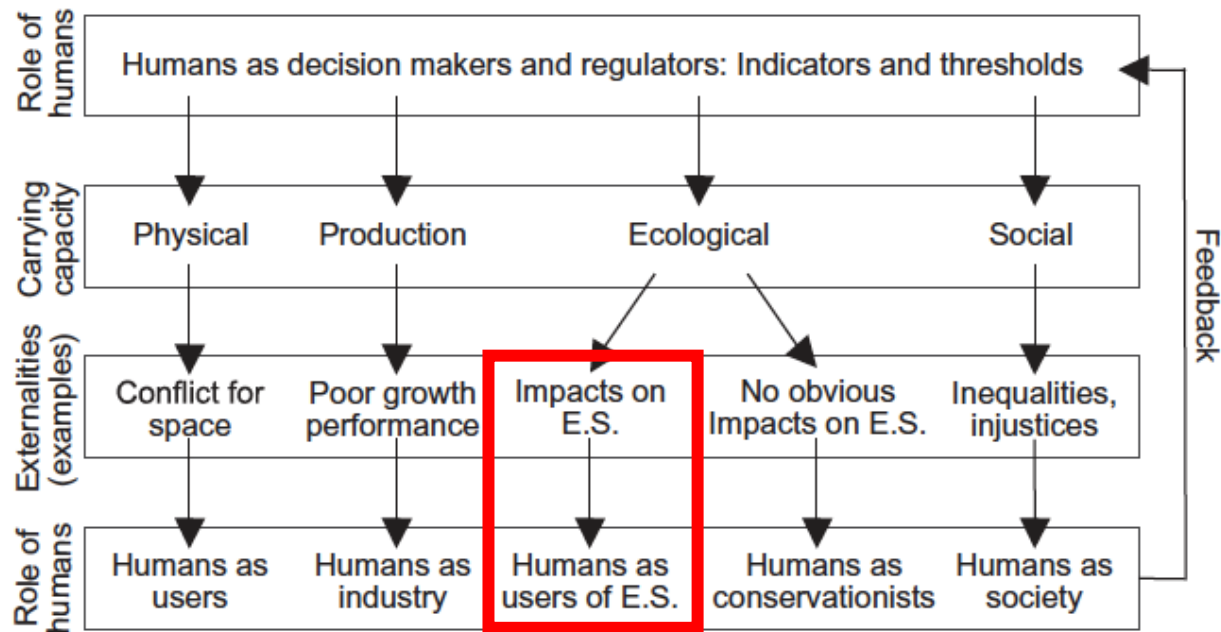


**Sharing information and adapting**

# Carrying Capacity – Limitations for Future Growth?



# Take-home messages (?)



Kluger and Filgueira 2020

The traditional focus on ecological carrying capacity is outdated, let's embrace:

- Holistic carrying capacity as a tool to implement the FAO's EAA
- Uncertainty, and tackle it by co-producing knowledge
- The dynamic nature of social-ecological systems and the relevance of local settings
- Transparency and communication as tools to increase trust, acceptance, and growth

# Acknowledgements



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<https://www.fishfarmingexpert.com.au/2018/05/21/finally-start-to-turn-for-nova-scotia-aquaculture/>

Thanks!

Questions?

<http://www.siv.com.au/our-industry.html>