

# Analytical and policy aspects for the management of UV filters in marine environment

**Rajendra KHANAL, PhD**

Policy Research Institute, Nepal

A think-tank of the Government of Nepal

[rajendra.khanal@gmail.com](mailto:rajendra.khanal@gmail.com)

IWA ACHSW/EESS/CWR ONLINE  
WORKSHOP ON EMERGING  
CONTAMINANTS IN WATER

**SIGN-UP  
LINK**



 21<sup>st</sup> & 22<sup>nd</sup> SEPTEMBER 2021  
9:30AM TO 12:00PM (SINGAPORE TIME)

 [HTTPS://NUS-SG.ZOOM.US/MEETING/REGISTER/TZCSDE6QQDMSGTEWL-MRFQZAWDFDRYIVCPLR](https://nus-sg.zoom.us/join/919876543210)



Department of Civil & Environmental Engineering  
Faculty of Engineering

**Day 1: Sep 21, 2021**

# Threats to Marine Environment

## Climate change

- Acidification – CO<sub>2</sub>
- Sea level/temperature

Global



## Pollution

- Chemicals – **UV filter**
- Nutrient runoff/sedimentation

Global to local



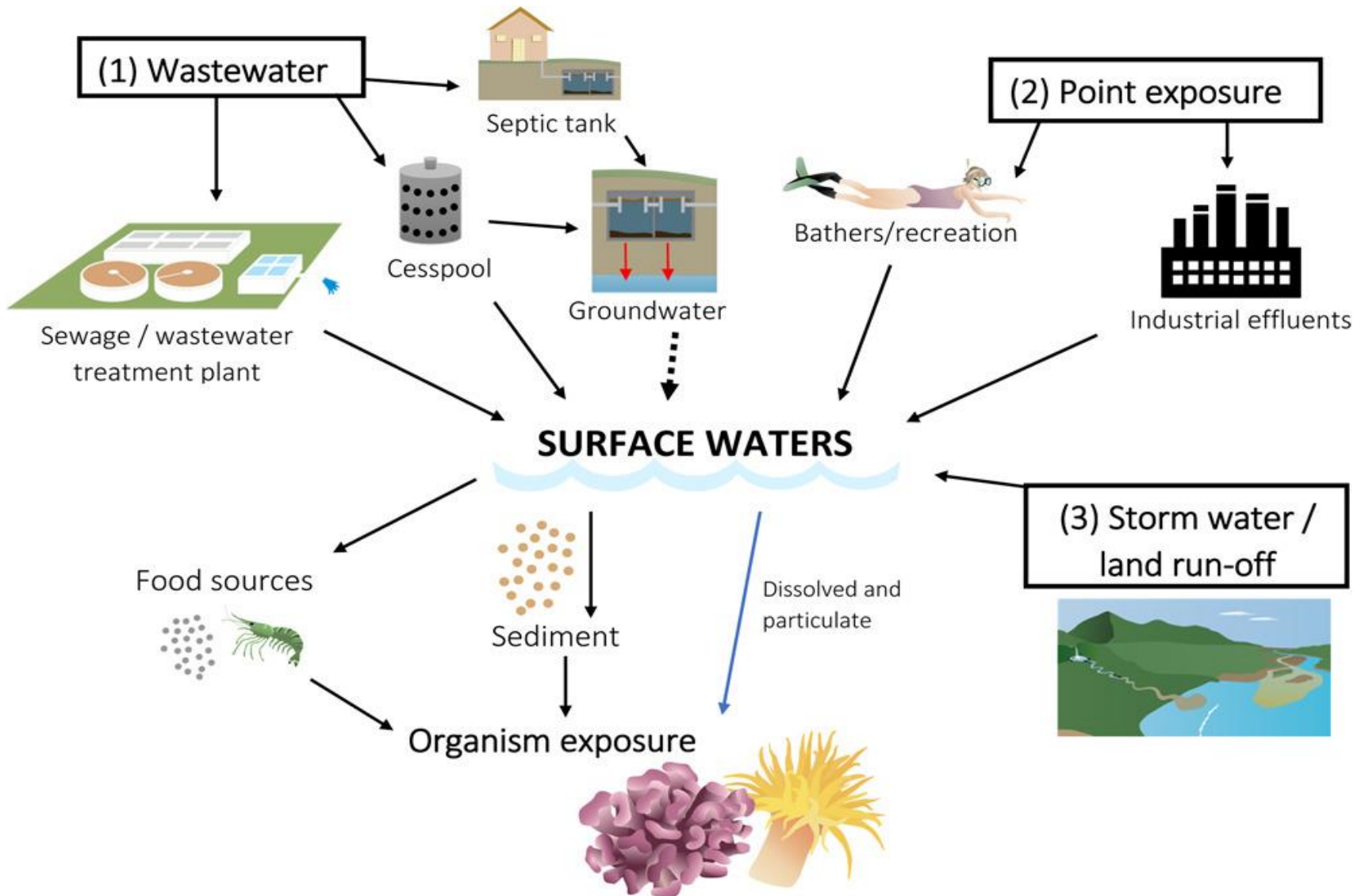
## Others

- Disease, invasive species
- Local stress - tourism, coastal development, anchor, dynamite, (over)fishing, storms

Local



# Source and occurrence of UV filters

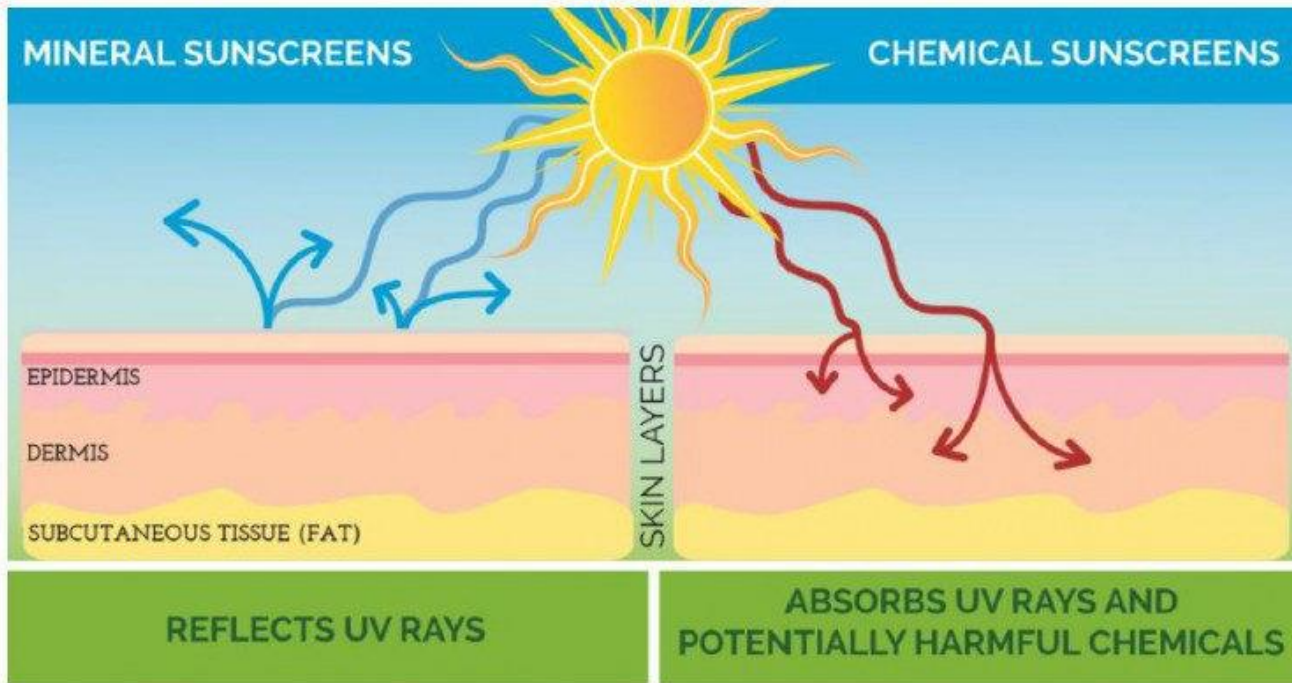


# UV-filters

**GRASE**

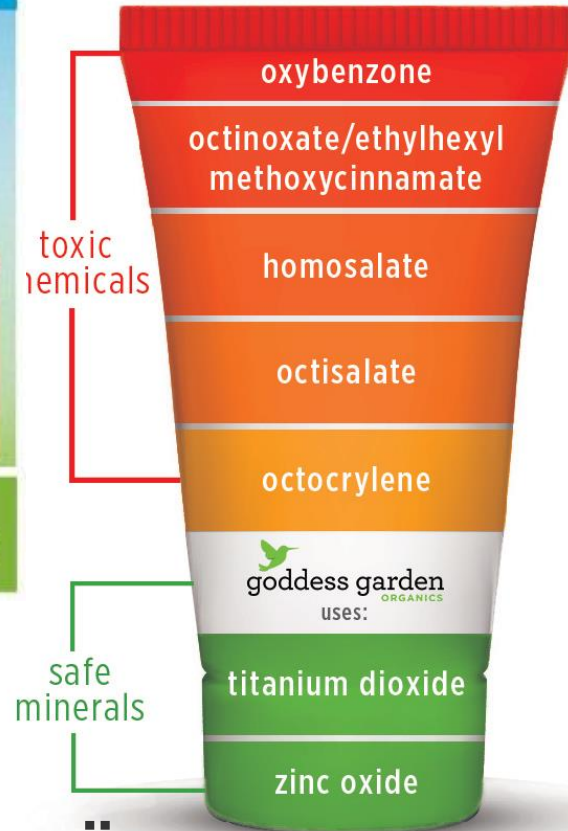
**Not GRASE or**

**Insufficient Info**



## SUNSCREEN TOXICITY RATINGS\*

\*from EWG.org/SkinDeep

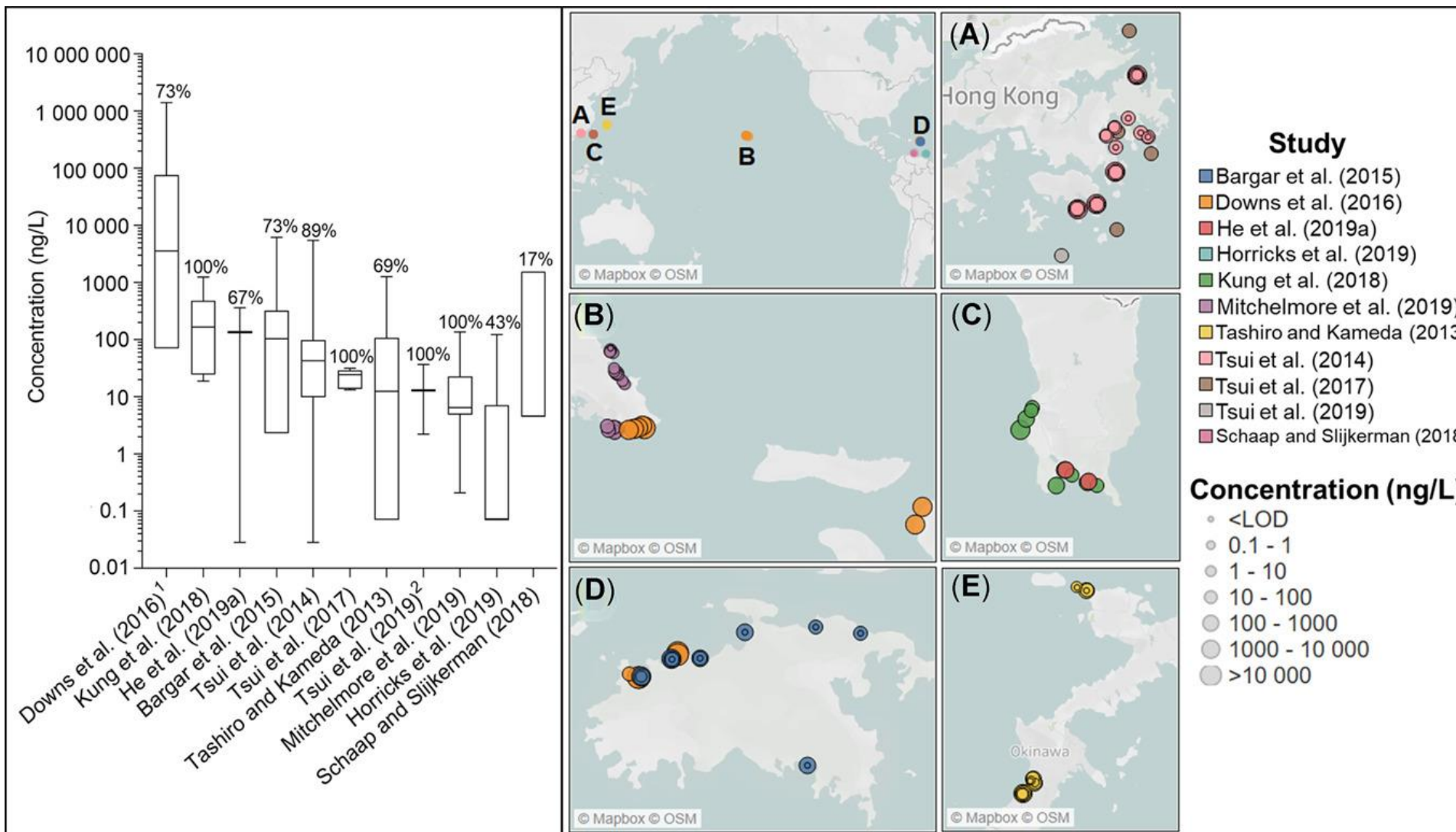


**Oxybenzone and octinoxate - banned - Hawaii**

**Republic of Palau, Bonaire island, Hawaii and Mexico**



# Spatial concentration of oxybenzone near-reef water column



(A) Hong Kong, (B) Hawaii, (C) Taiwan, (D) US Virgin Islands, and (E) Japan  
 Mitchelmore, et al., 2021. Environmental toxicology and chemistry, 40(4), 967-988.

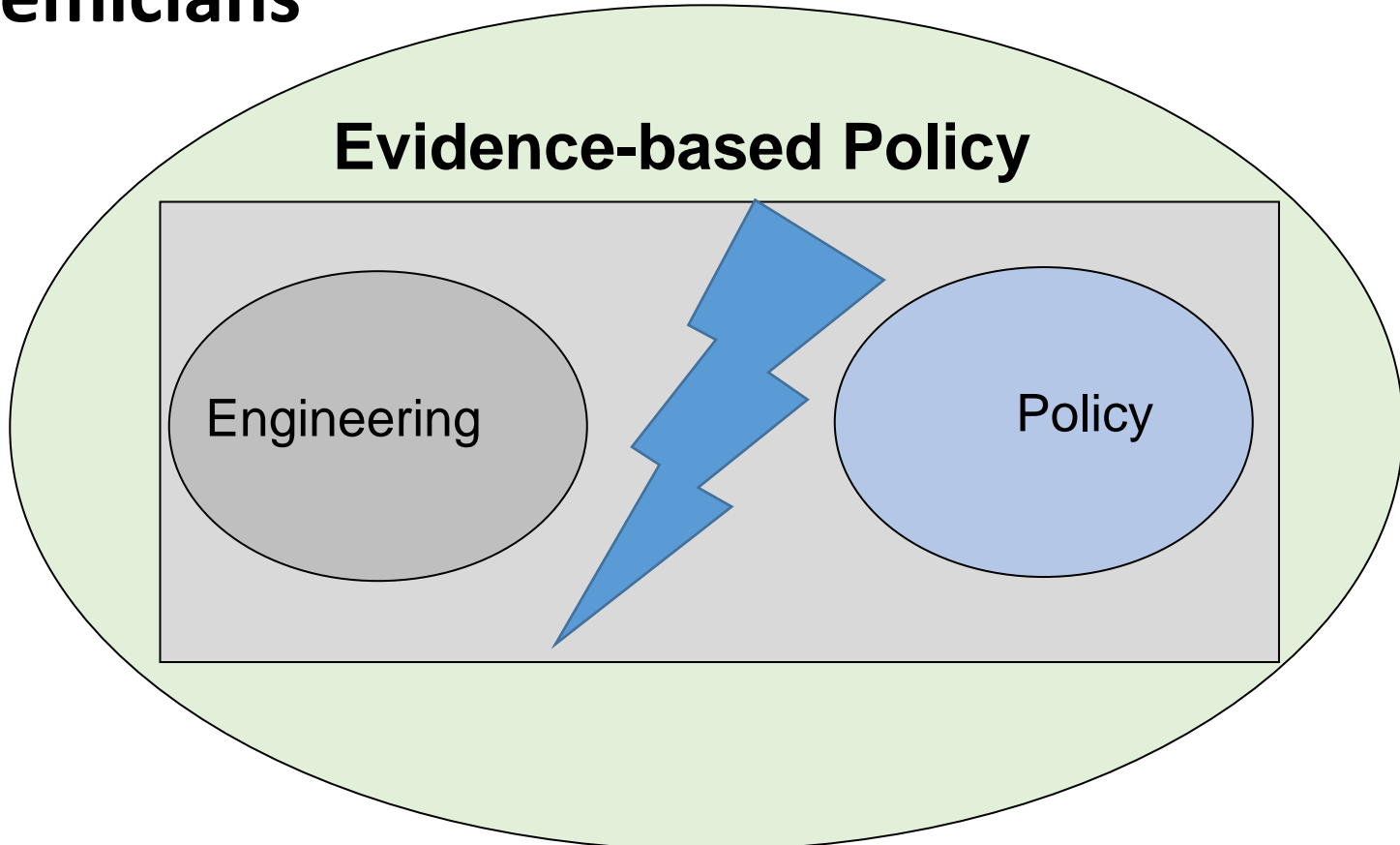
# Policy synthesis

**Analytical**

**Researchers,  
academicians**

**Policy**

**Lawmakers,  
bureaucrats**



## Hawaii UV ban

bans the sale, offer for sale, or distribution in the State of any sunscreen that contains avobenzone or octocrylene, or both, without a prescription issued by a licensed healthcare provider.

- **oxybenzone or octinoxate, or both – Jan 1, 2021**
- **avobenzone or octocrylene, or both – Jan 1, 2023**
- **homosalate, octocrylene, and octisalate – More review needed**

### Opposition -

- Hawaii Medical Association, Hawaii Skin Cancer Coalitions
- Manufacturers and retailers of sunscreen products
- Consumer Healthcare Products Association, the Hawaii Food and Industry Association, and the American Chemistry Council

# Hawaii UV ban

## Against- Hawaii Food Industry Association

It's important to understand that it's **nearly impossible to enforce a State specific ban of products that can be bought online**, including skin protecting moisturizers and sunscreens. Functionally this law will just make it harder for Hawaii consumers to buy products they use to prevent skin cancer, and force them to buy from online sellers rather than local stores

Given that **this ban would not do anything to alleviate the known primary causes of coral, bleaching**, and that it would try to **deprive people of products they use to prevent possibly life, threatening skin cancers**, we do not think the potential benefit is worth the risk and we ask that this measure be held.

## For – Hawai'i State Youth Commission (ages 14 – 24)

- a strong precedent and reaffirming Hawai'i's commitment **to protecting and preserving the environment.**
- Octocrylene, one of the three chemicals accounted for in this new amendment, poses **a grave threat to marine ecosystems.**
- **Bioaccumulation**, impair developmental gene expression adverse reproductive effects, **Carcinogens** and hormone disrupters



# Key questions in policy synthesis

Background – **Why policy is necessary?**

Environment - **What are the cause, effect?**

Target – Local, Global, Aquatic vs human health

Time ASAP (long/short term ) - **When?**

Partners / Stakeholders – **Who?**

Expected impact – **Social, Economical, Environmental**

**Water pollution occurs? What rate? Source of pollutants?**

Socio-economic factors? Land-based pollution? Fishing or agriculture?

**How is water quality / biodiversity changing?**

**Impact of climate change?**

**Aquatic vs human health .... etc**

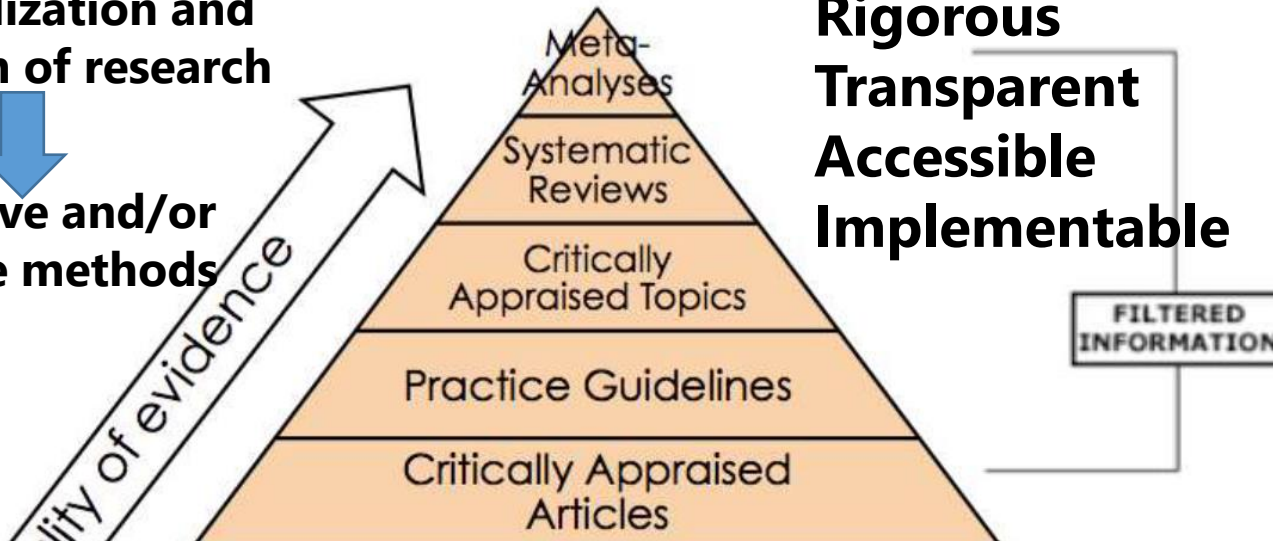
**HOW?**

# Policy synthesis

Contextualization and integration of research



Quantitative and/or qualitative methods

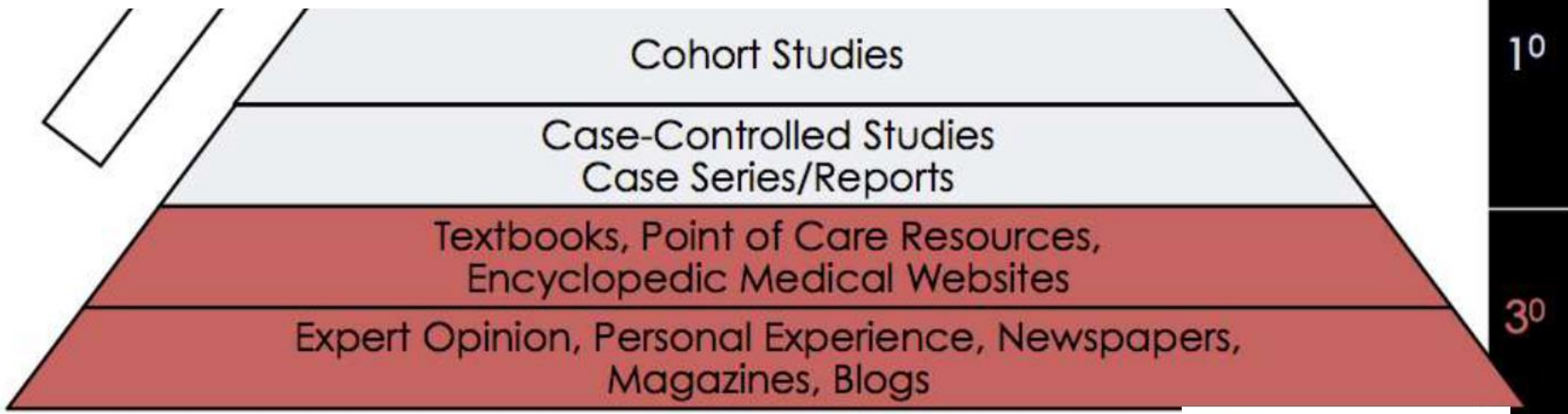


Explore

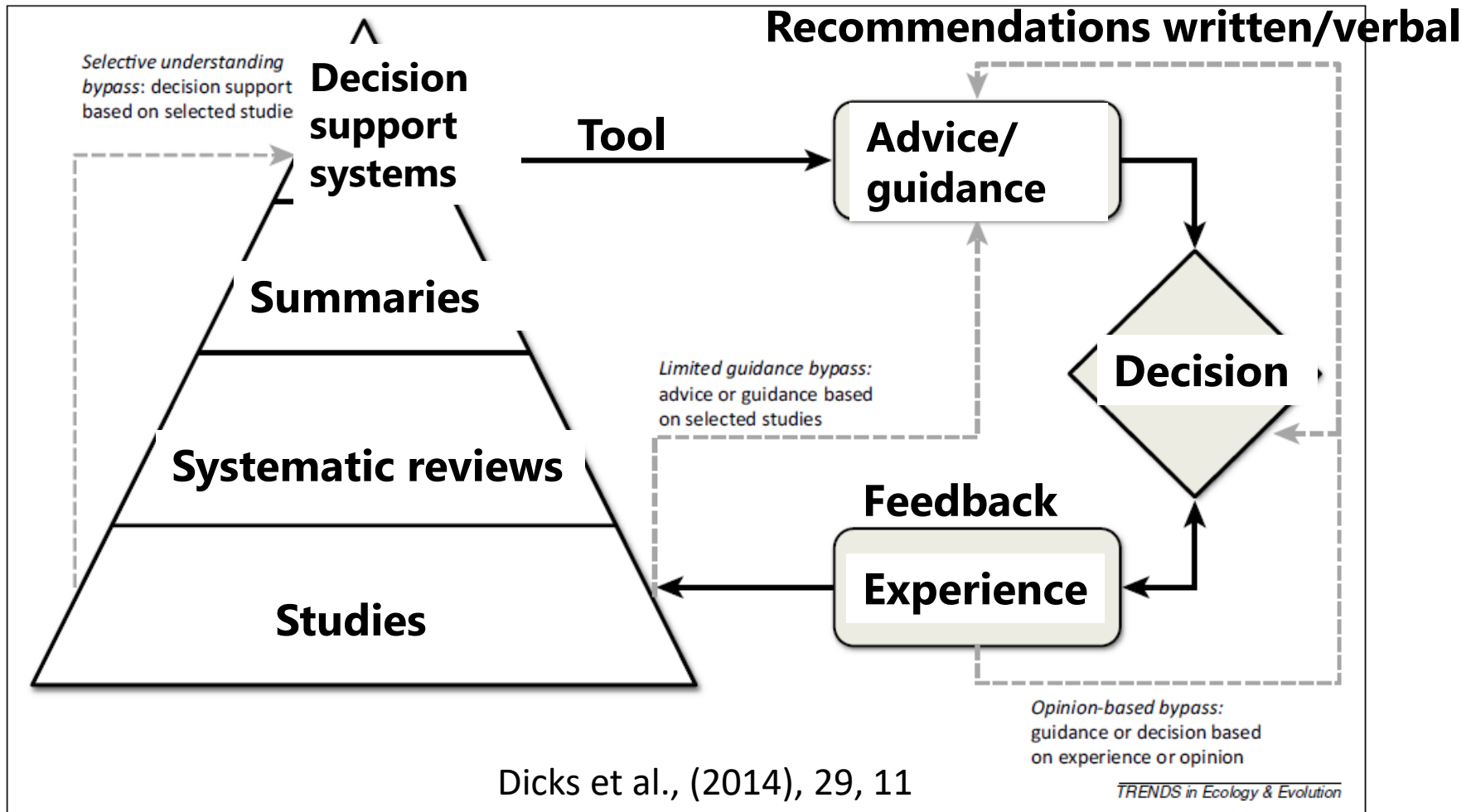
Engage

Analyze

Evaluate



# 4S hierarchy of Policy synthesis



# Human Health Risk assessment

Process to estimate the nature and probability of adverse health effects (acute or chronic) due to chemicals/microbes.

Key questions,

Who is at risk?

Individual, population

Hazard of concern?  
metabolites

Specific chemicals, and its

Exposure route?

Dermal, ingestion

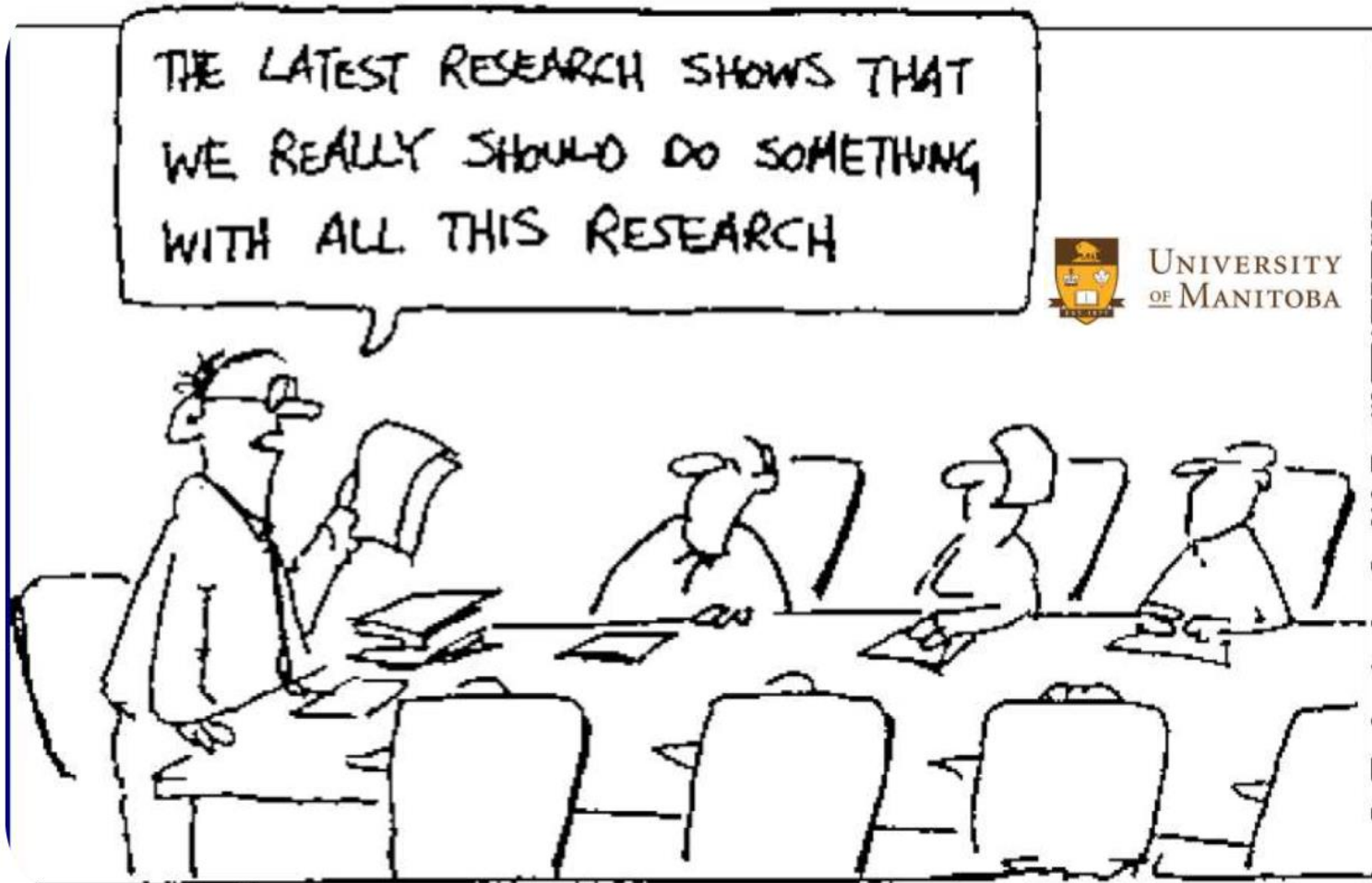
Health effect?

Acute, chronic

Uncertainty factors  
data

Human variability, extrapolation,  
**How?**

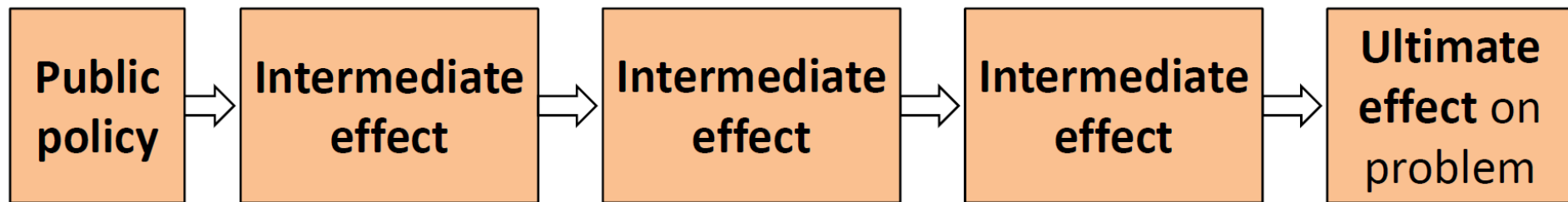
# Decision making



UNIVERSITY  
OF MANITOBA



# Decision making



- **Healthy marine environment**
- **Cancer prevalence**
- **Revenue generation**
- **Employment**



# Decision making

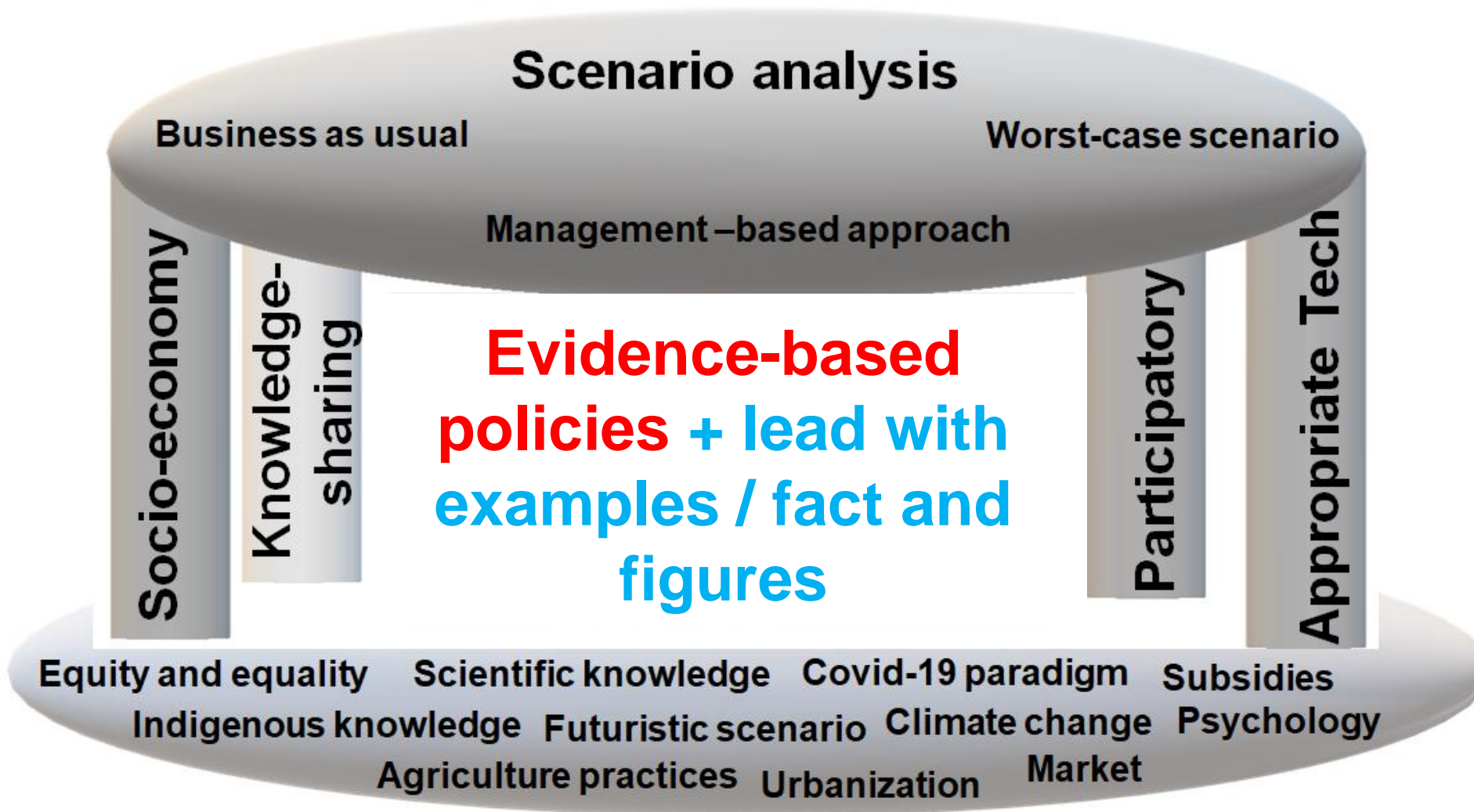
## Who chooses?

The decision  
maker/  
commissioner of  
the synthesis

Negotiation  
between the  
decision maker  
and yourself

Yourself:  
complete  
autonomy

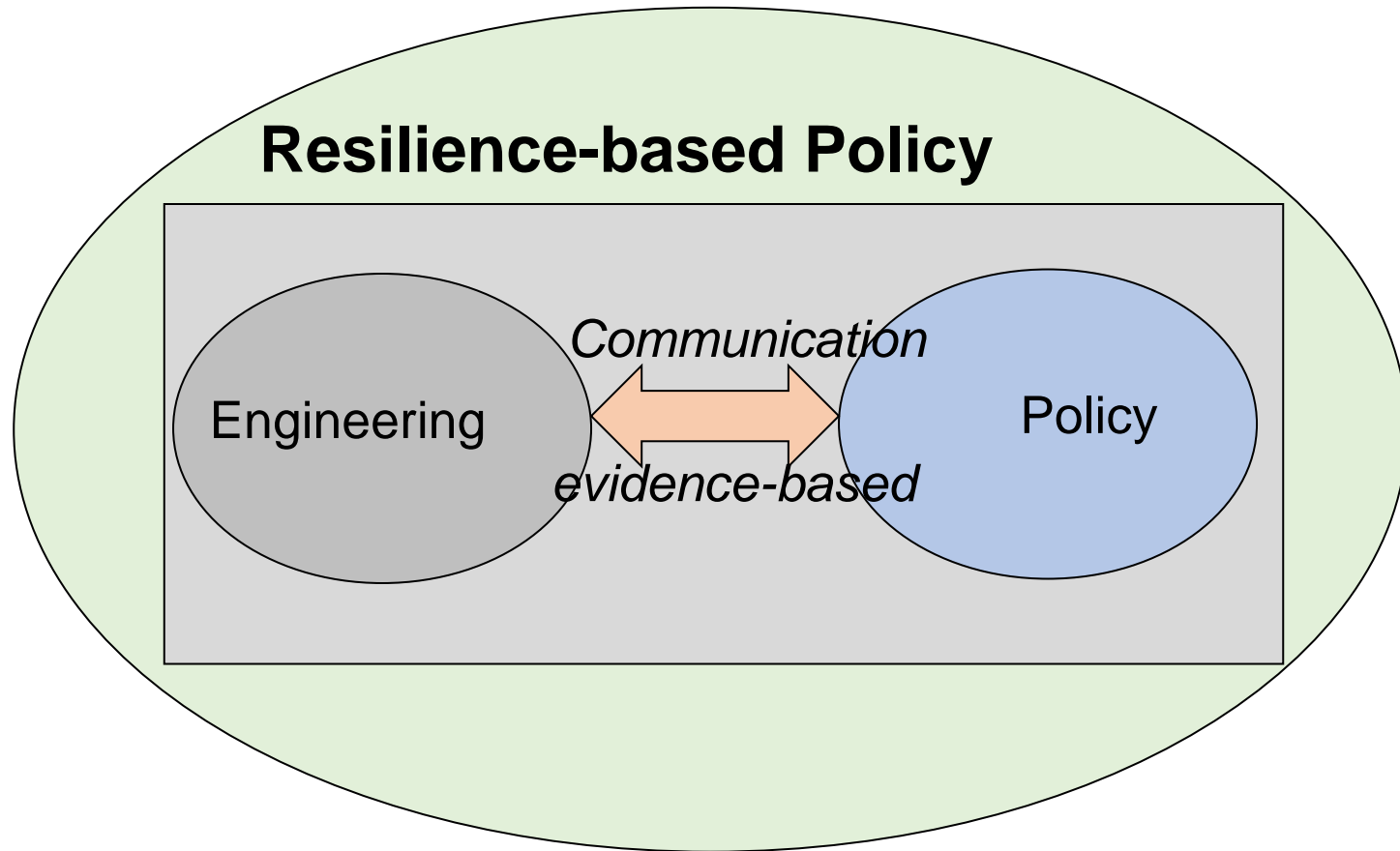
# Foundations of Evidence-based Policy Synthesis



Income opportunities, sustainable tourism, sustainable fishing

**Socio-economy and ecological approach**

# Conclusions



Contextualization of knowledge, research, evidence, policy, and economic empowerment

# Acknowledgements

**APN** - Asia-Pacific Network for Global Change Research for funding this project - "Collaborative Research Platform to Manage Risk and Enhance Resilience of Coral Reef in Southeast Asia, CRRP2019-08MY-Khanal"

Policy Research Institute, Nepal