Agenda and Notes from

MANAGING NATURAL VALUES IN A CHANGING CLIMATE WORKSHOP

October 2008

Department of Primary Industries, Parks, Water and Environment

Tasmania
Explore the possibilities

Agenda and Notes from
MANAGING NATURAL VALUES IN A CHANGING CLIMATE WORKSHOP
on 9-10 OCTOBER, 2008

Convened by

Tasmanian Climate Change Office and Department of Primary Industries & Water, at the CCAMLR Secretariat,

181 Macquarie Street, Hobart

Agenda:

DAY 1: Thursday, 9th October

Session 1 – Introduction

9.00 am Michael Dunlop – Setting the scene for today's workshop

Session 2 – Biophysical & ecological changes/implications

9.30 am - 12.00 pm Breakout Groups

- Individual Species Responses
- Responses at the Ecosystem level
- Threats
    - Fire
    - Invasive Species/Disease
    - Land-use Changes and emerging/new threats

11.30 Reporting back from all groups

12.00pm Lunch

Session 3 – Implications for Habitats and Natural Values

1.00– 3.00 pm

- Terrestrial
- Aquatic
- Marine & Coastal

3.00 pm Afternoon Tea

Session 4 – Plenary

3.15 pm	Reporting back from all groups
3.45 pm	Group discussions
4.30 pm	Close

DAY 2: Friday 10th October

Session 1 - Introduction

9.00 am	Introduction and recap from Plenary Session

Session 2 – Policy and Planning in the Face of Climate Change

9.30 am	Chair – Cross-cutting Themes and Questions from Day 1
10.30 am	Morning Tea
10.45 am	Chair – Cross-cutting Themes Continued
12.00 pm	Summarise / Where to / Close
12.30 pm	Lunch
1.30 pm	Field trip to Free-Air Carbon Enrichment (FACE) Experimental Site, Pontville Mark Hovenden - Global Change Impacts Ecologist, School of Plant Science, University of Tasmania

List of attendees to the workshop

Adrian Pyrke
Alan Johnston
Alex Spink
Andrew Crane
Andrew Holliday
Annie McCuaig
Annie Philips
Annika Everaardt
Anthony Reid
Brooke Craven
Bryce Graham
Christine Crawford
Clare Hawkins
Colin Bastick
Daniel Sprod
Dave Pemberton
David Bowman
David Nichols
David Taylor
Declan MacDonald
Drew Lee
Dugald Close
Felicity Faulkner
Felicity Hargraves
Fionna Bourne
Gary Davies
Glenys Jones
Gretta Pecl
Howel Williams
Ian Houshold
Jann Williams
Jason Bradbury
Jason Whitehead
Jayne Balmer
Jennie Whinam
John Harkin
Karyl Michaels
Kerry Bridle
Kim Nolan
Liza Fallon
Louise Gilfedder
Louise Mendel
Mark Bryce
Michael Askey-Doran
Michael Comfort
Michael Dunlop
Mike Driessen
Mike Pemberton
Murray Root
Naomi Lawrence
Nathan Males
Neil Davidson
Nerida Bleakley
Oberon Carter
Penny Wells
Peter Davies
Peter Voller
Phil Bell
Richard Koch
Rosemary Gales
Rosemary Sandford
Sarah Munks
Sib Corbett
Stephen Harris
Stephen Waight
Stewart Blackhall
Stewart Frusher
Tim O'Loughlin
Tim Rudman
Todd Baker
Tony Norton
Wendy Potts
Wendy Spencer
Yvonne Hill

Thursday Workshop Notes:

Session 1 – Introduction & setting the scene for workshop (Michael Dunlop)

Session 2 – Biophysical & Ecological Changes / implications

Individual species responses

- Traits that could make species more susceptible:
    - Specialised habitat / microhabitat requirements
    - Narrow environmental tolerances / thresholds
    - Dependence on specific environmental triggers or cues
    - Dependence on interspecfic interactions that could be disrupted by climate change
    - Poor ability to disperse or colonise new or more suitable range
- It will be complicated – no species is an island. Synergies are likely
- Imbalances likely – some species will increase; others will decrease
- Need to do risk matrices for all Tasmanian species
- Fire is an issue for all terrestrial groups

Examples

- Specialised habitat requirements
    - some eucalypts
    - Freshwater crayfish
    - Swift parrot
    - Handfish
- Narrow environmental tolerances
    - Galaxids
    - Ferns
    - Algae
    - Stag beetles
- Dependence on specific environmental triggers or cues
    - Aquatic macrophytes
    - Epacrids
    - Leucopogon
    - Skinks
- Dependence on interspecific interations
    - Orchids / wasps / fungi
    - Bettong / fungi / Eucalypts
    - Shearwater / prey availability
    - Urchin predators
- Poor ability to disperse or colonise new or more suitable range
    - Forty-spotted pardalote
    - Marine algae
    - Native conifers, alpine plants
    - Velvet worms
    - Frogs
    - Endemic marine molluscs

We know:

- Changes to reproductive success
- Changes in seasonality of rainfall
- An increase in pest / weed issues

We don't know:

- Change in population / extent of herbivores
- Change in competitive advantage / tolerance between species
- Interactions between species under changed environments
- Responses of particular species

Responses at the ecosystem level

Alpine

- High sensitivity, indicator communities
- Fire increases / increased lightning strikes
- Moisture decreases / changes
- Temperature increases
- Research to identify which communities /areas have step-changes (critical thresholds of change) and which have cumulative change (gradual)
- Macquarie Island – wetter – more landslips – plant community impacts
- Changed geomorphic structures and processes and feedback responses
- Changes in species composition
- Changes in pollination
- Pests and diseases – new opportunities for invasive species
- Phytophthera
- New weed habitat
- Conifers favoured
- Hydrological responses; hydrological buffering

Rainforest

- Increased fire intensity – loss of rainforests
- Increased disease opportunities eg: myrtle wilt
- Decreased opportunity for rainforests to re-establish over time
- Removal of rainforest along riparian areas
    - changed river flow / structure
    - bank erosion
    - bed erosion
    - increased salinity from tidal surges

Wet Eucalypt forest

- Fire
- Commercial forestry – edge effects; systematic effects
- Changes in growth rates (increase and decrease)
- Changes in foliar nutrients and browsers

- Eucalypts presently out of step with current fire frequency
- Phenological changes forcing shifts in fauna behaviour eg: pollinators

Dry Eucalypt forests and woodlands

- Thickening of woody understorey
- Eucalypt dieback
- Changed hydrological regimes and human use of water resources / irrigation
- Browsing increases ; pests and diseases
- Change in boundary between grasslands and woodlands / forests
- Edge stresses
- Filtering out of obligate species due to higher fire frequency
- Failed regeneration
- Potential for increased salinity
- Potential changes in community structure and composition

Grasslands

- Favoured under warming
- Impacted by irrigation
- Transgression of grassland boundary by shrubs/thickening
- Changes in floristic composition
- Increased grazing pressure
- Different grassland types favoured
- Impacts to birds; invertebrates
- Animals flexible on big islands

Saltmarsh and Marine

- Sea-level rise, wedging out of some communities
- Loss of landscape in coastal areas
- Increases in human influences
- Change in fish reproduction – estuaries
- Changes in fisheries
- Changing habitats – potential for marine pests
- Seagrass and kelp communities potentially highly impacted
- Reduced run-off, increased sedimentation
- Southward move of the East Australian Current – changed nutrients etc
- South-east Tasmania – major area of productivity – potentially shift to South-west
- High occurrence of local endemism in Tasmanian marine bioregions – this may change
- Which impacts can we control and build resilience?
- Coastal erosion - shifting sands

Policy and Planning Responses

- Limit anthropogenic effects in systems – increase resilience
- Identify 'high value' natural assets and concentrate efforts on these
- Offshore island management – remove grazing; weed control. Low priority for islands inundated

- Invasive species management and fire management
- Identify elements of ecosystems subject to threshold or cumulative changes
- Focus fire management on those communities that will be most impacted and are most sensitive to fire
- Engagement of indigenous landowners
- Prioritise according to simplicity of management response, rather than complexity
- Build a more robust, resilient system (connectivity), especially in lowland dry areas
- Refuge areas in marine parks with removal of anthropogenic factors eg: fishing
- Research traditionally fragmented, need more research collaboration across disciplines and research into process and function
- Community education and engagement
- Payment for ecosystem services
- Promotion of natural systems, rather than just biodiversity
- Researching historical data – eg: tree rings; sediment deposits
- Research into restoring degraded systems
- Legislative frameworks – needs to reflect the need for adaptation
- Planning for what we know we can do
- Economic incentives for adaptation

Threats - Fire

Hazard Reduction

- Good fire planning and monitoring needed
- Currently pressure to do more hazard reduction burning – will need to protect fire-sensitive assets with fuel reduction
- Some concerns raised that too much fire may reduce vegetation resilience – leading to impacts from PC, erosion, soil carbon etc

Research and monitoring needed/improved

- Fire boundary mapping and recording – state-wide fire maps
- Fire danger indices
- Historical context – return time of megafires
- Fire interaction with soil carbon
- Vegetation condition monitoring /mapping
- Many scales needed to answer different questions

Impacts

- Increases in:
    - Growth rate
    - Woodiness
    - Transpiration
    - Fuel load (where water is not limited)
    - Flammability
- Fire weather – increases in:
    - Dry lightning
    - Wind

- Number of days over 300
- Change in seasonality – later rain
- Leads to lengthening of fire season - increases in:
    - Fire frequency and extent
    - Pressure on volunteers
    - Fires burning to burnout boundaries
- Mitigation
    - Rapid fire suppression
    - Predicting lightning and checking after for fire
    - Increase fire management staffing – permanent fire crews

Fire-sensitive/vulnerable ecosystems

- Rainforest, alpine, sphagnum peatlands etc (existing list of vulnerable communities)
- These are at greatest risk from likely changes in fire regimes due to climate change
- Combined with drought, it reduces resilience
- Peat soils – increases flammability
- Margins / ecotones – attrition of fire sensitive communities – more vulnerable
- Erosion / soil loss will cause vegetation condition to decline
- Interactive impact of PC with fire

Fauna

- OBP migratory route – fires are impacting on forage
- There will be winners and losers. Not appropriate to list individual species, and there will be changes in populations

Limitations

- Weather stations
- Analysis of weather data
- Soil dryness

Values / Priority

- Risk analysis has been done - needs to be adopted
- Labour – fire crews
- Smoke may become an issue
- Carbon – concern that burning increases CO2 emissions
- Social issues may impact on wet forest old growth logging and regeneration burning

Threats - Invasive Species / Disease

- Monitoring is crucial
- Future impacts re: viability of important species under climate change
- Modelling is crucial
- Identifying potential threats re: climate change – more information needed
- Economic issues are the bottom line
- Exponential change over time – accelerating and therefore variable and unknown
- Distinction between climate change impacts and invasive impacts and relationships

- Issue is ecosystem collapse / loss – not change
- Lag between landscape change and ecosystem creates loss issues and opportunities for invasives
- Have potential opportunities ie: islands to protect / preserve
- Climate change has 'opportunity value' for cats / rodents etc
- Wildlife disease is increasing in frequency and types. Climate change significant effect
- Economic costs of disease and human relationship
- Modelling climate change on human disease spread world-wide – humans can't be separated from other life
- Forestry (Eucalypts) – key component in climate change – (sequestration and emissions); increased stress events need amelioration re: compensatory recovery - a management opportunity. More information / science required
- A known unknown: increased disease opportunities via invasive species
- Marine impacts – increasing tension between climate change impact and existing exploitation of resources. Habitat change is known. The impact is unknown.
- Many new disease opportunities (marine)
- Demographic changes – population increase brings about pollution increase
- Genetically modified organisms may be a managed marine response, with unknown impact regarding disease
- Huge economic impact re climate change in the marine environment
- Invasive vegetation – plants of concern are changing – esp. grasses
- Management - intervention control is large scale 'gardening' based on a set of values that are contingent and may be different in the future
- Need to develop new risk assessment tools to take account of climate change, particularly for vertebrates
- Biofuel impacts – there is a huge potential risk as weeds / pests and disease spread
- Herbicides – changes and changed impacts on vegetation
- Now is the best time to act
- Problem wildlife is on the increase due to land-use change and will get worse under climate change

Climate Change benefits?

- Invasive species with economic benefits and /or reduce pressure on native species
- Any ecosystem is better than none
- Carbon trading benefits
- "Invasive" – a human concept?
- In response, new models and holistic approaches are being developed
- Need to identify and prioritise threats and risks (resource implications)
- Performance / monitoring is crucial to assess and reassess modelling and predictions. Climate change helps us focus on these issues
- Subvert the dominant paradigm
- Need to remove 'silo' responses and pool information, resources and responses

Climate Change negative impacts

- Pace of climate change outstrips ecosystem resilience and adaptation

- Decoupling
- Increased interactions and synergistic emergent problems from the 'nasties'
- Ecosystem resilience is the central underpinning issue
- Native pests / pathogens and other 'sleepers' will respond to climate change. The focus should not only be on exotics

Threats - Land use change and emerging / new threats

Pressures arising from climate change that would result in land use change

- More people eg: immigration
- "Food bowl" – diversification; productivity
- Coastal pressures
- Less water / change in rainfall pattern. (But plenty of water in some places)
- Carbon Economy
- Market-oriented solutions – permits, offsets, credits

Resulting land use change and emerging threats

- Irrigation – pasture to crop; clearing
- Biofuels
- Plantation / carbon farms
- Urbanisation – barriers to flows; changes in material, transport
- Change in habitat
- More fences (impact on faunal movements)
- More bushfires
- Renewable energy – wave, wind solar

Implications / conflict

- Poor water quality
- Streamflow / water usage
- Water logging on poor soils
- Salinity
- Biosecurity risks – weeds; disease
- Changes to native populations – increase in wallabies; decrease in wedge-tailed eagles
- Drying of wetlands
- More hunters/predators – cats; dogs
- New soil problems eg: coastal acid sulphate soils; exposure of sodic soils

Session 3 – Implications for Habitats and Natural Values

Management Responses – Terrestrial

What are our objectives for natural values management in light of Climate Change?

- Primary Objective: Preserving Ecosystem Function
- Single species vs Landscape function
- Private Land – Balancing sustainable production with preserving key values

Current Approaches:

- Threatened Species Protection Act – focus on species rather than systems – piecemeal
    - Lack of commitment and money
    - Need more focus on functional species, centres of diversity
    - Resource hungry
    - Needs review
- Reserve system
    - Contains small reserves
    - Vulnerable to weeds, fire
- Private Reserves
    - Need incentives
    - Money, advice, support accreditation
- Whole farm planning – needs landscape or catchment context

Tools:

- Geoheritage legislation needed
- Legislation generally – land-use planning important
- Fostering partnerships with landholders
- Monitoring
- Planning in a wider context – eg: catchment – co-ordinated approach
- Carbon trading and market-based Instruments
- Government service incentives (eg: provide transport; reduction in rates)
- Education
- Extension systems
- Policies and guidelines for private land management and reserves

Management Responses – Terrestrial

What are our objectives for natural values management in light of Climate Change?

- To maintain the diversity of natural systems and processes and resilience and continuity of systems and interactions between systems. Natural systems includes species, genes, biodiversity, ecosystems and ecosystems services etc.
- Prioritisation of impacts
- Mitigation
- Adaptation based on monitoring
- Be flexible in natural resource management
- Ensure cross-agency collaboration in decision-making

- Prioritise ecosystem functions, species and habitats.
- Genes at risk – risk assessment / modelling.
- Management is not place-based
- Develop realistic and useful legislation and policy
- Develop landscape-level management plans and systems that cover both on and off reserve areas
- To integrate existing landscape level systems. Eg: Forest Practices system; catchment management systems, NRM etc. To facilitate off-reserve management. Cross-agency – break down silos.
- To ensure Comprehensive, Representative and Adequate reserve system at the bioregional scale
- To minimise loss of species
- Build upon existing 'good' parts of system :
    - CAR reserve system
    - Forest Practices system
    - Permanent Forest Estate
    - Natural Resource Management (NRM)
    - Water Management system
    - Nature Conservation Act

What are the approaches to deliver these objectives?

- Multiple spatial scales - Landscape, catchment, regional and local scale
- Both reserve and off-reserve management
- Generic approach to weeds, pests and diseases management – combined approach to biosecurity at catchment or sub-catchment level. (standard hygiene procedures). Assess/evaluate and ensure effective and rapid response
- Prioritise impacts including pests and diseases using (quantitative or qualitative) risk-assessment approach
- More connectivity in reserve system
    - Linkages of habitats in 3 dimensions across land tenures
    - More strategic approach to reserve design
- Development of threshold levels for maintenance of habitats and processes
- Restoration of habitats where lack of connectivity or required to maintain processes
- Landscape-level planning needs to integrate terrestrial freshwater systems

Tools

- Education and communication between policy makers, scientists, land use managers, planners, private landholders and the general public.
- Monitoring – implementation and effectiveness; feedback mechanisms
    - Adaptive management processes
    - Development of evaluation framework
    - Strategic approach required across agencies
    - Development of measurable objectives
- Modelling scenarios – what we don't know
    - Testing strategies
    - Multi-species Population Viability Analyses (PVAs)
- Databases

- Natural Values Atlas (NVA)
- Locality and potential habitat
- Avoid derived information / data interpretation

Management Responses – Terrestrial

What are our objectives for natural values management in light of Climate Change?
Current objectives:

- Maintain evolutionary processes
- Protection – species level (present process) ; ecosystem level
- Current approach has status orientation. Future approach requires reassessments of goals and what can be achieved.
    - Provision of ecosystem services must prioritise genetic diversity (C,A,R)
    - Present approach value judgements are hierarchical and rigid and no longer appropriate. The hierarchy of values needs to be flexible and open for reassessment
- Securing resources (public/private land management) – under climate change this may change
- Maintain natural rates of change (this may change)
- Icon management (threatened species)
- Threat abatement
- Maintain what we've got (public and private)
- Sustainable development
- RMPS Objectives (overarching)
- Static model of natural world dominates current underpinning values
- Rarity has priority over representativeness (although this is important)

Are we achieving current objectives?

- NO:
    - Diversity in decline
    - Landscapes degraded
    - Mitigation (reactive) has failed
    - Planning has not been successful
    - Were the objectives wrong?
    - Greater knowledge has not led to greater success
- YES:
    - The C&R of CAR – this is a positive
    - Greater social acceptance of natural values (sometimes ahead of State Government)

Reasons for failure to achieve objectives

- Internal barriers (bureaucratic) have been problematic (and beneficial). These barriers need to go
- Diminished human resources
- Competing policy and legislative objectives leading to systemic failure

New Objectives

- Climate change provides and opportunity to leverage bureaucratic reform and organisational restructure
- Focus should be on uniqueness and endemism rather that rarity (before things become rare). Preserve Tasmania. This could include any healthy landscape / ecosystem rather than just rare. (Private reserves)
- Need to identify, assess and protect economic benefits of natural environment (Carbon, storage, water etc)
- A mechanism for this is making the environment pay
- Make resilience a criteria. 'resilience' needs clarification and definition. Climate change has an impact on this. Eg:
    - Self-perpetuating
    - Diversity maintenance
    - Ecosystem 'integrity'
    - Habitat diversity
- Need to prioritise the components of the reserve system to identify the bits we can effectively manage for uniqueness / resilience. That is, targeted and strategic intense management and discard the rest.
- New objectives should be achievable (compared with current objectives)
- Scale of objectives can increase effectiveness and skew our assessments and review regarding success
- Adaptive management / review cycles

Tools/ Knowledge gaps

- No need for new tools / data sets but we need to refocus and collate and analyse the data we already have and share it. Need to use tools differently
- Establish a shared database / register / metadata to avoid duplication / gaps etc
- Structures and processes to encourage and maintain collaboration
- Potential data gap is fauna – need to assess what we have
- Legislative tools to cater for new objectives (eg: move away from Threatened Species focus)
- Ensure that National frameworks align with Tasmanian frameworks

Management Responses – Aquatic

What are our objectives for natural values management in light of Climate Change?

- Try to retain a broad range of habitat types to maintain diverse freshwater systems
- How do we maintain species resilience / persistence in climate change
- To understand how communities will change in the future
- Increase knowledge of surface water / ground water interactions
- To maintain and understand functions and processes in wetlands and river systems
- To understand the natural / historical variability in our freshwater systems (water is not always good)
- Monitoring for exotic invasive species to maintain our current lower levels
- Maintaining catchment marshes functionality
- Understanding water requirements for wetlands
- Artificially managed wetlands

- Raising community awareness (dry is not necessarily bad – let's fluctuate)
- Use CFEV to help identify important areas and become more broadly used
- To understand threats – eg: grazing
- Centralise water management
- Have a CAR reserve system for freshwater systems

What are the approaches to deliver these objectives?

- Need to do more monitoring of:
  - Ramsar wetlands. Ecological character descriptions
  - Environmental flows
  - Reserve system
- Water management planning
- Monitoring with the RMC as core business. Eg: geomorph, wetlands
- Innovative, efficient ways to use water
- Field-days / information days. Landowner information to understand values and processes and what it means to them under climate change.
- Greater riparian buffer – carbon capture
- Adjust sampling procedures to account for varying flows for water quality variables.
- Dam approval process
- Water licensing
- Approach 'water pool' for water allocation and use
- Legislation and review to find impediments that limit good conservation outcomes
- Incentives for maintaining Natural Values
- Water trading for the environment

Tools

- Need to have research program and monitoring program that looks at functions and processes
- Hydro-ecological model including aquatic systems
- Database of wetland plant knowledge and other good communications
- Multiple uses of water storages
- Integration of management tools eg;
  - VCA – Vegetation Condition Assessment needs to be reviewed to (include?)
  - TRCI – Tasmanian River Condition Index
  - CFEV – (Conservation of Freshwater Ecosystems Values database)- maintain into the future

  (Disadvantage – use the same baseline data)
- Monitoring vegetation condition index for wetlands using CFEV, TRCI together
- Need better methods for assessing wetland health in the future. eg: species life traits, function groups
- Scale and regionalisation of the tools - Adapt CFEV to a bioregional level
- Fully integrated property planning – includes business and conservation – all aquatic and terrestrial parts of the property
- Community consultation / engagement for education of landowners
- Water management planning
- Sustainable diversion limits

- Strategic monitoring and assessment of actions are not detrimental
- Assessment of climate change actions are effective in the long term
- Improved aquatic ecosystem assessment eg: improving AUSRIVAS
- Holistic environmental flow assessment

Other Issues
- Impact of scale
- Strategic reserve design on private land
- Change focus – give conservation the same value as the resource
- Just to be able to swim in it - enjoyment

Management Responses – Marine and Coastal

What are our objectives for natural values management in light of Climate Change?
- Existing legislation OK – clunky but it's doing the job
- Policy needs to be updated and new language to reflect climate change issues. It currently reflects static systems
- While it broadly takes into account community values, it was drafted when current future projections of climate change and the community were not as high a priority. Thus its uncertain whether the Act did capture all the issues
- The current MPA issues demonstrate difficulty in establishment whereas enforcement was OK
- Concern over terminology clarification – what does it mean and what are people's expectations: resilience, biodiversity, ecosystem health. How is it measured?

What approaches do we need?
- Increased emphasis on critical habitats as well as threatened species. eg: reef habitats
- Ecosystem approach compared with single species approach
- Integrated over systems – freshwater flows / sedimentation / nutrients / coastal systems
- Multi-disciplinary approaches
- Integrated approaches
- Is the resources management and planning system will appropriate after 20+ years?
- Clearing house of all information and audit process based on integration – social, economic. Identify gaps.
- Concern over community tensions, therefore need diffuse early
- Existing risk based approaches need to incorporate climate change issues
- Need to be better informed about what ecosystem services are being provided
- Do we let systems go? Community perceptions.

Tools
- Monitoring – coordinated; use the community
- Comprehensive and integrated approach to existing knowledge

Management Responses – Marine and Coastal

What are our objectives for natural values management in light of Climate Change?

- Need for threatened habitat legislation. eg:
    - alpine; reef habitat; native oyster leases
    - Refugia – critical habitat in NC Act
- Allocation of staff to conservation / climate change
- Conserving habitat types
- How do you deal with shifting ecosystems?
- Pole-ward extension of species
- Big changes on the east coast due to East Australian Current
- Maintain ecosystem function
- Climate change amplifies other impacts
- Build resilience
- Difficulties with biosecurity
- Is a maximum size limit appropriate?
- Fishing; tourism; recreation
- Need to clarify the meaning of:
    - Ecosystem resilience
    - Do we strive for biodiversity?
    - What comprises ecosystem health?
- Legislation – old language. Climate change is the new situation. Conceptually different meanings; uncertain if Act encompasses key issues. Needs to be broad. Needs to be more contemporary.

What approaches do we need?

- Legislation should reflect all stakeholders, including industry and the community
- More integration required – reduce 'silo' approach
- Act states 'take into account community values' very broadly
- Marine reserve enforcement good, but legislation to establish marine reserves not so effective
- Management of sea-level rise under land management planning
- Engage community understanding about wider marine issues and implications – not just sea-level rise
- Councils, because of lack of overview guidance, have gone their own way
- Multi-disciplinary approaches required, bur grouped in 'focus' integrated mechanism
- Is the RMPS still appropriate? Does a contemporary approach have merit?
- Extraction of water will also impact estuarine ecosystems. Interactive effects.
- Many more community tensions
- Social and economic issues need greater understanding, along with environment
- Clearing house – include what we know in one place
- Greater communication required. NRM a potential repository.
    - Transparent body
    - Integration mechanism
    - Collaboration
    - Work across issues
- Risk-based approach? Need greater understanding about sustainability that includes a component of climate change
- Also need to consider decisions for 'whole' environment – iterative process

- Broader issues need to be considered as well as species specific issues
- Ecosystem services. Estuaries – seagrass communities – natural waster water
- Water quality objectives
    - Have strategies – not necessarily legislation. eg: stormwater strategies
    - Upper estuary – wetlands. They offer ecosystem services
- Identify whether some areas of the marine environment do not change much - Refugia areas?

What tools do we currently have?

- In what areas can proactive tools be developed?
- When reactive management occurs, risk management becomes more applied
- No-regrets decisions
- Moving marine species to another place is less likely or possible. Eg: handfish – ex-situ; translocation
- Monitoring will become extremely important (ie: acidification). Little is done in the marine environment.
- Biosphere research – relevant; could monitor baselines
- We have Sharples / Hunter sea-level rise issues for Tasmania; Clarence work
- Richard Mount's research
- Air monitoring sites (is only 12 enough?)
- Edgar's diving research ; MPA research
- Social research (eg work of Melissa Nursey-Bray). Maritime college / council
- LIDAR Research
- Managing the impacts ie Marine Protected Areas (MPAs):
    - Understanding changes
    - Facilitating movement
    - Deconnecting areas

What tools do we need to develop?

- Monitoring (long-term)
- Collaboration
- Support from heads of government (resources / support)
- Create channels between research and governments – further develop
- Discussions between policy and research
- Multidisciplinary approach
- Marine Protected Areas – baseline
- Community understanding – develop custodianship
- Remote monitoring may offer some possibilities
- Climate futures project needs to extend past shoreline – political / institutional issues
- Comprehensive climate science audit. Big picture required. Needs to be able to communicate issues. Science – policy road map.
- Tasmanian Climate Change Office – resource constraints – able to forward discussions

Left field:

- Genetic engineering to create resilience

- Zoos and aquariums as Refugia
- Artificial reef formation further south with pole-ward shift of species (custom built)
- Let nature takes its own environmental shift – do nothing approach
- Active interventions - is sand replenishment of beaches appropriate in all areas? Are the species being maintained somewhere on the coast? Are we managing for habitats? Do we want to develop a saltmarsh?
- May need to let go of some values that have nowhere to go.

Friday Workshop Notes

Session 1 – Introduction & recap from Plenary Session

Session 2 – Policy and Planning in the Face of Climate Change

Large Natural Areas
Objective - Retain large natural areas

- What is health / integrity decline
- Which one? Diversity, ability for management?
- Do you require active management? Eg: disturbance regimes particular sites/species
- Do we want to facilitate or minimise the change?
- May need less intervention – large enough to maintain processes
- What info and why?
- Reference sites

Species extinction / loss
Objective – Minimise the loss of species; protect gene pool

- Current approaches put resources into the most threatened species
- Change from in-situ to ex-situ? (society will need to decide)
- Shift from individual species to functional groups / similar groups
- Risk assessment process – especially functional role
- Prioritise species we will manage? (Taxonomic distinctiveness etc)
- Ex-situ: hang onto gene pool? Eg holding pattern until things improve? Do we work on where they may function better.
- Risk assessment associated with translocation - few examples of where active intervention works
- Ethical issues and community opinion / concerns - softening community
- Triage – decisions / trade-offs between species and human / other uses eg: deciding what value eg: water – for drinking, agriculture, or protecting threatened species
- Review where we put our resources
- Need good science / understanding
- Review where we put our resources; legislation etc
- Process for determining level of intervention over time
- Monitoring – threatened species could arrive in large natural areas and we wouldn't know
- Can manage threatened species in large natural areas

- Focus on most vulnerable and / or decreasing the likelihood of species becoming threatened

Landscapes without invasive species

Objective – Reduce the impact of exotic species

- How do you decide when the impact in bad enough to act
  - Changes in function in ecosystem
  - Displaces diversity
- Approaches
  - Monitor trend and react (maybe too late)
  - Predict / risk assessment (depends on information availability)
  - Keep healthy ecosystems - less vulnerable to invasives
- Physical processes will lead to increased impact of exotic species
- Policy / strategy for doing this with new invasives (eg: agricultural) ; pre-empting
- Retaining new species for a functional role, if they fill a niche
- Global responsibility eg: Banteng cattle in northern Australia. (An Asian cattle variety, endangered in their natural range)
- Prevention, such as borders within the State, transport / reduce spread; hygiene
- Prioritise good areas for action

Healthy native forests

Objective – Maintaining healthy forests (including kelp forests!) while composition, structure etc may change

- Current Management – active management in private reserves only monitor certain components and places

Approaches / issues

- Need more info to know whether natural processes are working / healthy
- Limit stresses / disturbance / impacts on forests
- Manage disturbance regime
- Maintain regenerative capacity of forests and systems, processes, functions
- Seed bank issues (short-lived) eg: lose tree canopy – should we replant?
- Restoration / replanting of native forests. Gene pollution? Buffers may improve health
- Act up front to reduce / stop decline or intervene / restore once we see it decline. A balance between effort and merit
- Maintaining the health of what we currently have vs maintaining healthy forests

Where to from here?

(Over different time-frames: what did we get out of it; what is the way ahead for me?)

- Alarm bells ringing now. Part of the education process. Lead the community in the knowledge of the gravity of what this means for natural values conservation. At all levels of government. Eg: summarise key points of workshop and present to DPIW executive.
- Get the community on board.

- Westminster system – our advice is expected and leads to political change. Needs to be driven all the way up and to the Climate Change Office. Collaborate with Climate Change Office.
- Couched in terms of core business of DPIW – what we can't do because of climate change
- Don't throw out the Threatened Species Act
- Possibly bring in the media at some stage
- When bringing together information – what other key stakeholders to bring in? eg: TAFI etc -> networks
- Also need to look at other values not covered ie: natural systems
- Community – we need to get the information across to them
- Land managers need interpreted information on climate change for natural values eg: on website
- Clearing house for information as it comes to hand eg: developments – responses to climate change. What people see. Contacts and outputs. Uni / NRM
- Discussion group to find out who was doing what
- Information gaps – what are the critical things we need to know? How variable will the weather be? Frost days etc. Work groups need to workshop what their key questions would be
- Documenting what we are seeing how to show that it's happening now, not something just in the future. Raise the profile
- Targeting the media – eg: every couple of months. Tasmania hasn't featured much in climate change
- Make it known to institutions that provide funds. Spend it wisely; need to save ecosystems for people
- Don't make it all negative – things that the community can do. People are over climate change, they don't know what they can do
- Fishing community is not engaged. Need coordination of communication about natural systems; good science; the community needs conversion

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