FROM MITIGATION TO SUSTAINABILITY

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	DEVELOPMENT ACTIVITIES	OPERATIONAL ACTIVITIES
REACTION TO PROJECT	EIA in Project Design	Environmental Management and Audit in Project Operations
PROJECT IN REGIONAL CONTEXT	EIA in Site Selection	Environmental Rehabilitation
REACTION TO DEVELOPMENT STRATEGY	SEA of Development Scenarios	State of Environment Reporting (PSR model)
PROACTIVE SUSTAINABILITY STRATEGY	Regional Sustainability Strategy	Resources, Processes, Outcomes, Response Model

MITIGATION

SUSTAINABILITY

SEQ AGM 2019, Brisbane, 17 July 2019

FROM MITIGATION TO SUSTAINABILITY

- Historical evolution of environmental instruments
- Beginning with project level environmental impact assessment
- Developments of audits of project operations, SoE reporting and strategic environmental assessments
- Progressing to regional sustainability strategies
- Shift from reactive impact assessments to proactive recovery strategies
- Outcome-based management rather than Effects-based management
- Implications for environmental professionals and the profession

PASSAGE OF NEPA IN USA (1969)

- Creation of a new environmental instrument
  - environmental impact assessment
- Action-forcing mechanism on proponents
  - publicly disclose adverse effects that cannot be avoided should proposal be implemented
- EIA and Effects-Based Management spread internationally
  - Australian states and Commonwealth Environmental Protection Acts
  - New Zealand Resource Management Act

FIRST ENVIRONMENTAL EFFECTS STATEMENT IN VICTORIA

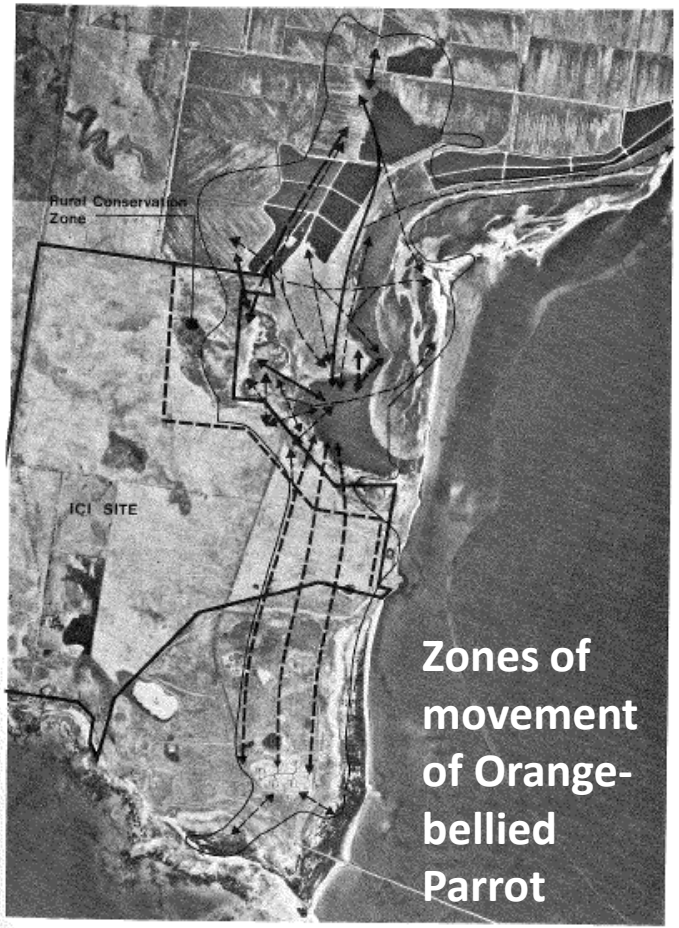
Botany plant

Point Wilson

Rezoning land at Point Wilson for Petrochemical Plant

- ICI (now Orica) plant at Botany: encroachment of urban development
- Point Wilson (near Geelong): “ideal” site - never surrounded by urban development
- Prime wintering habitat of the Orange-bellied Parrot

CREATION OF CONSERVATION RESERVE



Zones of movement of Orange-bellied Parrot

- Critical habitats, flight paths and buffer zones determined as part of EES
- Location of industrial development modified and conservation reserve proposed
- 300ha reserve is now the corner stone of Orange-bellied Parrot conservation programme
- Incredible value of timely environmental impact assessment

EFFECTS-BASED LEGISLATION

- Emphasis of EIA on mitigation measures
- Legislation requirement
  - avoiding, remedying or mitigating and adverse effects of activities on the environment (SA)
  - prevent, control and abate pollution and environmental harm (WA)
  - management, monitoring, planning and other measures to minimise adverse impacts (Qld)
- Created a new profession of environmental practitioners and a new professional association

EXPANSION TO PROJECT OPERATIONS

- Operational requirements on projects
  - EIA approval requirements (Australia)
  - Pollution control licences (Australia)
  - Consent conditions (New Zealand)
- Expansion of role of environmental professionals
  - environmental managers
  - environmental auditors

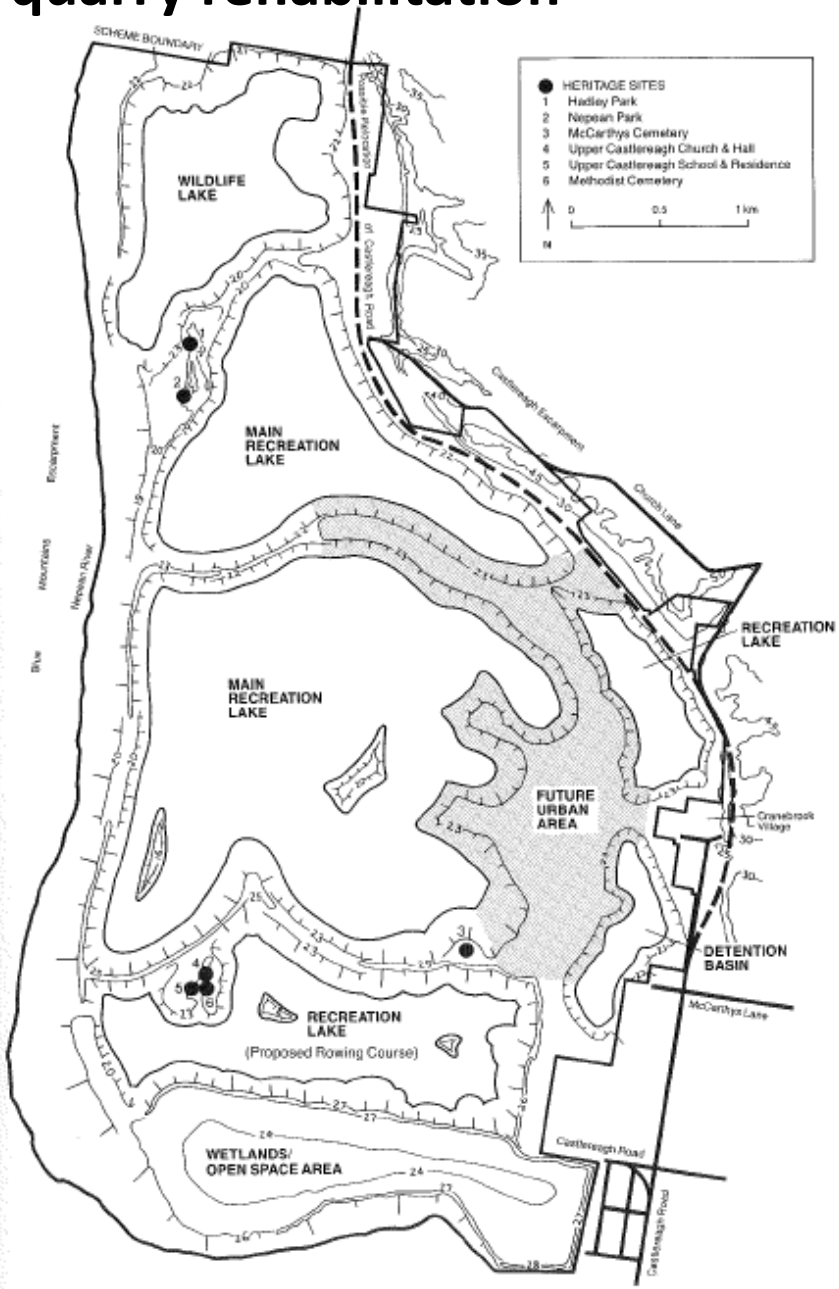
Sites for second Sydney airport

PROJECTS WITHIN THEIR REGIONAL CONTEXT

EIA on Site Selection

- Second Sydney Airport (1985)
- Comparison of 10 alternative sites after examination of 80 km radius around Sydney (plus Goulburn)
- Multi-criteria analysis with preferred site dependent on weighting of criteria
- Two alternatives assessed (Badgerys Creek and Wilton) to facilitate political decision

Lake layout as endpoint of quarry rehabilitation



PROJECTS WITHIN THEIR REGIONAL CONTEXT

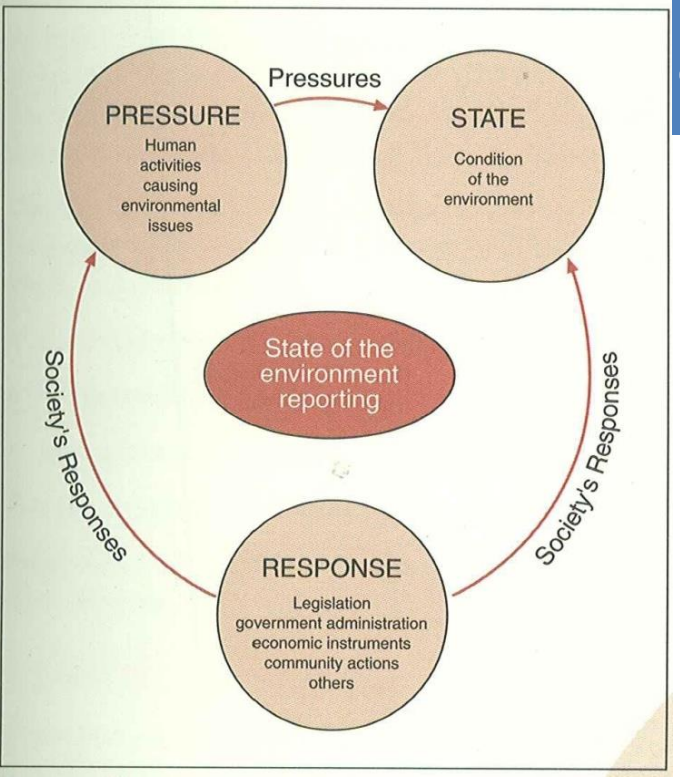
EIA on Rehabilitation on Industry Closure

- Penrith Lakes Scheme (1986)
- Coordination of extraction and rehabilitation of multiple quarrying operations for sand and gravel
- Rehabilitation to create regional water-oriented recreation resource in former quarry areas

ELIMINATION OF ADVERSE EFFECTS NOT REQUIRED

- Legislation requirements
  - prevent “significant adverse effects on the environment”
  - address “material environmental harm”
  - ensure adverse effects “are no more than minor”
- Cumulative outcome
  - adverse effects are approved
  - cumulative outcome is ongoing degradation of the environment
- Limits set under Environmental Policies
  - effects-based legislation allows for extraction or discharge up to the limit

STATE OF ENVIRONMENT REPORTS



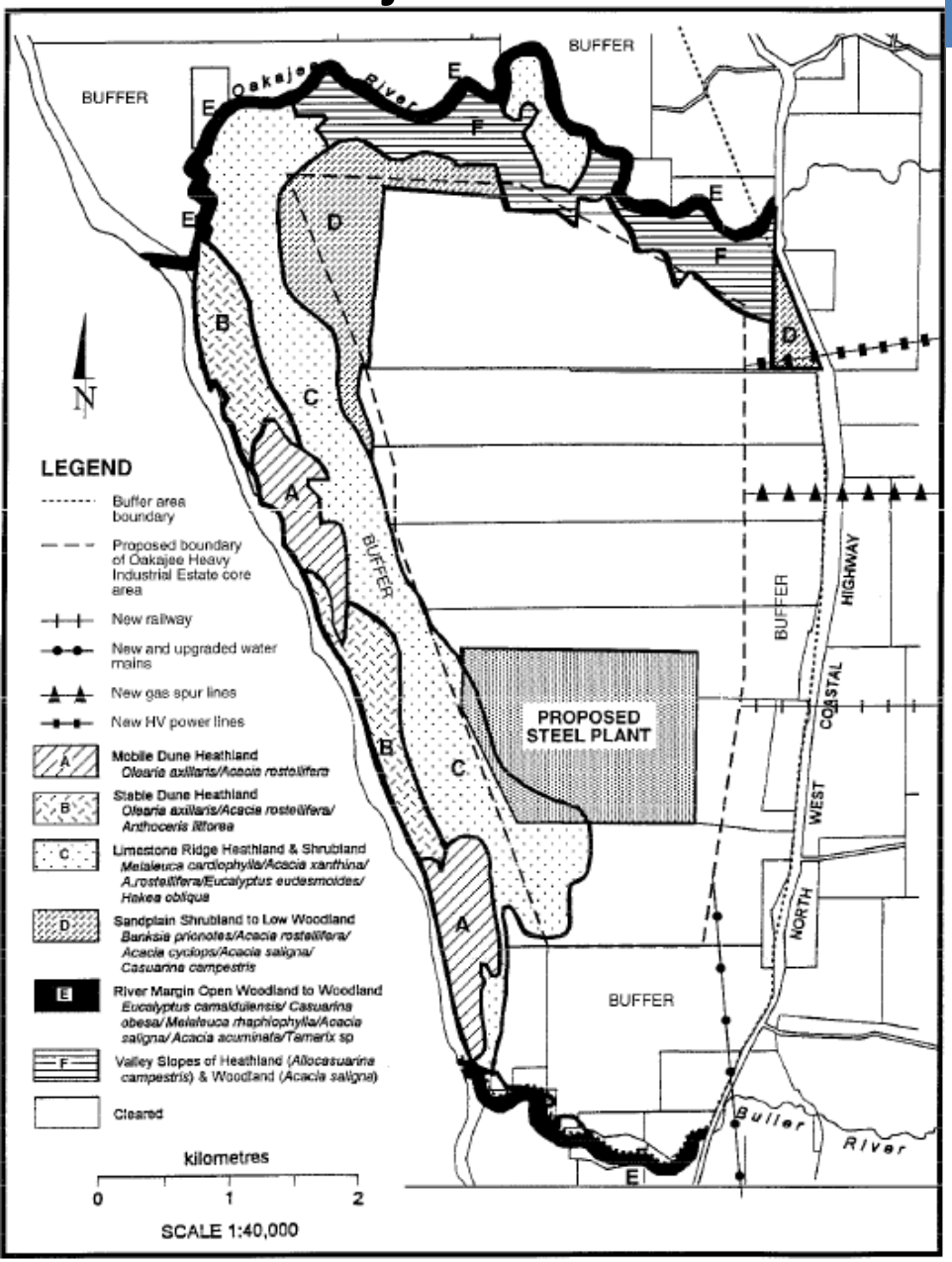
- Equivalent to Environmental Audits at the region, state or national level
- Based on "***Pressure-State-Response***" model:
  - *human activities exert **pressures** on the environment*
  - *pressures alter the **state**, or condition, of the environment*
  - ***responses** undertaken to reduce pressures or improve environment*

- Demonstrated ongoing deterioration of the state of the environment

STRATEGIC ENVIRONMENTAL ASSESSMENT

- Bring environmental considerations earlier into the development decision process
- Effects of policies, plans and programmes
- In Australasia, first introduced in WA (1995)
  - proposed industrial estates
  - planning schemes and structure plans
  - water or wastewater management strategies
  - transport and infrastructure proposals
  - strategic advice on proposals
  - class assessments

Geraldton steel plant proposal sited in Oakajee Estate



OAKAJEE ESTATE SEA

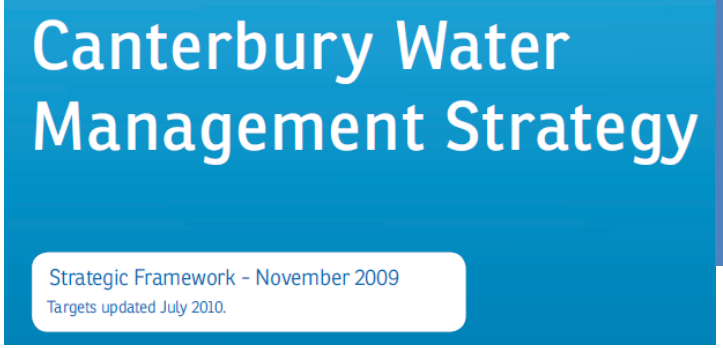
- Definition of sensitive environments
- Buffer zones from adjacent land uses
- Hydrogeological investigations on liquid waste disposal in karstic limestone
- Infrastructure corridors
- Siting of proposals to avoid environmental issues

NATURE OF ENVIRONMENTAL ASSESSMENTS

- Reaction to the consequences of development
- Ongoing degradation of the environment
- Need for proactive approach to environmental restoration
- Concept of sustainable development

WESTERN AUSTRALIAN SUSTAINABILITY STRATEGY

- Sustainability framework of 11 principles, 6 visions, and 6 government goals for action
- Action Plan for government agencies to contribute to sustainability
- Regional sustainability strategies for regional councils and local government
- Designed as a proactive document driven by Premier & Cabinet
- With resignation of Premier implementation of strategy lost momentum



CWMS: COLLABORATION AT REGIONAL SCALE

- Strategy overseen by a multi-stakeholder group under the auspices of the Canterbury Mayoral Forum
- Strategic framework developed: based on stakeholder and community engagement
- Implementation programmes developed through region and zone committees
- Developed under LGA with statutory backing through Land & Water Plan (RMA)
- Shift from addressing water availability through storage on alpine rivers to targets for ten community priority issues related to water

SUSTAINABILITY APPRAISAL OF STRATEGIES

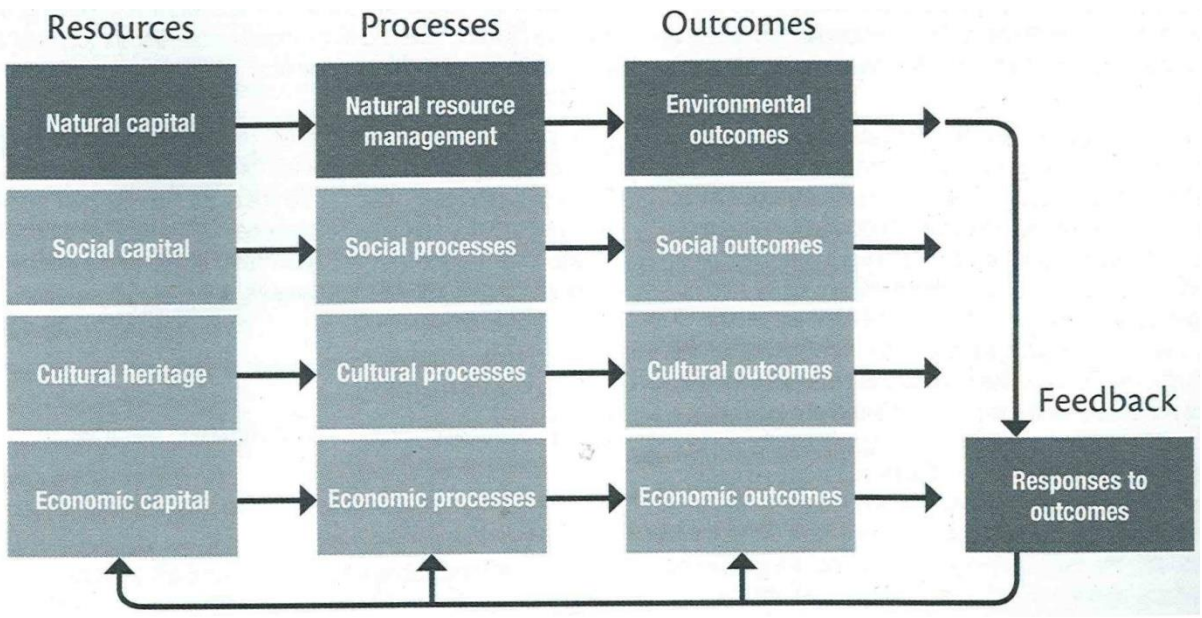
- Bottom line higher than “Business as Usual”: current situation based on the RMA is not sustainable
- Environment-led option scores well on environmental criteria but below economic bottom line
- Storage-led option scores well on economic criteria but below environmental bottom line
- Efficiency-led option scores above the bottom line on nearly all criteria

OUTCOMES OF SUSTAINABILITY APPRAISAL

- Only possible to achieve sustainable development by considering existing uses of water as well as new uses and projects
- Most economically viable source of additional water was from efficiency gains from existing users rather than storage
- Environmental requirements best met by improved land use practices of existing and new users
- No capacity for further development unless cumulative effects of existing use reduced
- Need for parallel development of environmental restoration with water development

IMPLEMENTATION OF CWMS

- Formulation of implementation programmes through collaborative community-based approach
  - ten zone committees of community members and runanga representatives
  - regional committee of multiple stakeholders and zone committee chairs
- Proactive implementation of ten target areas
  - e.g. Immediate Steps Biodiversity
  - community identified projects consistent with Regional Biodiversity Strategy



REGIONAL REPORTING IN SUSTAINABILITY FRAMEWORK

Resources/Processes/Outcomes/Response Model

- Resources provide basis for processes both productive and pressures on environment
- Outcomes can be productive as well as negative impacts
- Responses are initiatives based on outcomes observed

Canterbury Reporting

- Regional Environment Report
- Community Outcomes Report

EVOLUTION OF ENVIRONMENTAL INSTRUMENTS

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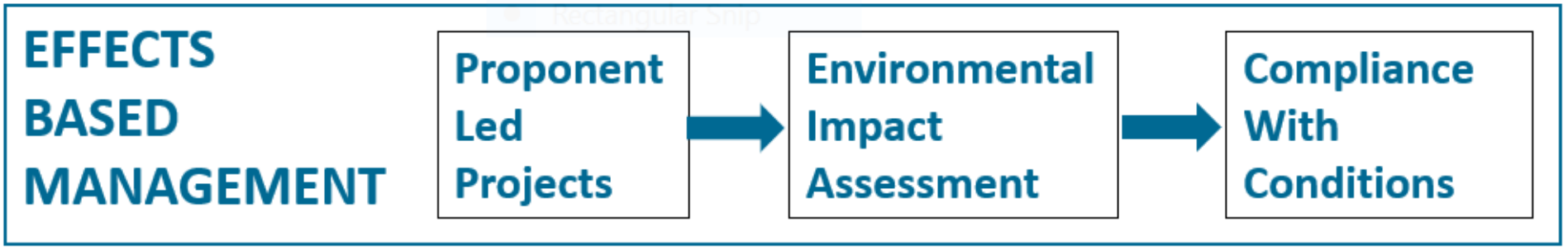
MITIGATION

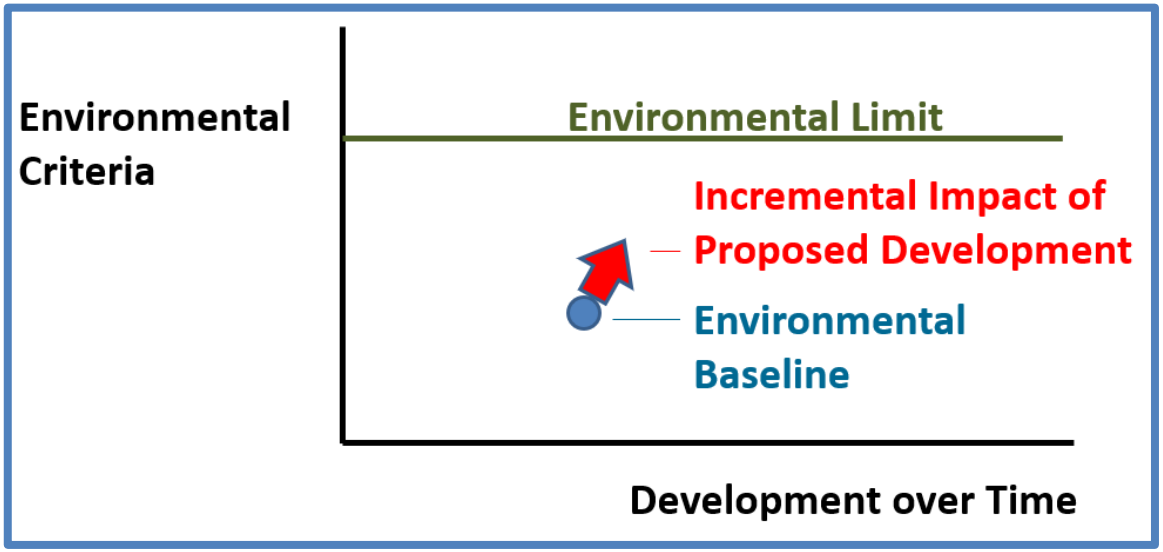
SUSTAINABILITY

EFFECTS-BASED MANAGEMENT

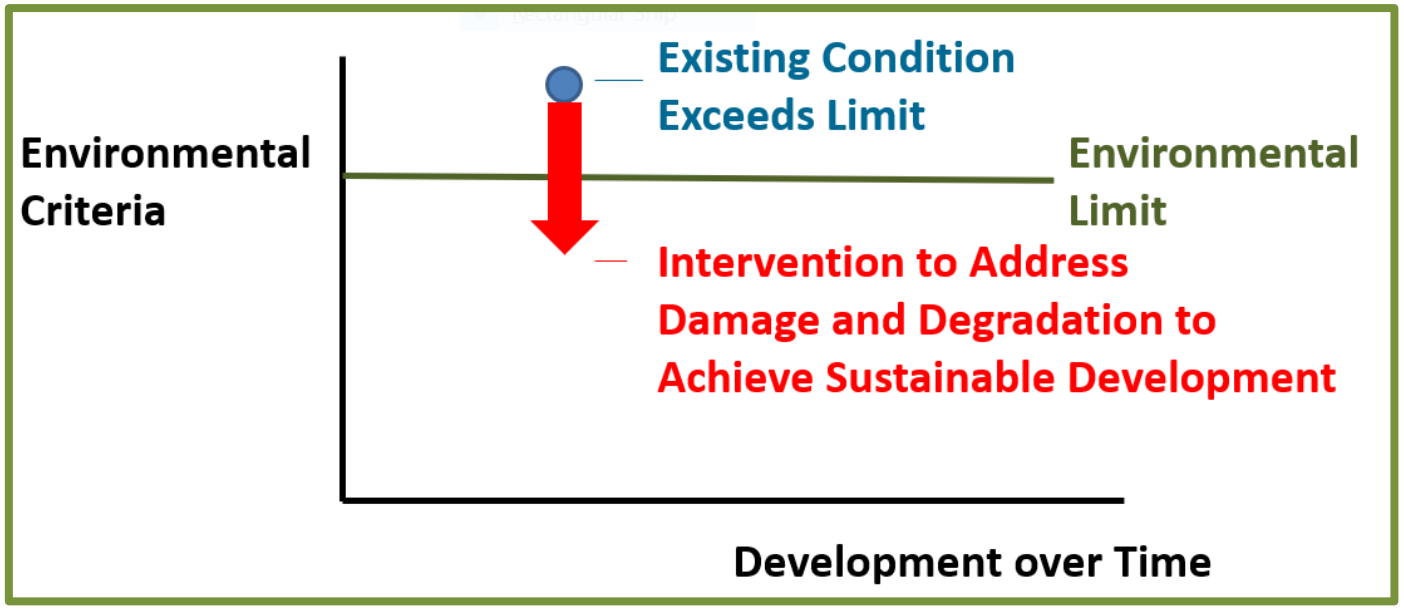


- Initiated by decision to undertake a proposed action
- Impact assessment to identify and mitigate adverse effects
- Conditions of project approval relating to management of effects
- Adversarial process
- Mitigating adverse effects leaves residual impacts
- Compliance with conditions less than 100% and limited enforcement of non-compliance

SHIFT FROM IMPACT TO RECOVERY ASSESSMENT

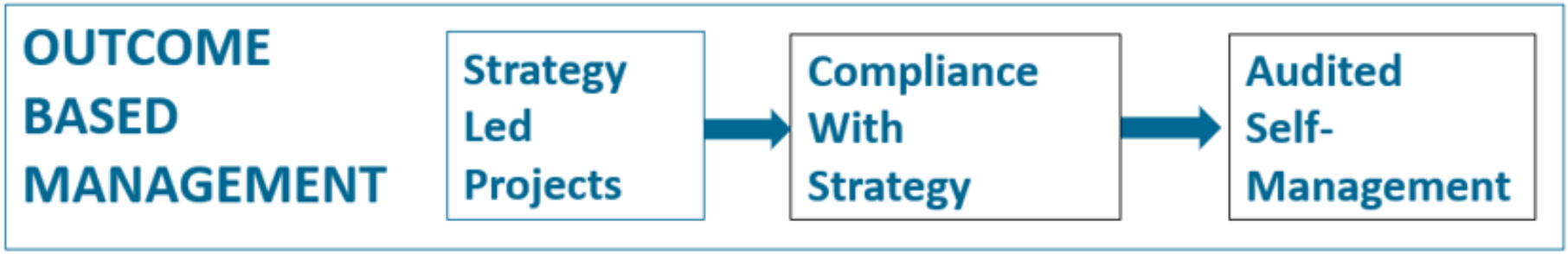


IMPACT ASSESSMENT
Incremental impacts within environmental limits



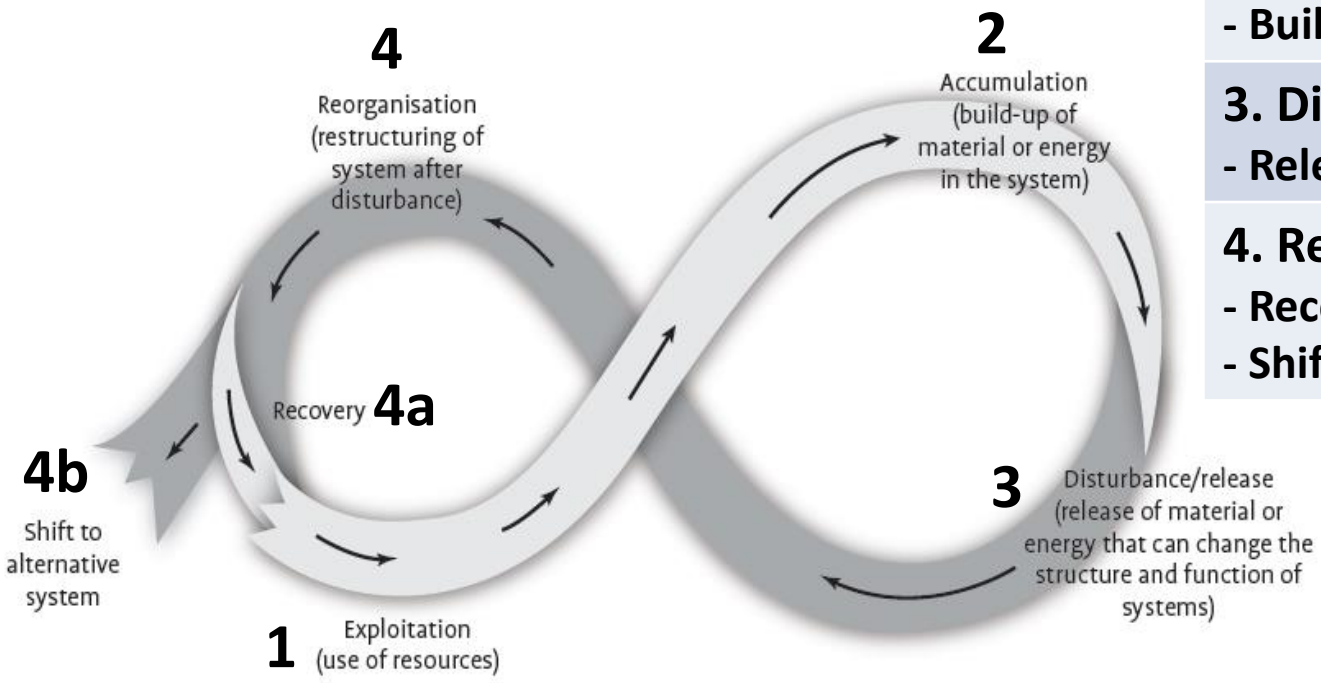
RECOVERY ASSESSMENT
Interventions when environmental limits exceeded

OUTCOMES-BASED MANAGEMENT



- Sustainability strategies to address cumulative impacts of multiple users
- Recovery assessment rather than impact assessment: interventions to address degradation
- Existing and future development needs to be compatible with strategy
- Regulation insufficient: existing users need to be willing to change
- Monitoring and management of individual and cumulative outcomes

ADAPTIVE CYCLE FOR SUSTAINABLE SOCIO-ECOLOGICAL SYSTEMS



PHASES OF ADAPTIVE CYCLE

1. Exploitation
- Use of resources

2. Accumulation
- Build-up of material or energy

3. Disturbance
- Release that can change system

4. Reorganisation
- Recovery, or
- Shift to alternative system

Adapted from
Gunderson and Holling 2002

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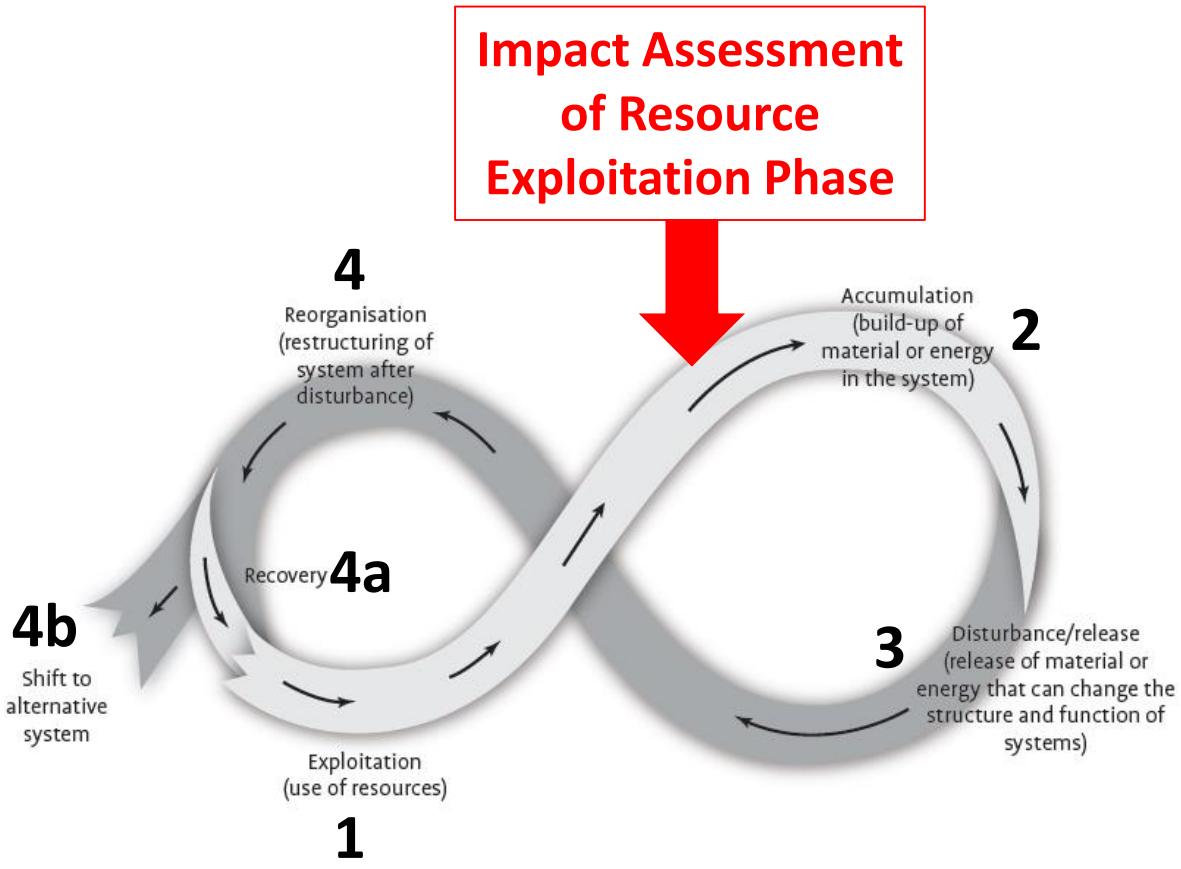

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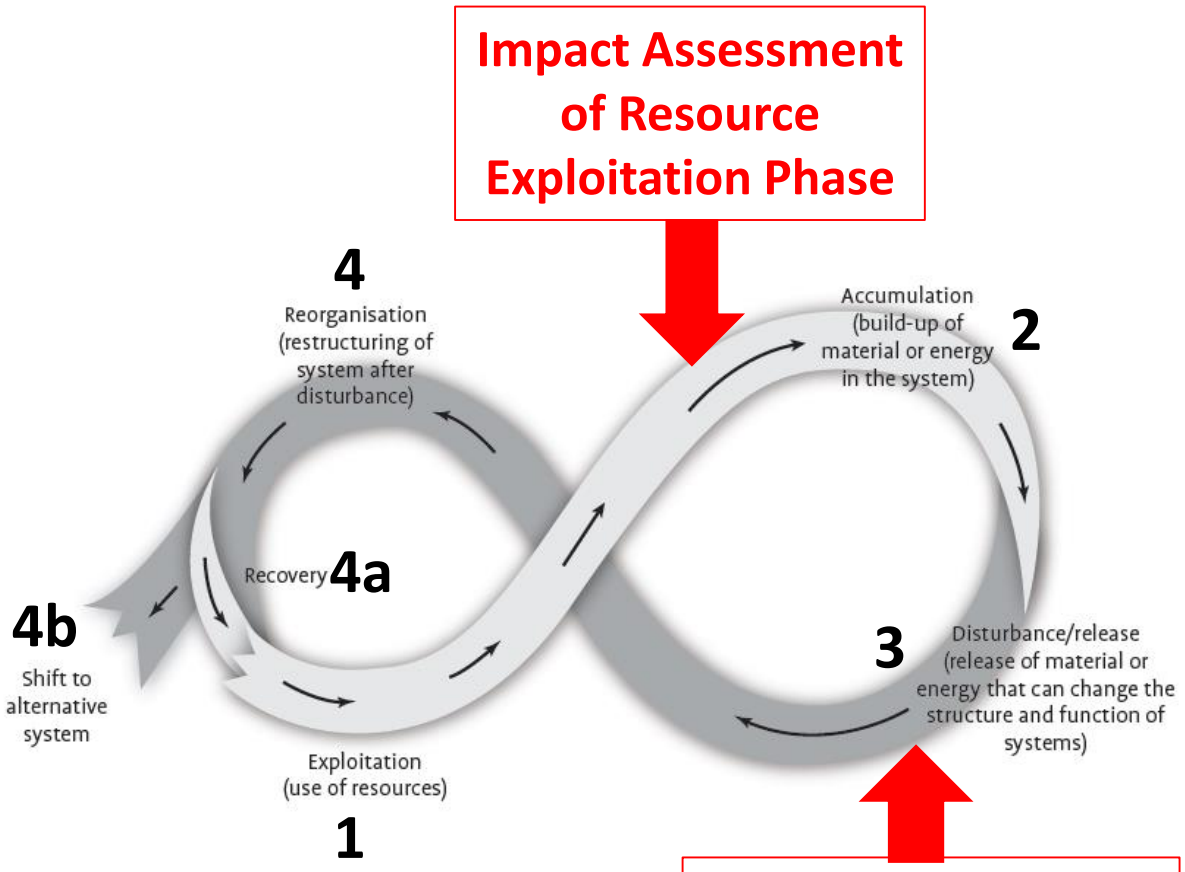

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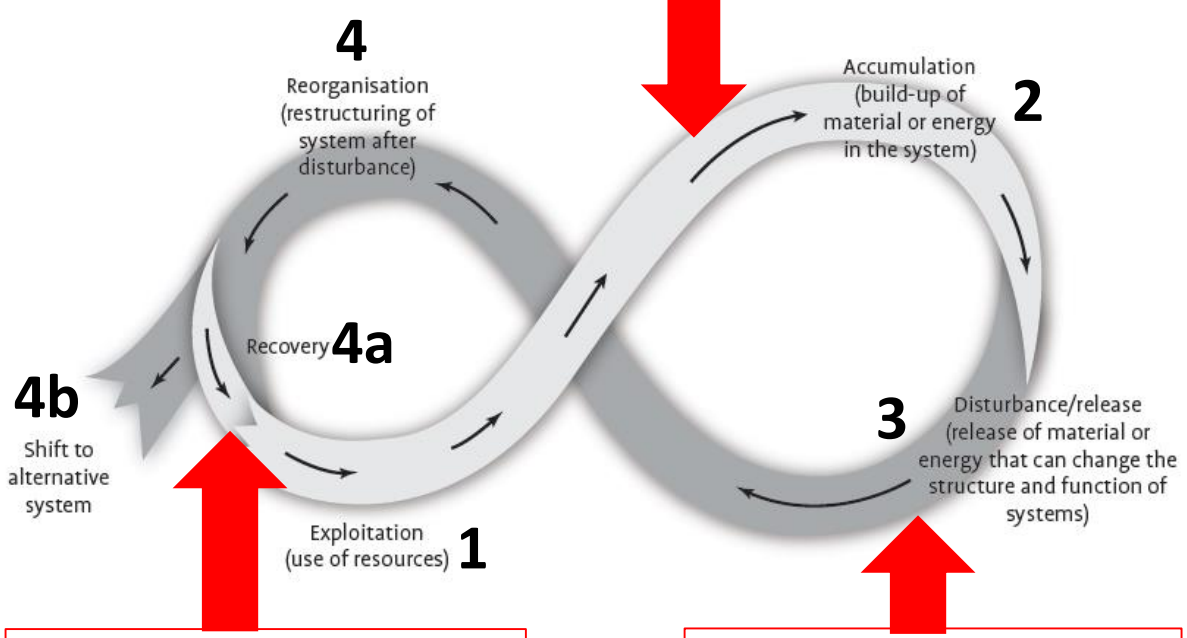
ADAPTIVE CYCLE FOR SUSTAINABLE SOCIO-ECOLOGICAL SYSTEMS

Impact Assessment of Resource Exploitation Phase



Recovery Assessment to maintain System Sustainability

Exceeding Limit leads to System Disturbance

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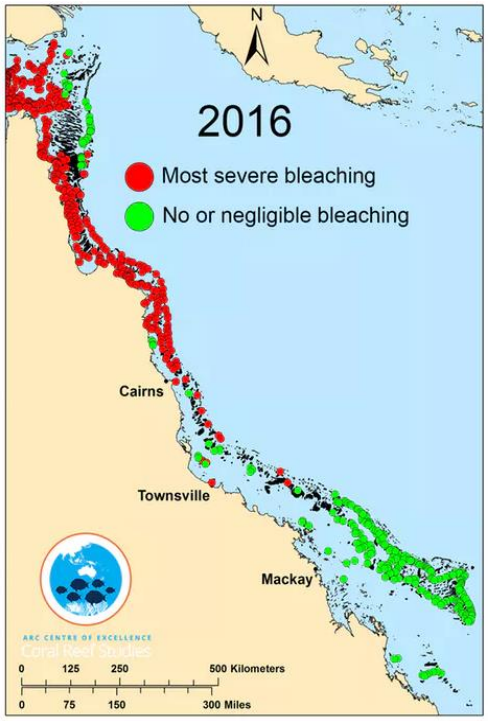
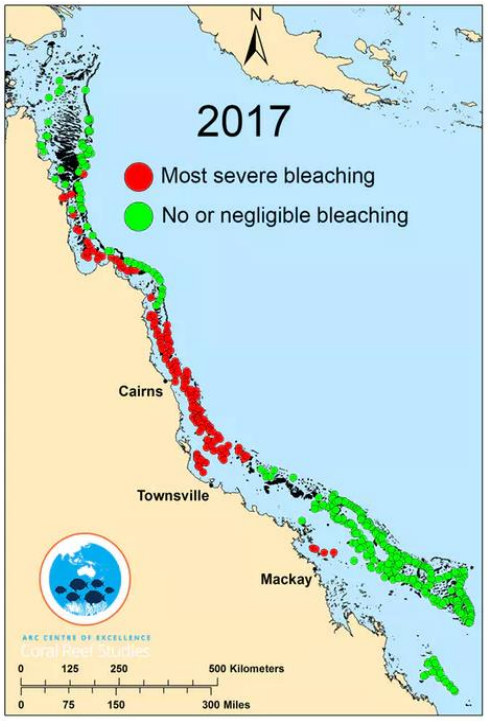
GREAT BARRIER REEF CORAL BLEACHING



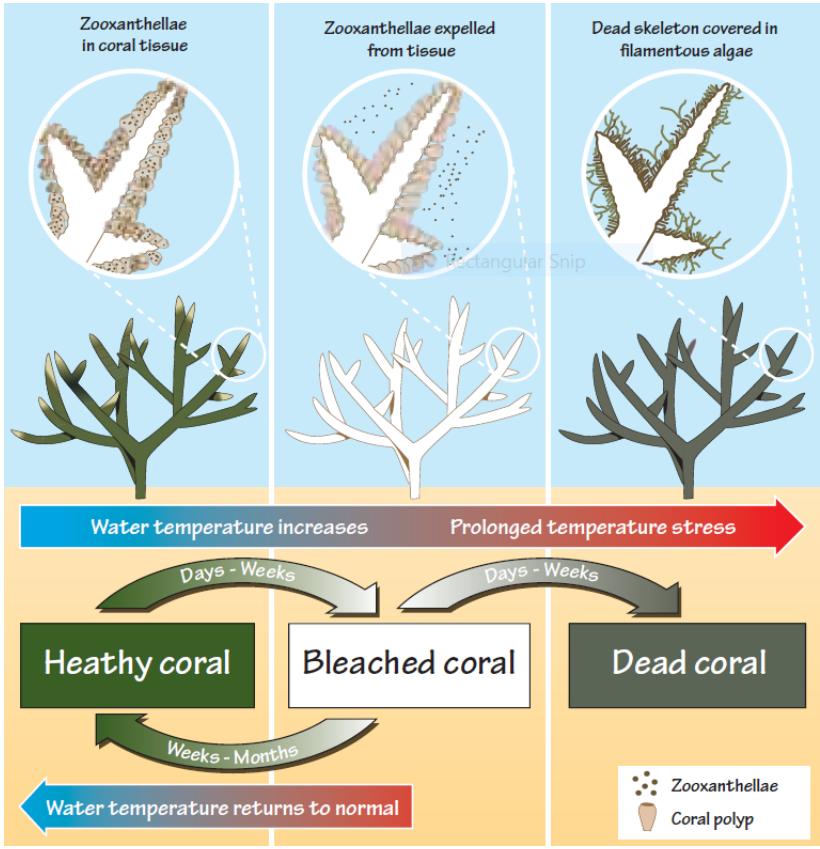


Source: Hughes and Kerry, 2017

- Climate-driven mass coral bleaching in 2016 and 2017
- Tropical Cyclone Debbie in 2017
- 80% of coral reef area in Marine Park impacted
- 50% of reef's shallow water coral died in bleaching events
- Heat stress increased incidence of coral disease
- Crown of thorns outbreak ongoing since 2010
- IPCC: coral decline by 70-90% at 1.5°C and >99% at 2°C increase

ADAPTIVE CYCLE FOR CORAL BLEACHING

- **Exploitation Phase**
  - zooanthella (symbiotic algae living in coral tissue) performs photosynthesis and provides food source to corals
- **Accumulation Phase**
  - corals store surplus food as lipids
- **Disturbance/Release Phase**
  - increase in sea water temperature zooanthella produce oxygen radicals harmful to corals
  - corals expel zooanthella to avoid tissue damage; leaving white coral skeleton
- **Reorganisation Phase**
  - recovery: temperature reduces and zooanthella repopulate coral
  - shift: prolonged temperature stress; coral without food source and dies



Source: Marshall and Schuttenberg, 2006

MANAGEMENT INTERVENTIONS FOR REEF MANAGER

- **Seawater Temperature**
  - requires global action on greenhouse gas emissions
  - mitigation beyond capacity of reef manager
- **Protect Resistant Coral Reefs**
  - establish refugia of reef areas more resistant to mass bleaching
  - network of refugia with connectivity to reefs more susceptible to bleaching to facilitate reseeding
- **Build Tolerance: Assist or Accelerate Natural Recovery Process**
  - evolution: bleaching-resistant corals make a greater contribution to next generation of corals – coral translocation
  - migration of heat-tolerant genotypes – coral seeding
- **Rehabilitate Adverse Effects to Promote Recovery**
  - improve water quality to reduce phase shift to filamentous algae
  - maintain fishery for grazing of algae
  - control crown-of-thorns outbreaks

DIFFERENT APPROACH TO IMPACT ASSESSMENT

- **Collaborative Approach**
  - Partnership Group: Government, traditional owners, industry, scientists and interest groups
- **Strategic Assessments**
  - marine component
  - coastal / catchment component
- **Reef Strategy for Coordinated Action of All Stakeholders**
  - Reef 2050 Long Term Sustainability Plan with Outcomes, Actions, Targets
- **Investment Framework for Implementation**
  - funding requirements for actions
- **Managing for Resilience of the Coral Ecosystem**
  - GBRMP Blueprint of Resilience

Outcome Based Management	Effects Based Management
Sustainability Strategies based on Nested Adaptive Systems	Projects and Programs with Impact Assessment
Strategy-led Development	Proponent-led Development
Systems Analysis of Failure Pathways and Management Interventions	Impact Analysis of Effects of Actions
Focus on Outcomes	Focus on Effects
Consideration of All Users	Focus on New Actions
Focus on Incentives	Focus on Regulation
Monitoring and Management of Aggregate and Individual Outcomes	Compliance with Conditions of Approval
Redesign Institutional Arrangements	Reliance on Existing Institutional Arrangements
Need Financial Mechanism for Implementation	Proponent Bears Cost of Implementation

IMPLICATIONS FOR ENVIRONMENTAL PROFESSIONALS

- Sustainability strategies require greater integration requirements with other disciplines and community
- Shift from impact assessment to recovery assessment
- Shift from independent assessment to interdependent decision making
- Active engagement in decision making with proponents and opponents of different approaches to development
- Potential for creative solutions but also compromises
- Safeguard of “independence” in EIA and audits no longer available

CONCLUSIONS

- Evolution of key environmental instruments from project EIA to regional sustainability strategies
- Effects-based legislation is powerful in mitigating adverse effects but insufficient when sustainability limits have been reached
- Need for proactive regional strategies to address sustainability limits rather than reactive assessments
- Changed role for environmental professional from independent assessor to interdependent decision maker
- Cooperative collaborative relationships needed rather than adversarial regulatory framework