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CONSERVATION CONFLICTS

ASSESSING TOOLS TO RESOLVE DISPUTES IN CONSERVATION

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Students as Partners Project Report

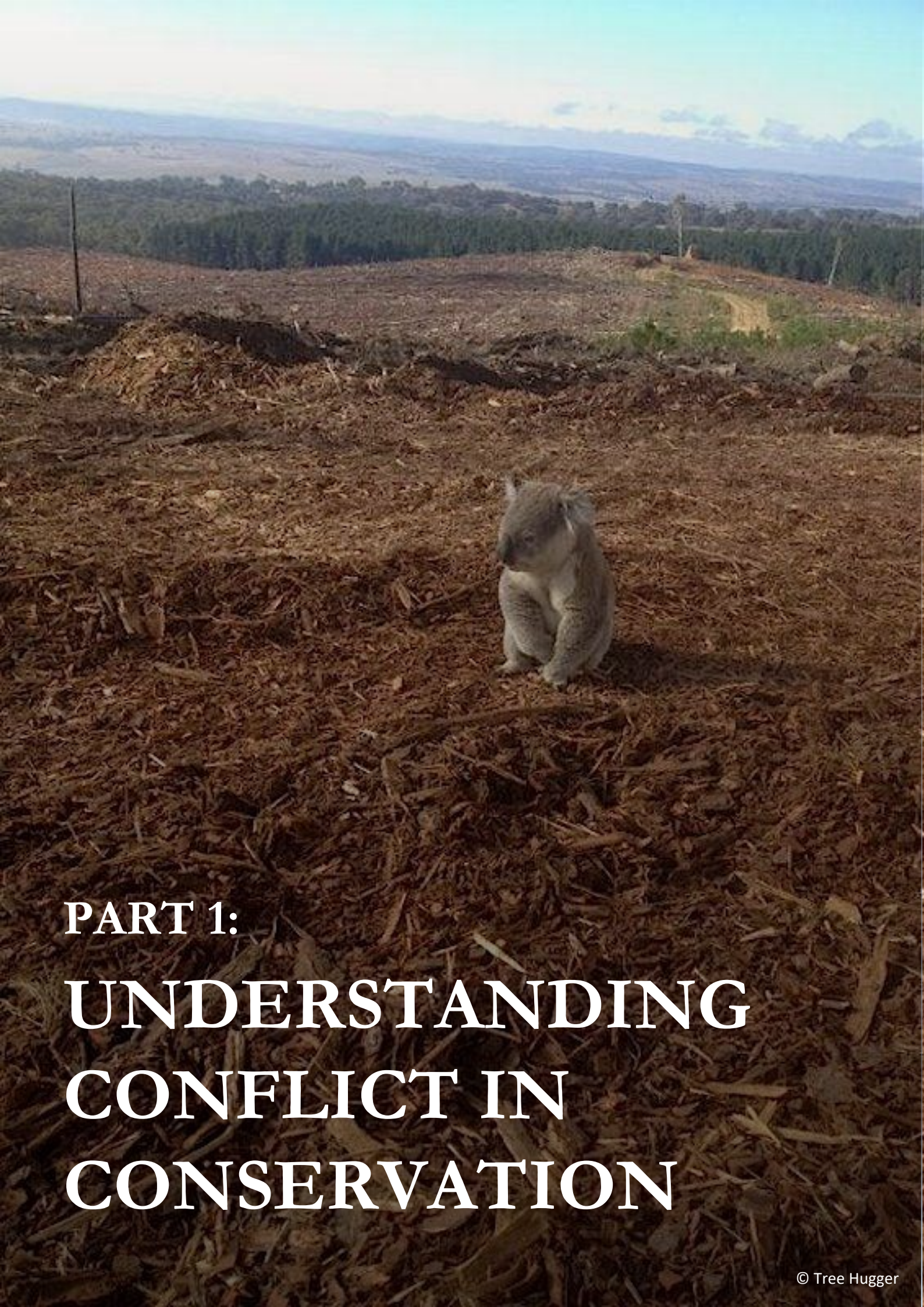
Prepared by Jessica Pinder for the University of Queensland

TABLE OF CONTENTS

PROJECT SUMMARY

Actions to conserve the earth's biodiversity routinely impact human livelihoods and wellbeing. To enhance the success of conservation projects, it is essential that scientists can negotiate conflicts of interests between people and biodiversity when they occur.

By critical appraisal of contemporary literature, this review describes the underlying causes of conservation conflicts, and how these types of disputes can be effectively resolved. Using case studies as examples, this review explains how three widely used frameworks; *Adaptive Co-Management, Joint Fact-Finding* and *Multi-criteria Decision Analysis,* have been successfully employed to negotiate conflicts in natural resource management.

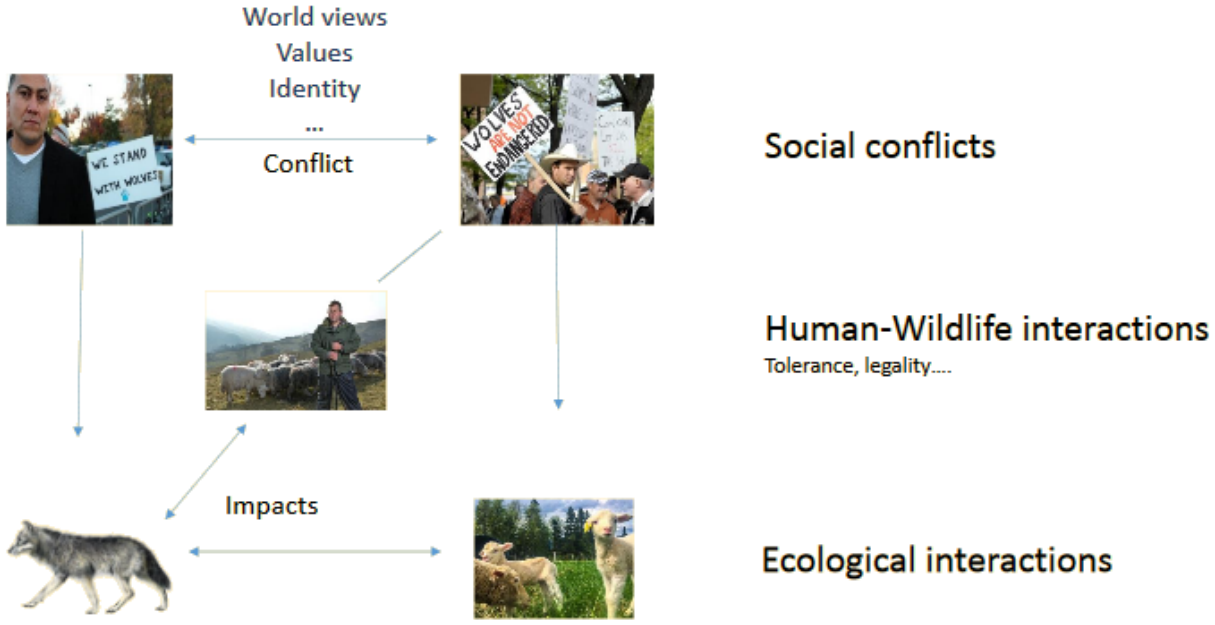


PART 1:
UNDERSTANDING CONFLICT IN CONSERVATION

CONSERVATION CONFLICTS

Conflicts typically occur when there are clashes in strongly held beliefs between two or more parties (Young et al. 2015), and when one party asserts its interests at the other's expense (Redpath et al. 2013).

In conservation, conflicts are especially hard to avoid, due to the complexity of interactions and competing interests that occur between people, wildlife, and natural resources. Though all conflicts in conservation are ultimately **social conflicts**, they are often interpreted to be about the **human impact** rather than a result of the socio-ecological system as a whole (Redpath et al. 2015). The diagram below demonstrates the typical structure of a conservation conflict, revealing how predator-prey dynamic between wild carnivores and livestock can impact human livelihoods and aggravate conflict between social groups (environmental activists and farmers) that are diametrically opposed.



Redpath, 2017

FIGURE 1- Conservation conflicts have multiple levels, involving interactions between social groups and ecological systems

Wild reindeers and tourism in Norway

Wildlife and oil palm plantations in Borneo

Leopards and human settlements in India

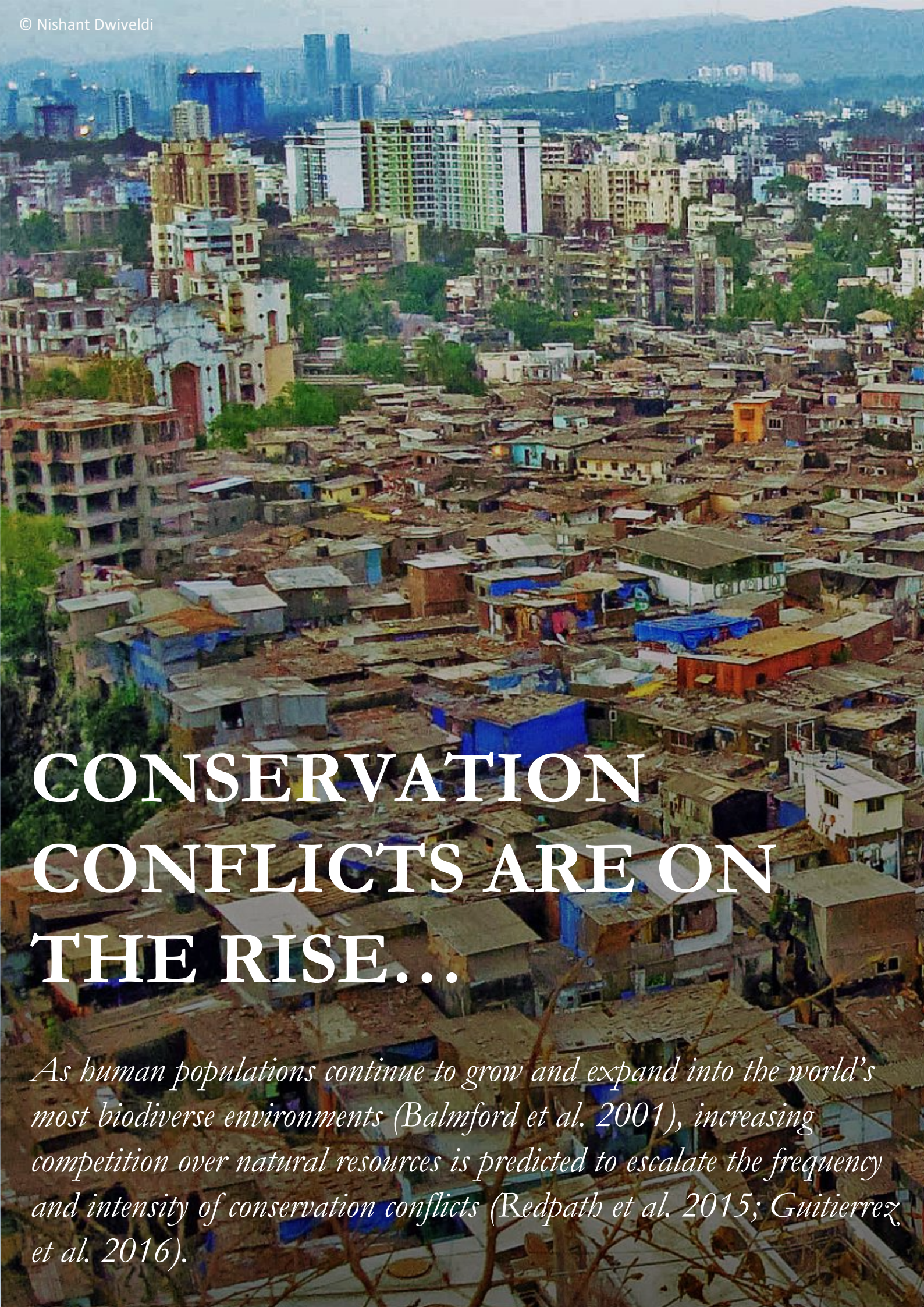
Pink footed geese and farming - Denmark

Many environmental problems can be framed as conservation conflicts

Salmon farming vs. wild salmon in Norway

Coal mining and Great Barrier Reef- Queensland

IMAGES L-R, T-B: Deposit Photos, Indian photo agency, Borneo Orangutan survival foundation, Kevin Clausen, Island Institute, Renew Economy



CONSERVATION CONFLICTS ARE ON THE RISE…

As human populations continue to grow and expand into the world's most biodiverse environments (Balmford et al. 2001), increasing competition over natural resources is predicted to escalate the frequency and intensity of conservation conflicts (Redpath et al. 2015; Guitierrez et al. 2016).

CONFLICT DRIVERS

Conservation conflicts can occur in any ecological system, but there are several common drivers of these disputes.

Below is described four major causes of conservation conflicts. The vast majority of these disputes are reported as human-wildlife conflicts (HWC), which is an encompass all term for wildlife attacks, disease outbreaks, economic losses and opportunity costs (Dickman, 2010).

TABLE 1- Major drivers and frames for conservation conflict

Conflict Drivers	Conflict Frames	Examples
Wildlife impacts on society	Commonly term human-wildlife conflict (HWC), these result when poor co-existence leads to wildlife impacts on human society	➢ Livestock predation ➢ Crop raiding ➢ Human injury
Resource-use and restrictions	Legal restrictions regarding how natural resources can be harvested	➢ Illegal harvest ➢ Restrictions on commercial activities
Land-use decisions	Changes in ownership or land-usage can cause conflict, especially in the case of protected area establishment	➢ Protected area designation ➢ Encroachment
Development and economics	Economic growth and human development can exacerbate conflict between human welfare and natural resources	➢ Poverty clash ➢ Economic development ➢ Civic protest

Adapted from Baynham-Herd et al. 2018


© Gabriela Barragan
Though a seemingly infinite variety of circumstances can trigger conservation conflicts- they all share one in common:
the conservationist
To effectively protect biodiversity, conservationists must recognise their role in antagonising conflicts and improve their abilities to resolve them.
(Redpath et al. 2015b).

STEP 1: KNOW YOUR CONFLICTS TYPES

While the term 'conservation conflict' describes many disputes relating to environmental assets, there are in fact six types of conflict that can occur simultaneously within a single 'conservation conflict'.

TABLE 2- Six categories of conflicts that occur in conservation

Conflict type	Description
Conflicts of beliefs and values	Caused by differences in normative perceptions about how people should be allowed to interact with animals and the environment
Structural conflicts	When cultural, legal or economic inequalities occur between parties one groups interests may be overlooked at the other's expense. An example might be large corporations leveraging their interests over local communities or grassroots organisations.
Conflicts of interest	Competing stakeholder claims on common pool resources can lead to disputes over ownership and harvest restrictions
Information conflicts	Lack of information or different interpretations is a common cause of conflict that generates mistrust between stakeholders
Conflicts over process	Disagreements over different approaches to the management of natural resources can ignite a conservation conflict, and can exacerbate the conflict during the resolution process
Interpersonal conflicts	When individuals dislike, distrust or misunderstand one another, this can lead to antagonistic dynamics that hinder the resolution process

Adapted from Sidaway, 2005; Young et al. 2010; Redpath et al. 2015

STEP 2: UNDERSTAND CONFLICT IMPACTS

When conservation conflicts go unaddressed, they cause undesirable impacts to people, wildlife and the economy.

ECONOMIC LOSSES

- Unequal distribution of economic benefits can occur when stakeholders have competing claims on natural resources, like wildlife tourism operators and hunting safari groups (Nyirenda & Chomba, 2018)
- Productivity losses may arise in industries that rely upon natural resources (Guitierrez et al. 2016)

HUMAN WELFARE

- Local communities can become marginalized, such as when a new protected area is gazetted (Baynham-Herd et al. 2018)
- Roadblocks to poverty reduction and the achievement of human development goals (Brockington et al. 2006)
- Degraded relationships between opposed parties (Lewis, 1996)
- Loss of ecological services for future generations

BIODIVERSITY IMPACTS

- Reduced likelihood that conservation projects will reach success
- Loss of functional diversity and resilience in natural systems
- Barriers to protecting species and ecosystem from extinction

STEP 3: LEARN FROM OTHER DISCIPLINES

As conservation conflicts are multi-dimensional problems; resolution requires input from a variety of different fields.

Sociology

Counselling

Natural resource management

Engineering

STEP 4: CONFLICT TRANSFORMATION

Management interventions are vital to minimising negative outcomes and enhancing biodiversity gains

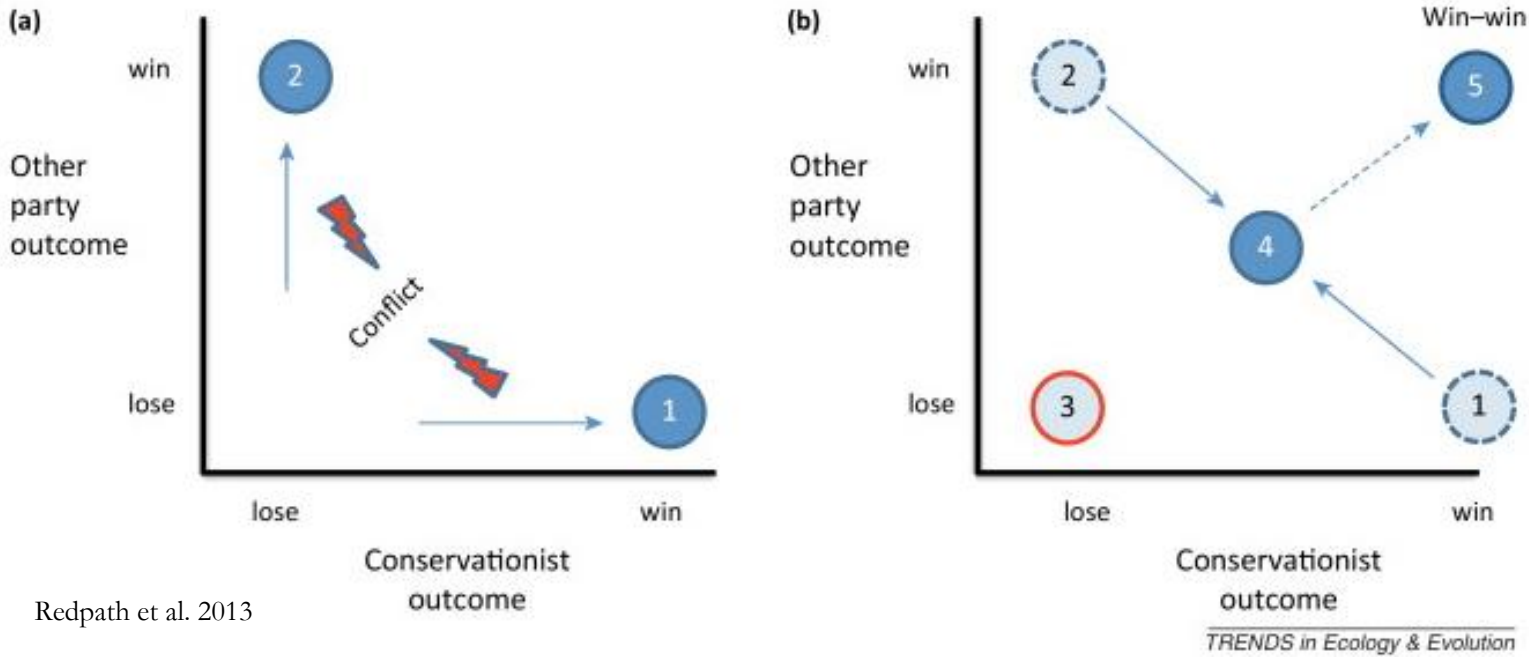
SUCCESSFUL RESOLUTION INVOLVES:

- Compromises between livelihoods and environmental protection
- Interventions in human behaviours and / or ecological systems (Baynham-Herd et al. 2018)
- Understanding of the relevant social, cultural and political context
- Monitoring of socio-ecological systems to inform management strategies (Guitierrez et al. 2016)

Some common tools for resolving conflict include:

1. Legal and institutional mechanisms
2. Collaborative approaches
3. Research and innovation
4. Decision science

Lewis, 1996



Redpath et al. 2013

FIGURE 2 – Conflicts before and after conflict management

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ADAPTIVE CO-MANAGEMENT

A case study in the Moray Firth, Scotland

WHAT IS ADAPTIVE CO-MANAGEMENT?

Adaptive co-management (ACM) is a form of conservation governance that converges two independent natural resource management strategies:

1. Adaptive management
   Stewardship through experimental learning. Management strategies must adapt by monitoring of social and ecological outcomes (Plummer & Armitage, 2007)

2. Co-operative management
   Governance which links actors through collaboration to build relationships and trust between management agencies (Plummer et al. 2007).

"ACM is a process by which institutional arrangements and ecological knowledge are tested and revised in a dynamic, ongoing, self-organized process of trial and error" - Folke et al. 2002, as cited in Sandstrom & Rova, 2010

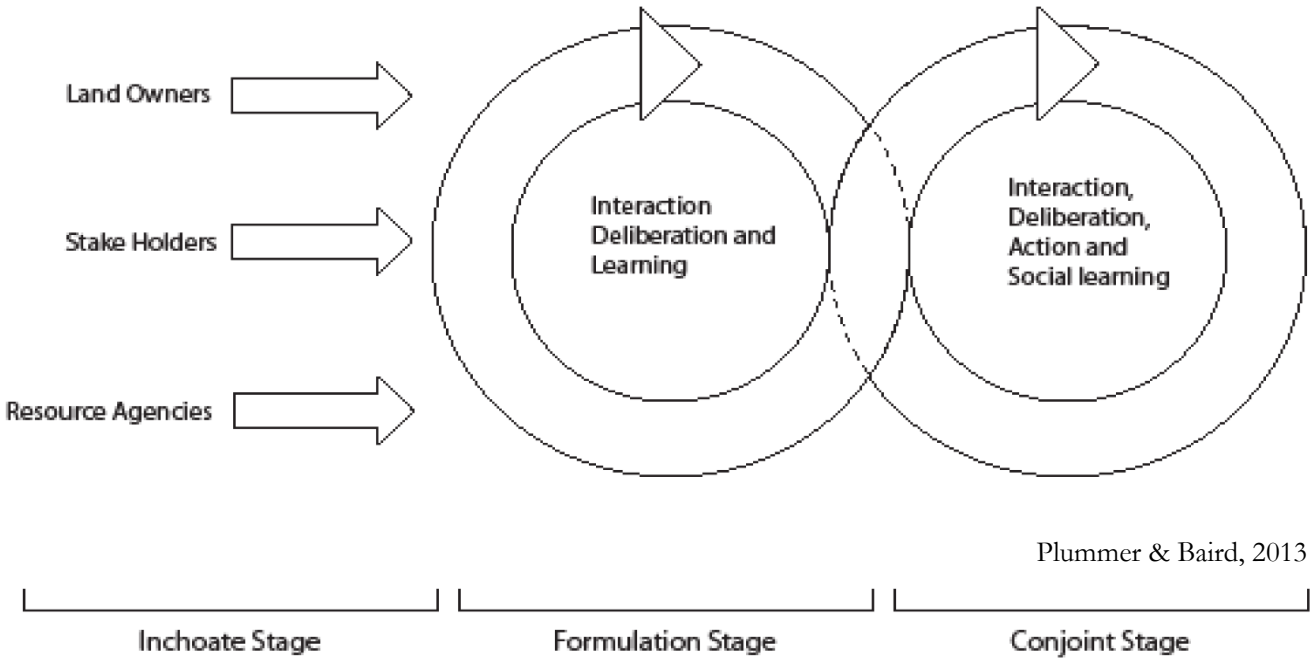
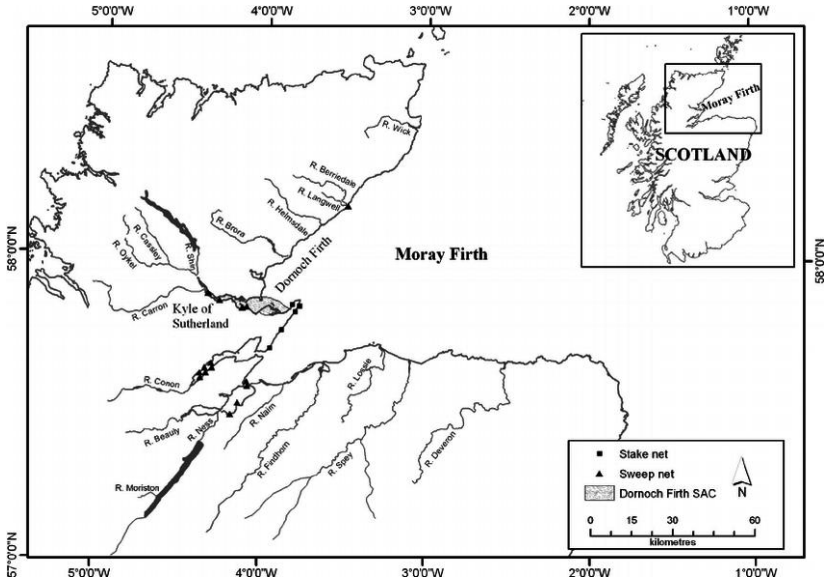


FIGURE 2- The adaptive co-management process

SEALS AND SALMON FISHERIES

Over the last century, fisheries management in Northern Scotland has been complicated by conflicting perspectives towards natural resource governance.



Scotland's largest inlet, the Moray Firth, has ecological importance for large marine mammals such as grey (*Halichoerus grypus)* and harbour (*Phoca vitulina*) seals. With 18 major rivers draining into the Firth (Butler, 2004), the inlet also supports a valuable economy of salmon and trout fisheries.


©Phil Green

Harbour seals predate Atlantic salmon at the river mouth and around netting stations, and have long been regarded as a major threat to fisheries. 81% of fishermen perceive that seals have a significant or moderate impact on salmon stocks, and are responsible for economic losses (Butler et al. 2011).

Though the harbour seal is protected under the Conservation of Seals Act (1970), seals are regularly shot by fishery interests to reduce the impacts of their predation and minimise damage caused to nets. Between 66 – 327 seals were shot each year in the 10-year period between 1993 and 2004 by fishermen (Thompson et al. 2007), causing population declines between 2 – 5% per annum.

Resolving this conflict is challenging because of social disputes and changing ecological systems…

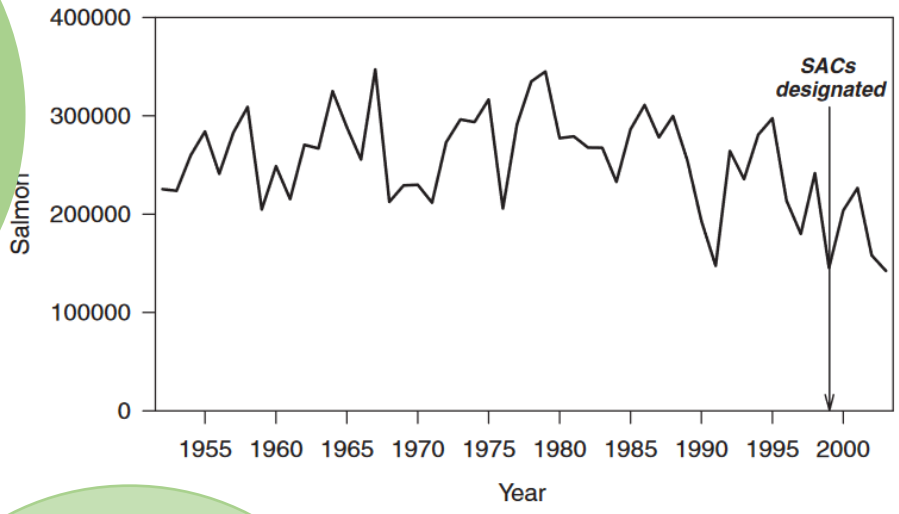
Negative perceptions

Public outcry over seal culling

Changes in salmon abundance

Salmon populations declined by 59% from pre-fishery abundance

Butler et al. 2004



Butler et al. 2008

Seal disease

Outbreaks of phocine distemper virus change maximum allowable culling

Changes in legal mandates

In 1999, six rivers in the firth were gazetted as Special Areas of Conservation (SACs)

Butler et al. 2008

Unanticipated effects

Non-lethal seal control has potential to economically impact the dolphin tourism

Information conflicts

Evidence suggesting that seal predation may be more minimal than previously thought

Graham et al. 2011

MORAY FIRTH SEAL MANAGEMENT PLAN

In 2005, a pilot conflict resolution scheme was introduced to manage the impacts of this complex dispute and restore degraded relationships between stakeholders.

This partnership had 5 main aims:

1. Maintain the conservation status of seals and salmon
2. Reduce the impact of shooting on harbour seal population
3. Reduce the impact of seal predation on salmon stocks
4. Monitor and research populations
5. Develop non-lethal methods of reducing seal-salmon conflict

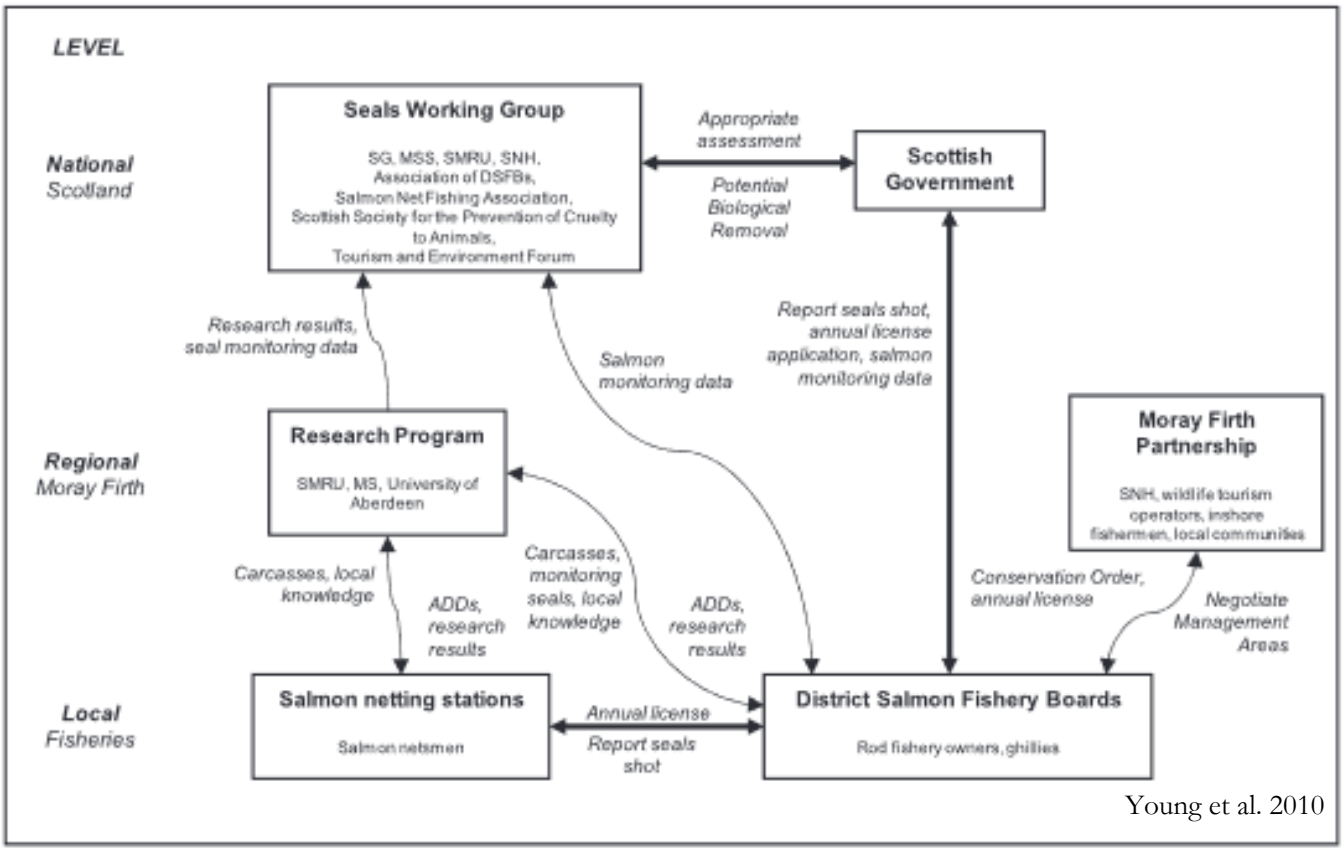


FIGURE 3- The governance framework of the Moray Firth Seal Management Plan (ADD = acoustic deterrent device)

REVIEWING ADAPTIVE CO-MANAGEMENT

Under the adaptive management framework, negotiations between key actors allowed the formation of an adaptive management plan. Due to its success, the ACM plan has since been adopted nationally through the Marine Scotland Act (2010).

Co-operative Management

Strengthened relationships between stakeholders, researchers, management agencies and policy makers

MFSMP Adaptive Solutions

Attained through learning, innovation and monitoring

- Acoustic scaring permitted near salmon netting stations
- Licences must be obtained to shoot 'rouge individuals', but culling can only occur in approved management areas outside seal breeding season
- Maximum allowable limit of 60 harbour seals and 70 grey seals p.a.
- Acoustic deterrent devices banned around wildlife tourism sites

Butler et al. 2015

SOURCE: woodproducts.fi

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SOURCE: metsa.fi

MULTI-CRITERIA DECISION ANALYSIS

A case study in in Scandinavia

WHAT IS MULTICRITERIA DECISION ANALYSIS?

Multi-criteria decision analysis (MCDA) is a decision-making tool used to mediate conflicts between strongly opposed groups.

MCDA can be used to calculate trade-offs between a variety of management options, to form a clear view of which actions can achieve objectives held by opposing parties. Advantageously, management options can be ranked by order of a number of currencies, such as monetary, geographic or biophysical units (Esmail & Geneletti, 2018)

THE MCDA PROCESS

1. **Identify context and participants**
2. **Define decision criteria**
   e.g. effectiveness, timescale, costs, legality, animal welfare
3. **Weight criteria**
   Stakeholder groups determine their preferences for each criterion
4. **List management options**
   e.g. changing quotas, introducing deterrents, altering habitats
5. **Score management options**
   Evaluate performance of management options against criteria
6. **Multicriteria analysis**
   Aggregate scores to reveal best management options
7. **Evaluate results**
   Negotiate outcomes among stakeholders

Adapted from Davies et al. 2013

REINDEERS AND FORESTRY

In Finland, competition between traditional land practices and modern technology is an ongoing challenge for forest managers.

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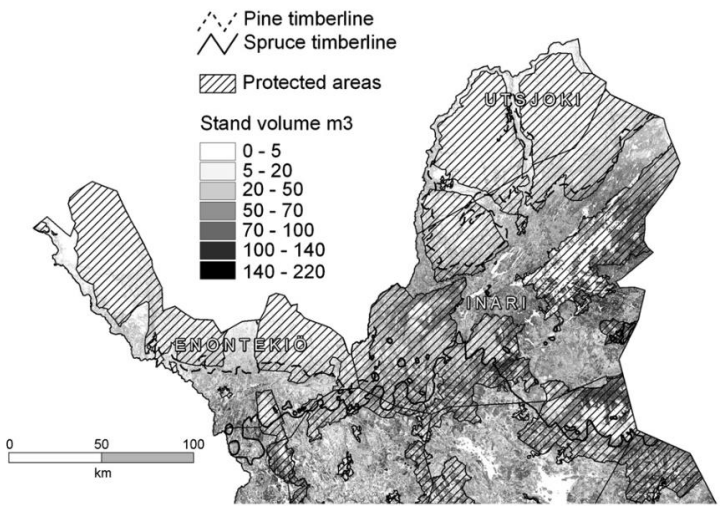
In the remote northernmost reaches of Scandinavia, old growth forests provide essential resources to support traditional livelihoods. For many centuries, the indigenous Saami people have utilised Finland's old growth forests as important winter grazing sites to restore the energy budgets of their reindeer herds.

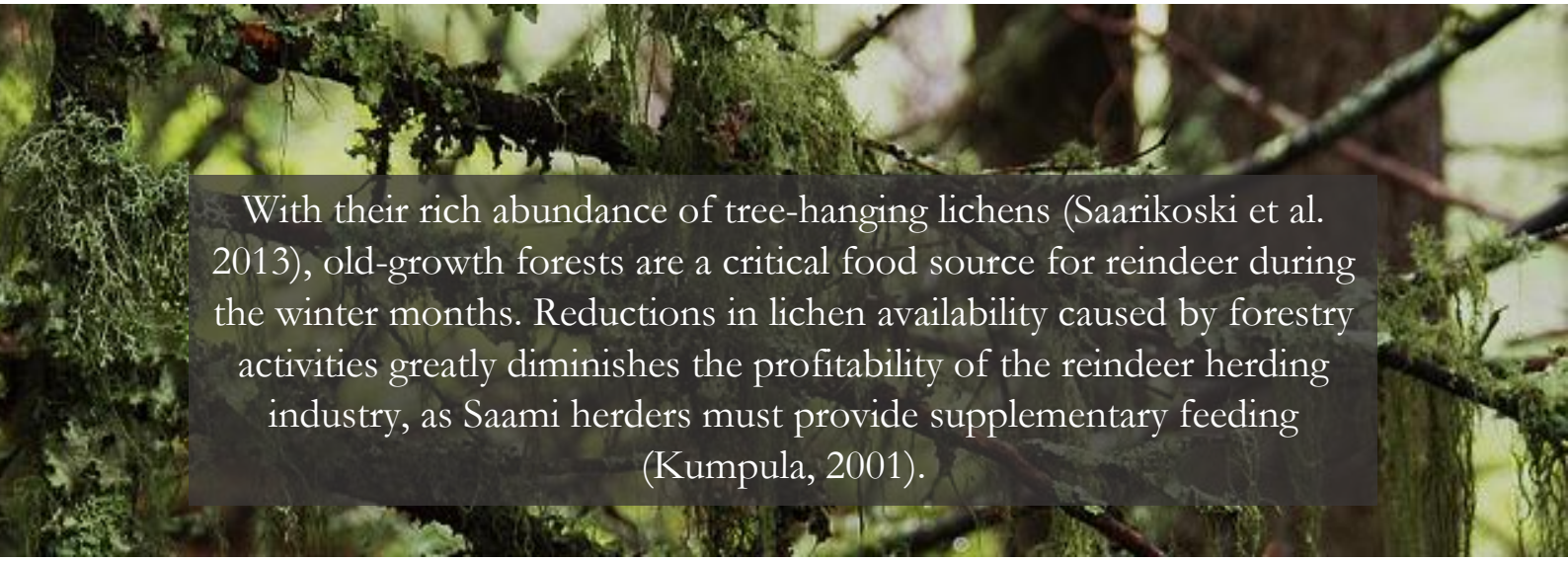
Following rapid expansion in 20th century, Finland's forestry sector has also gained competing claims on forest resources in the Upper Laplands. Now an integral part of the local economy, there is significant civic interest in continuing support for forestry activities. However, forestry productivity has undergone notable declines due to the long regeneration times of the slow-growing arctic forests (Saarikoski et al. 2013). Consequently, past exploitation has locked the most valuable timber in 29% of Finland's remaining old growth forest fragments (Mustajoki et al. 2011).

FIGURE 4- Timber concessions of the Finnish Upper Lapland



LAND USE CONFLICT:
OLD GROWTH FORESTS

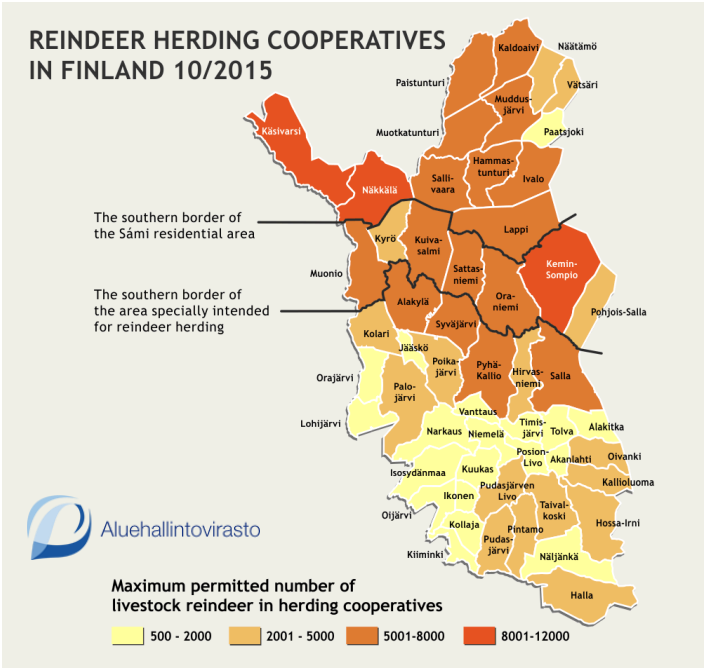
Utilisation of Finland's t remaining old growth forests has become a subject of growing contention between reindeer herders and foresters



With their rich abundance of tree-hanging lichens (Saarikoski et al. 2013), old-growth forests are a critical food source for reindeer during the winter months. Reductions in lichen availability caused by forestry activities greatly diminishes the profitability of the reindeer herding industry, as Saami herders must provide supplementary feeding (Kumpula, 2001).

STAKEHOLDERS ARGUE AGAINST LOGGING

- Logging damages pristine natural areas that are a valued asset to the tourism industry, providing 20% of gross income and employment (Mustajoki et al. 2011).
- With 56 herding cooperatives and designated herding area spanning a third of the country (Raitio, 2008), reindeer herding has significant heritage and economic value
- Old-growth forests are considered a traditional land-use right of the Saami people, lending an ethno-political element to this conflict (Heikkinen et al. 2007)



USING MCDA AS A MANAGMENT TOOL

Following earlier failed attempts at conflict resolution (Raitio, 2008), Mustajoki et al. 2011 introduced multicriteria decision analysis

- Group project meetings were carried out by a panel of experts from backgrounds including forestry management, reindeer herding, nature protection, conflict resolution and research science
- The group identified common objectives relating to social, cultural, economic and ecological sustainability
- Impact evaluations were carried out using expert elicitation when quantitative data was lacking, to reveal impacts of five management alternatives on criteria / attributes
- Criteria weights were determined by decision analysis interviews DAI with 15 different stakeholder groups

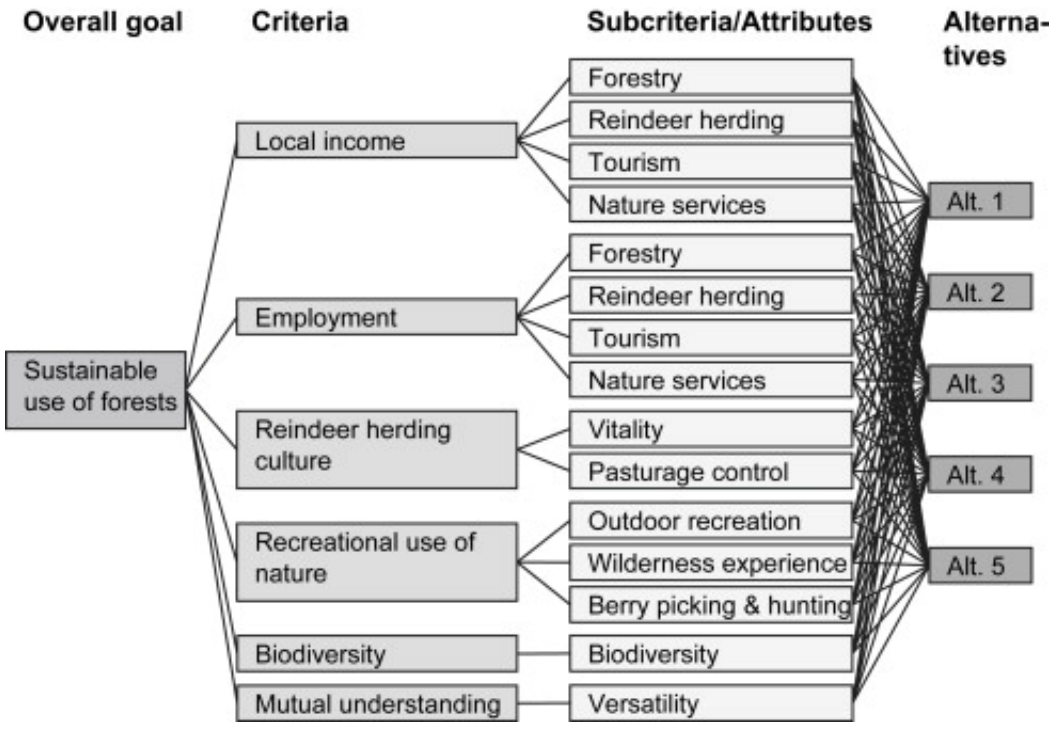


FIGURE 5- Value tree describing MCDA management objectives, criteria, attributes and management alternatives – Musajoki et al. 2011

OUTCOMES OF DECISION ANALYSIS

Decision analysis interviews determined stakeholder preferences and identified that the optimal solution would be to restrict logging between 80 000 – 115 000 m^3 per year

Management alternatives:

1. Maximum sustainable yield (MSY) of logging at 300 000 m^3 per year
2. Logging capped at half of MSY: 150 000m^3/year
3. Logging capped at 115 000 m^3/year (Sandstrom et al. 200)
4. Logging capped at 80 000 m^3/year (Sihvo et al. 2006)
5. Forests older than 140 years are preserved (logging becomes unprofitable at MSY 11 000m^3 year)

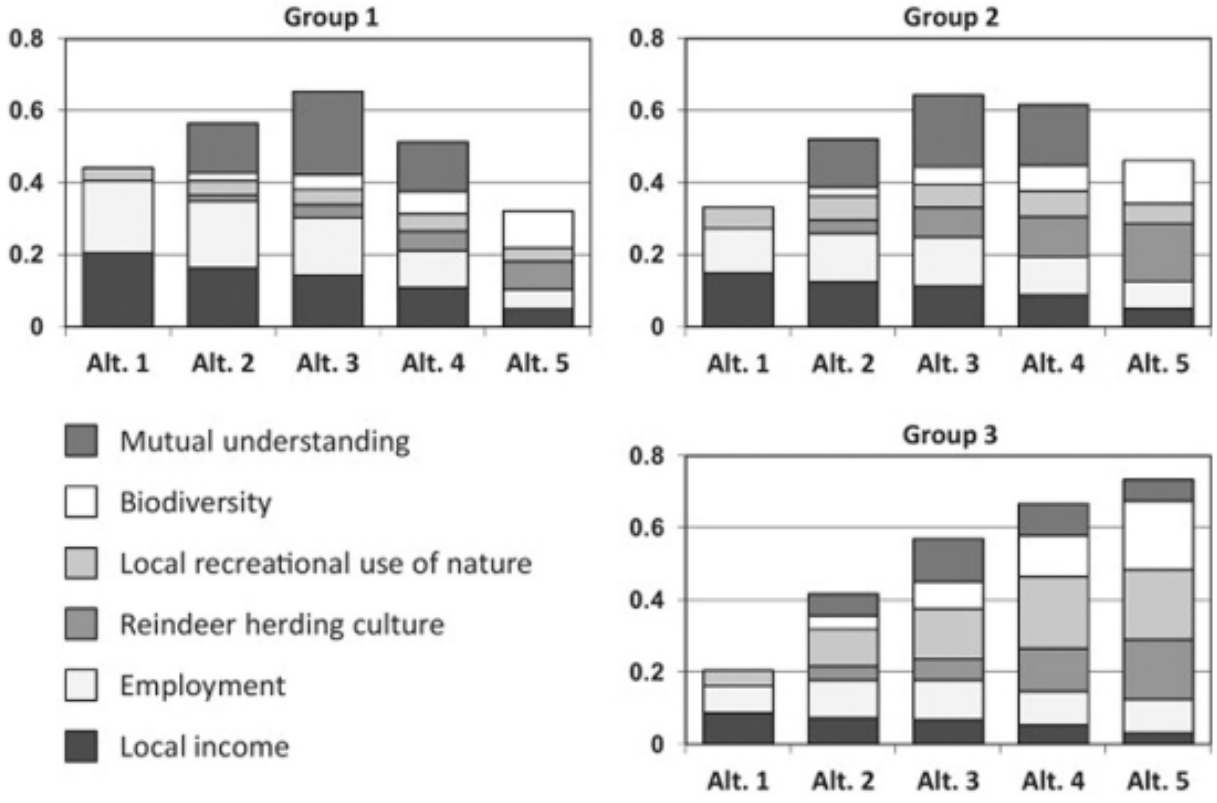


FIGURE 6- MCDA outputs revealing the order of preferences between three distinct stakeholder groups – Saarikosji et al. 2013

REVIEWING MULTICRITERIA DECISION ANALYSIS

In the case of reindeer herders and foresters in Finland, the use of multicriteria analysis as a decision-making tool has successfully alleviated conflicts of interest, beliefs and values and governance processes. Advantageously, MCDA has also identified management actions which achieve the most benefit for social, cultural, ecological and economic goals.

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JOINT FACT FINDING

A case study of Australian Wetland Management

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WHAT IS JOINT FACT FINDING?

Joint fact finding (JFF) is a public engagement strategy used to resolve factual conflicts between the stakeholders, policy makers & environmental managers

JFF has three main objectives:

1. To use the best technical information available and focus upon the factual elements of complex social disputes
2. To enhance collaboration between stakeholders
3. To provide a sound knowledge basis to construct public policy

Alder, 2014

THE JFF PROCESS (adapted from Maatsura & Shenk, 2016)

1. Assess the need for JFF

identify dispute

appoint a neutral party to convene

2. Convene the stakeholders

drafting roles & timeline

generate technical questions

review exisitng knowledge

3. Define the scope of the study

frame objectives

evaluate costs and benefits of methods

4. Conduct the study

experts study team collects and analyses data

report prepared for stakeholders

5. Evaluate the results of the study

experts translate findings

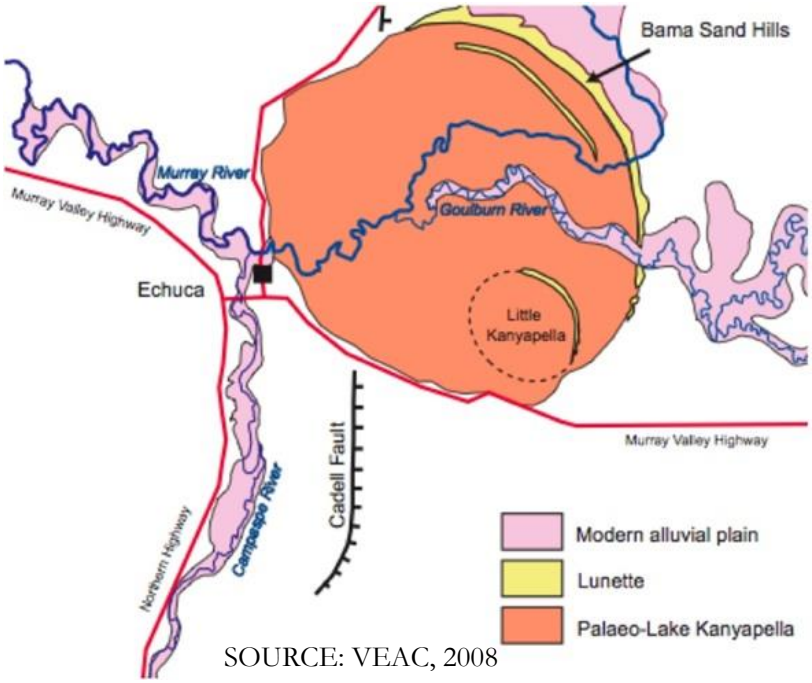
stakeholders outline policy recommendations

6. Communicate the results of the process

stakeholders present findings to consituents, public and policy makers

LAND MANAGEMENT:
KANYAPELLA BASIN

The Kanyapella Basin is large, ephemeral wetland situated on the floodplain of the Goulburn and Murray rivers.



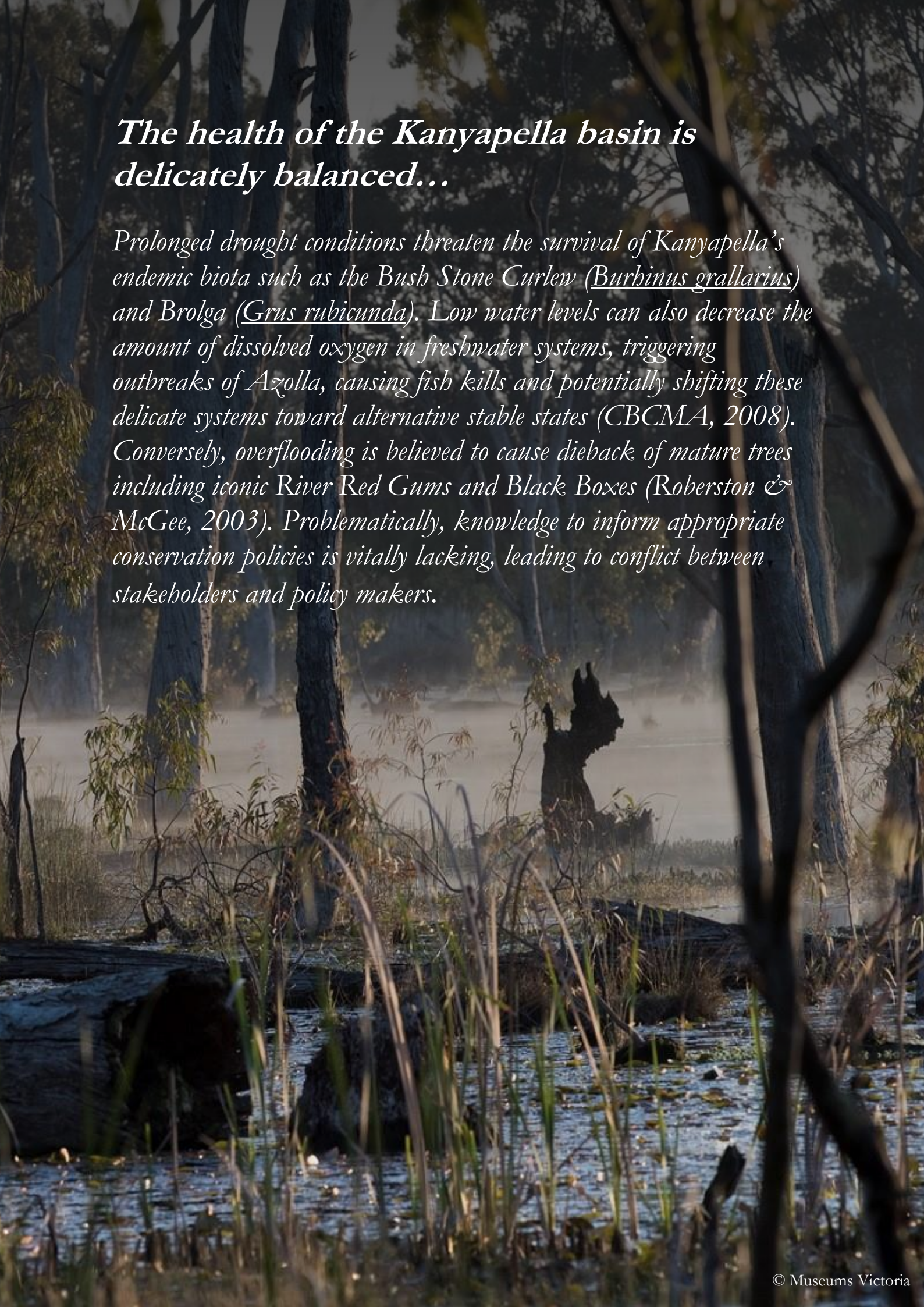
SOURCE: VEAC, 2008

In a matrix of arid agricultural land, the freshwater marshes of Kanyapella Basin have national ecological importance as a breeding site for waterbirds. However, for much of the past decade, prolonged drought, livestock over-grazing, tree removal, drainage channel construction and introduced species have degraded the health of this important freshwater ecosystem.

Despite prior efforts to restore the wetlands using revegetation and pest control, limited understanding of the basins' natural wetting and drying cycles has challenged the determination of an appropriate water regime (Environment Australia, 2001). The subsequent failure to recover Kanyapella's ecological assets has resulted in strained relationships between stakeholders, including management authorities, indigenous communities, landowners, field and game clubs and conservation groups.

Ethno-political:

The undulating sandhills of the ancient shallow Lake Kanyapella were traditional burial sites for Indigenous people (Rhodes, 2012)



The health of the Kanyapella basin is delicately balanced…

Prolonged drought conditions threaten the survival of Kanyapella's endemic biota such as the Bush Stone Curlew (Burhinus grallarius) and Brolga (Grus rubicunda). Low water levels can also decrease the amount of dissolved oxygen in freshwater systems, triggering outbreaks of Azolla, causing fish kills and potentially shifting these delicate systems toward alternative stable states (CBCMA, 2008). Conversely, overflooding is believed to cause dieback of mature trees including iconic River Red Gums and Black Boxes (Roberston & McGee, 2003). Problematically, knowledge to inform appropriate conservation policies is vitally lacking, leading to conflict between stakeholders and policy makers.

OUTCOMES OF JOINT FACT FINDING

In the early 2000s, Hugh Roberston introduced JFF to address knowledge barriers hindering conservation conflict resolution.

Oral History

In situations where there is limited historical and expert knowledge of a system, a fast and cost-effective approach to information gathering is to harness the experiential knowledge of local people (Amengual, 2004). Following this mindset, Robertson & McGee (2003) consulted local landowners, residents and natural resource managers, to evaluate the causal effects of water management on flooding and significant flora and fauna in the Kanyapella Basin. Interviewee accounts were triangulated with aerial photographs, historic data and existing scientific knowledge to increase their validity (Table 3). Oral evidence successfully identified events unknown to expert studies up to 50 years in past (Amengual, 2004), and highlighted that intermediate sized flood events have been removed from the wetting cycle of the Kanyapella Basin.

TABLE 3. Oral history information and cross-validation sources from the Kanyapella Basin

Type	**Example**	**Information source used**
Hydrological	Reports of the extent and frequency of inundation, and the effects of increased river regulation on flooding	Aerial photographs, digital elevation model, floodplain study
Water quality	Incidental observation of surface water salinity, turbidity and algal bloom	Unpublished water quality monitoring data; Regional water quality assessments
Vegetation	Indication of the water regime required for the conservation of eucalypts	Existing scientific knowledge
Fauna	Lists of bird species and other fauna	Existing fauna records
Management	Description of the effects of past management on the wetland	Previous draft management plan; Existing literature

Adapted from Robertson & McGee, 2003

Water quality monitoring

Water quality and turbidity monitoring was conducted fortnightly at four sites in the Kanyapella Basin. This study detected unnaturally high-levels of salinity, turbidity, nitrate and phosphorus, suggesting current water management practices were poor. Improving this could reduce nutrient outfall levels to the Murray and Goulburn rivers, leading to a widespread increase in ecosystem health.

Robertson & James, 2002

Geographic Information Systems

Vegetation surveys were carried out 4 times a year at 120 sites across the Basin. Using GIS, maps were produced relating to the distribution and relative abundance of both eucalyptus and understory species. This analysis was useful in identifying areas of altered hydrology marked by clusters of weedy natives. When combined with floodwater data, vegetation mapping has potential to predict changes in vegetation communities and weed threat under different water regimes. In this way, researchers can model and optimise water management strategies.

Robertson & James, 2002

field & game™ AUSTRALIA INC.

GOULBURN BROKEN CATCHMENT MANAGEMENT AUTHORITY

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DECISION TOOL SUMMARY

PROS	CONS
Adaptive Co-Management	
Emphasises communication to focus on shared decision-making	Requires long term funding and organisation capacity
Increases adaptive capacity and strengthens socio-ecological systems (Plummer, 2012)	Partnerships can degrade over time
Incorporates a learning component	Monitoring is costly and requires organisational expertise
Multicriteria Decision Analysis	
Easy comparison of ecological and socio-economic goals	Scoring process lacks transparency (Saarijoski et al. 2011)
Incorporates both qualitative and quantitative information (Mendoza & Martins, 2006)	Conflicts can escalate if the focus is misplaced upon worldviews and identities (Stirling, 2006)
Participatory decision-making builds trust between stakeholders	Becomes complicated with more management alternatives
Joint Fact Finding	
Findings are jointly developed, so information gather is more credible and durable	Not very useful for resolving value-centred problems, like 'what species should we prioritise (Alder, 2014)
Stakeholders and public have a greater role in resolution which reduced public policy debate	Funding is required, but their sources could potentially jeopardise the project's neutrality
Information gathering allows optimisation of management solutions	Can be a length (and costly) process

FINAL THOUGHTS

As man continues his prerogative of development and expansion, the role of the conservationist is rapidly evolving.

For applied scientists in narrow fields of expertise, resolving environmental disputes is challenging because of their complex origins in economics, policy, social welfare and cultural heritage. If addressing these multidimensional problems more effectively in future is the goal, conservationists must become well-versed in a new language- that of the social sciences. Conflict management processes including collaboration, welfare assessments, monitoring and decision tools will therefore be essential to alleviating the negative impacts of conflict on stakeholders and biodiversity (Colyvan et al. 2011).

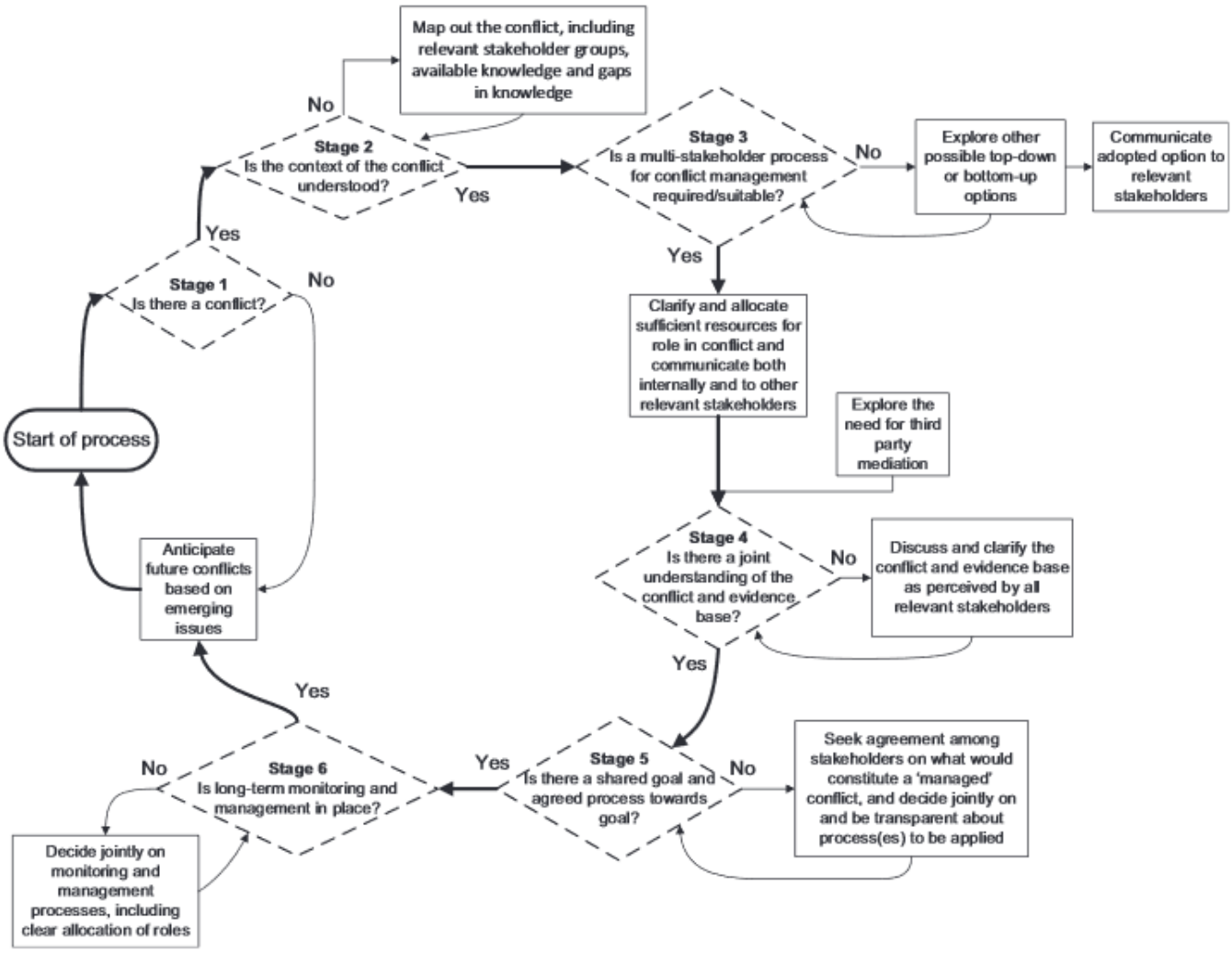

FIGURE 7. A novel approach to identifying and managing conservation conflicts, proposed by Young et al. 2016.

"Our carrying capacity for wildlife depends on conservation's ability to reconcile social conflicts"

Madden et al. 2014

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