Protecting Islands from Invasion and Disease: Biosecurity and Strategic Environmental Assessment

Dr James Russell, University of Auckland
Russell & Kueffer (2019)

*Trends in Ecology & Evolution.*
Invasion science and the global spread of SARS-CoV-2.

Stages for emergent zoonotic viruses (e.g., SARS-CoV-2):
1. Evolution of the pathogen in the wild
   Increased reservoir of one or more wild species
2. Spillover into humans
3. Humans disperse the pathogen across geographic barriers
4. The virus becomes an epidemic or pandemic, causing major socioeconomic impacts
5. The virus remains within the human reservoir, causing variable impacts; management aims to constrain viral population growth (e.g., through vaccination)

Stages for biological invasions:
1. Evolution of species in native range (e.g., traits associated with invasiveness)
2. Interface with human transportation systems
3. Propagules are taken from native range and dispersed by humans across geographic barriers
4. The species becomes established and proliferates in various regions, causing ecological and socioeconomic impacts
5. The species remains in the introduced range at variable abundance; management aims to constrain population growth

Threats to IUCN Red listed species

- Just under half of IUCN Red Listed threatened species are found wholly on islands
- Invasion and disease is the only threat *more likely* to be impacting a species on an island

Biosecurity

Strategic Environmental Assessment

• SEA is the analytical and participatory approaches that aim to integrate environmental considerations into policies, plans and programmes and evaluate the inter linkages with economic and social considerations

• An over-arching framework of a collection of tools rather than a single, fixed and prescriptive approach (just like eradications operations)

• Invasive species eradication is not just a technical problem

Russell & Taylor (2019) Strategic environmental assessment for invasive species management on inhabited islands. Island invasives: scaling up to meet the challenge, 692-697
SEA Toolbox

- Community and stakeholder engagement techniques
- Social profiles/baselines and social impact assessment (SIA)
- Health impact assessments
- Cost benefit analysis
- Ecological baselines and impact assessments (EIA)
- Technical feasibility studies
- Livelihoods analysis
- Social marketing/environmental education
- Environmental and social monitoring
- Institutional analysis and change management (includes ongoing biosecurity planning)

Russell & Taylor (2019) Strategic environmental assessment for invasive species management on inhabited islands. *Island invasives: scaling up to meet the challenge*, 692-697
Protected Areas on Islands

Mammal Eradications on SIDS

Small Island Developing States 58 SIDS in total

- Atlantic Ocean 4
- Arabian Sea 1
- South China Sea 1
- Caribbean 28
- Indian Ocean 4
- Pacific 20

The future of island biodiversity will depend on envisioning new human-nature relationships on islands that build on the biocultural knowledge of indigenous and local people, are in line with local and global pathways of long-term sustainability, and integrate island biodiversity into culture practices ranging from stewardship (protection and restoration of qualities of prehuman biodiversity) to biodiversity-friendly land-use practice and the regeneration of the cultural and ecological potentials of island life.

Russell & Kueffer (2019)