RESOURCE MANAGEMENT & PLANNING FRAMEWORK

Resource Management and Planning

Although Tasmania has no dedicated catchment management legislation, provision is made for the declaration of State Sustainable Development Policies under the *State Policies and Projects Act 1993*. Under the Act, sustainability and accountability are to be key considerations in the development of State Policies dealing with resource management and planning (see box).

The Sustainable Development Advisory Council (SDAC) is central to the management and planning process under the *State Policies and Projects Act 1993* and is responsible for

- the assessment of referred draft State Policies such as was undertaken for the State Coastal Policy (SDAC 1995);
- preparation of State of Environment Reports; and
- the integrated assessment of declared Projects of State Significance.

Catchment management issues that fall outside the province of SDAC may involve the Tasmanian Land and Water Management Council. The Council's overall function is to facilitate and promote the development, co-ordination, implementation, and monitoring of Statewide policies and programs for the sustainable management of Tasmania's soil, river and water resources. One key aspect is co-ordination of the development, monitoring and implementation of comprehensive strategic plans for catchment based soil, river and associated resource management programs.

The Tasmanian Land and Water Management Council (chaired by the Department of Primary Industry and Fisheries) represents the State Government's soil and water management agencies, Local Government, and the State's major soil and water user groups.

Community involvement in catchment management and the development of local initiatives means that Local Government has a key role in assisting the development and effectiveness of community groups. This is achieved through financial and technical support of these groups, the development and interpretation of council by-laws promoting sustainable growth, and by fulfilling the goals and requirements of State legislation (such as the *Local Government Act 1993*) dealing with natural resource issues.

Schedule 1, *State Policies and Projects Act 1993*

1 - The objectives of the resource management and planning system of Tasmania are -

a) to promote the sustainable development of natural and physical resources and the maintenance of ecological processes and genetic diversity; and

b) to provide for the fair, orderly and sustainable use and development of air, land and water; and

c) to encourage public involvement in resource management and planning; and

d) to facilitate economic development in accordance with the objectives set out in paragraphs (a), (b) and (c); and

e) to promote the sharing of responsibility for resource management and planning between the different spheres of Government, the community and industry in the State.

2 - In clause 1(a), "sustainable development" means managing the use, development and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural well-being and for their health and safety while -

a) sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of the future generations; and

b) safe-guarding the life-supporting capacity of air, water, soil and ecosystems; and

c) avoiding, remedying or mitigating any adverse effects on the environment.

CATCHMENT MANAGEMENT – DOES IT WORK?

National

A nation-wide review of catchment management activities undertaken in Australia (AACM 1995) identifies the following issues as potential barriers to the successful implementation of catchment management plans.

- lack of a process (to plan, implement and evaluate the integration of natural resource activities) whereby the philosophy of integrated catchment management is linked to the product
- perception that the Catchment Management Plan is the 'product' rather than part of the process
- lack of accountability in terms of a process for the evaluation of outcomes from planning, implementation or monitoring phases of work
- lack of economic analysis to identify priorities and allocate costs and benefits between public and private sectors
- the need for a sustainable financing process for projects (including cost-sharing with industry and private sector) and an awareness that community commitment to natural resources can wane if funding inadequate
- lack of priority setting which avoids the confusion arising from the diversity of regional issues
- no process to identify priorities, integrate community and agency skills, design and implement activities and monitoring and evaluation of program activities
- tendency to focus on symptoms rather than causes
- lack of process for the integration of social, biodiversity conservation, and cultural attributes with natural resource management plans
- limited understanding of how ecologically sustainable development principles can be implemented at catchment or sub-catchment level
- need to enhance linkages between different stakeholders priorities to avoid conflicts
- lack of community consultation
- need to include 'outsiders' such as tourism representatives with rights to use of natural resources
- community frustration with emphasis on planning rather than implementation of activities on the ground
- confusion regarding how bottom-up consultation and community participation links with top-down flows of policy and government investment
- need to overcome institutional barriers and lack of communication by development of multi-disciplinary teams
- lack of marketing plan/communication process for promoting the benefits of catchment management activities
- the scale of activities relative to landscape as whole and the timeframe for change means lack of tangible natural resource management benefits
- lack of political will to adopt a sustainable economic approach to management of catchment resources

CATCHMENT MANAGEMENT – DOES IT WORK IN TASMANIA?

State

At a state level, the review suggests that Tasmania has little legislation covering issues of integrated catchment management, soil conservation and landcare or native vegetation management (AACM 1995). Overlap between the roles of the Sustainable Development Advisory Council and the Land and Water Management Council has arisen due to the lack of legislative and institutional arrangements in those areas relevant to integrated catchment management. The study suggests, however, that this provides scope for catchment communities to manage implementation activities and integrate government contributions into a 'bottom-up' catchment management process. A relative assessment of the strengths and weaknesses of the Tasmanian situation is given below.

Review of Tasmanian catchment management planning policy (AACM 1995)

Strengths

- Growing awareness of catchment management issues, particularly amongst rural landowners
- Tasmania's simple bureaucratic structure has the potential to enhance integration
- Small size of state allows effective adoption of Geographical Information System (GIS) support tools for regional planning

Weaknesses

- Catchment management primarily government agency driven, weak community participation
- Slow bureaucratic change to integrated approach by government
- Potential exists for small number of individuals to hijack catchment management processes
- Dependency on government to provide solutions rather than individuals or community
- Disagreements between agencies about how catchment management should proceed i.e. DELM setting rules and standards under which DPIF work
- Federal money needed to co-ordinate catchment management projects state-wide
- Lack of understanding about community empowerment by both government and community
- Weak understanding of catchment management at national level complicates programme implementation at state level
- Individual property rights issues not addressed
- Catchment management process weakened by lack of backing legislation
- Sustainable catchment management activities need to be shown to be profitable
- Performance indicators have not been developed for catchment management activity
- Problem in defining 'appropriate' land management practices due to lack of land management legislation

COMMUNITY LANDCARE GROUPS

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MAP COVERAGE

Land Information Bureau : Coal River Catchment map coverage

Table 12 : 1:25000 Scale

Stonor 5230	Whitefoord 5430
Colebrook 5229	Woodsdale 5429
Bains 5228	Buckland 5428
Tea Tree 5227	Runnymede 5427
Richmond 5226	Sorell 5426
Hobart 5225	Carlton 5425

Table 13: 1:100000 Land Tenure

Lake Sorell	Little Swanport
Derwent	Nugent

Table 14 : 1:100000 Topographic Series

Lake Sorell	Little Swanport
Derwent	Prosser

APPENDIX ONE

Total Phosphorus Loading Estimates

Estimates for total load for phosphorus (diffuse or non-point source) should include all flow conditions - drought flow, normal flow and flood flow (this would include sediment resuspension, bank erosion, algal sloughing, twigs and branches etc.).

Table 15 : Phosphorus loading estimates for the Coal River - point source and diffuse

	Diffuse		Point
Site : Coal River @ Richmond	High Flow *	Mean Flow	Richmond STP
Phosphorus concentration (mg/L)	1.13	0.049	~10
Load per cubic metre (mg/m^3)	1130	49.4	10000
Flow (m^3/s)	21.41	0.24	0.002
Daily load (kg/day)	**2090**	**1.024**	**2.2**

* not necessarily maximum or 'first flush' concentration.

APPENDIX TWO

INFORMATION ON 'BEST PRACTICE' OPTIONS FOR A RANGE OF RESOURCE MANAGEMENT ISSUES HAVE BEEN CIRCULATED WITH THE COMMITTEE NEWSLETTER. THESE ARE INCLUDED BELOW.

CATCHMENT WATER QUALITY: NUTRIENT MANAGEMENT STRATEGIES

Rural

Cullen (1995) suggests a range of strategies aimed at managing non-point sources of phosphorus from rural areas. Most of these strategies are also applicable to nitrogen.

Input controls

- Land use controls to restrict point-source inputs of phosphorus via local planning process could be extended to non-point source inputs.
- Use of conservation cropping and controlled stocking rates.
- Ensure fertilisers are not applied to streams and buffer areas; use multiple small dressings; use rock phosphate or slow release formulations; avoid fertiliser application before rainfall.
- Land disposal of effluent.

Mobilisation and transport controls

- Maintenance of vegetation cover through conservation cropping and acceptable grazing rates.
- Drought management to minimise contaminant loading following 'drought-breaking' rains. The key component is maintenance of vegetative cover on land and riverbanks through drought management plans at farm level, keeping stock away from watercourses, and nand feeding stock in small pens.

Trapping strategies

- Fence waterways to provide buffer or filter strips and water stock away from streambanks.
- Develop wetland ponds with aquatic plants to trap nutrients and sediments and provide drought fodder.
- Recycle land run-off for irrigation.

Population Centres

Improved sewage treatment has meant that a large proportion of urban nutrient loading is associated with stormwater runoff. Garden fertiliser, lawn clippings and domesticated animal faeces are some major sources of nutrient input. Lawrence (1995) recommends that stormwater control and utilisation should be the focus of urban nutrient reduction.

Block level

- Use of vegetated areas, infiltration pits, porous pavements etc. to intercept runoff and pollutants.
- Retention tanks for runoff and grey water.
- Mulching to minimise external water demand.

Drainage corridor level

- Retain vegetated waterways and riparian zones for surface stabilisation and pollutant interception.
- Use gross pollutant traps to limit trash and sediment loading to waterways.
- Integrate wetlands and open space to enhance pollutant interception.
- Re-use stormwater for irrigation.

SALINITY MANAGEMENT

Management strategies in the Coal River Valley need to deal more with bulk salt storage than high root zone salinity. The strategies listed below have been developed in response to salinity problems in various parts of Australia, thus some judgement is required as to whether they are appropriate for the Coal River Valley.

INACTION

- **Do nothing** and attempt to remain viable despite environmental and productivity losses arising from increasing salinity. Lower land values as a consequence of saline areas.

REGIONAL ACTION

- As public commitment is required for remediation strategies to succeed, **community education regarding the problem** is needed. This would be one component of Catchment Management process.

- **Setting management objectives, determining priorities and allocating responsibilities should be community based activities** (assisted by technical specialists where necessary). Consensus should not necessarily be expected for management plans.

- Where possible **define the financial benefits** of management options, otherwise the **environmental and social objectives need to be defined and promoted.**

- Salinity **control measures need to be integrated with other catchment management programs** to maximise benefits and minimise costs (e.g. tree planting should fulfil multiple roles - restrict watertable recharge, commercial forest production, shelter belt and native habitat provision).

- Salinity is both a local and regional problem requiring **cost-sharing and incentives for action** (grants, loans or tax-breaks for salinity reduction projects).

- **Community or political leadership may be required** where the causes of salinity are catchment wide but the impacts are localised. Potential areas for conflict - management costs being spread across all irrigators but not all subject to salinity problems; management plans on one farm (say for drainage) may affect neighbouring property; 'free-loaders' who avoid remediation costs but enjoy the benefits.

- **Regional monitoring** to keep track of salinity trends, provide measure of effectiveness of treatment, provide data for development of predictive model to replace monitoring. Planning also requires good hydrological information - i.e. water table levels, recharge/discharge areas. Use farm surveys as part of monitoring process - i.e. "areas of salt affected land previously used for crops and pasture?". Monitoring can be done at community level (watertable height, soil salinity) for immediate use before passing to relevant authority for collation and long term report.

FARM BASED ACTIVITIES

- **Whole farm planning** as mechanism to gather salinity information and implement reduction strategy. Work out whether water is limiting resource or low salinity soil is limiting resource.

- On-farm maps required identifying land susceptible to salting. Soil salinity and permeability status needs to be clear. Sodium adsorption ratio (SAR) is important as it affects soil permeability and infiltration. To maximise financial return avoid over irrigating areas of saline soils and **maximise inputs and production on low salinity soils**. This may require sacrificing low-lying land as groundwater discharge zone.

- **Structural adjustments to increase number of viable farm units** allowing resources to be concentrated on lower salinity soils. Two forms : amalgamation of land with better soils, amalgamation of water rights.

IRRIGATION

- **Determine 'true cost' for irrigation water** both to highlight scarcity and induce efficiencies.

- **Only irrigation water used should be charged for** with unused Water Right not charged. **Shorter irrigation season?** By concentrating on better soils there should be **less extensive irrigation** in regional terms.

- **More technical information for farmers and irrigation scheduling services**

- **Modification of irrigation practices to prevent over-irrigation and waterlogging**. Includes irrigation scheduling to match application to plant needs, reduction in irrigation periods, changing frequency of irrigation, judicious timing of leaching irrigation, mixing of irrigation water supplies, minimise late Autumn irrigation to minimise runoff from winter rainfall.

- **Minimising loss of water through distribution system** (especially where permeable soils) and control options such as channel lining or tree-planting.

- **Selection of water application systems according to soil permeability and infiltration rate** - i.e. sprinkler or trickle irrigation for permeable soils rather than flood irrigation which wastes water.

DRAINAGE

- **Landforming** for more efficient water use - surface levelling to give more uniform soil wetting and minimise run-off.

- **Drainage objective is to match rainfall and irrigation inputs**. Where widespread shallow watertable rainfall may have significant impact especially over winter when plant uptake is low. Use open ditches and tile drains to maintain the watertable below two to three metres depth. Drain spacing depends upon soil hydraulic conductivity - hence in clay soils they may need to be so close together that management of land impractical. Eighty metres is minimal practicable spacing.

- **District drainage system** may be required to connect problem areas and provide outfall for on-farm drainage water.

- **Water may be pumped from wells and re-used for irrigation** resulting in a lower watertable, salt leaching from the root zone and reductions in off-farm disposal of saline water. The viability of this method is dependent on water salt content, cost, availability of pumpable aquifers, knowledge of soil and plant type.

- **Management of saline drainage** (controlled or uncontrolled release) to prevent degradation of neighbouring land or watercourses. On-farm minimisation and sanctions against excessive runoff. On-farm storage of saline water and release only during flood events. Use of evaporation basins although they tend to concentrate contaminants (metals and pesticides) and may have leakage points. Export saline drainage by pipeline or channel to sea. The potential for conflict exists between land and stream salinisation objectives where improved drainage may increase downstream salinity.

- **Restoration of natural flow characteristics and riparian characteristics of waterways** to facilitate drainage and enhance drainage line water uptake.

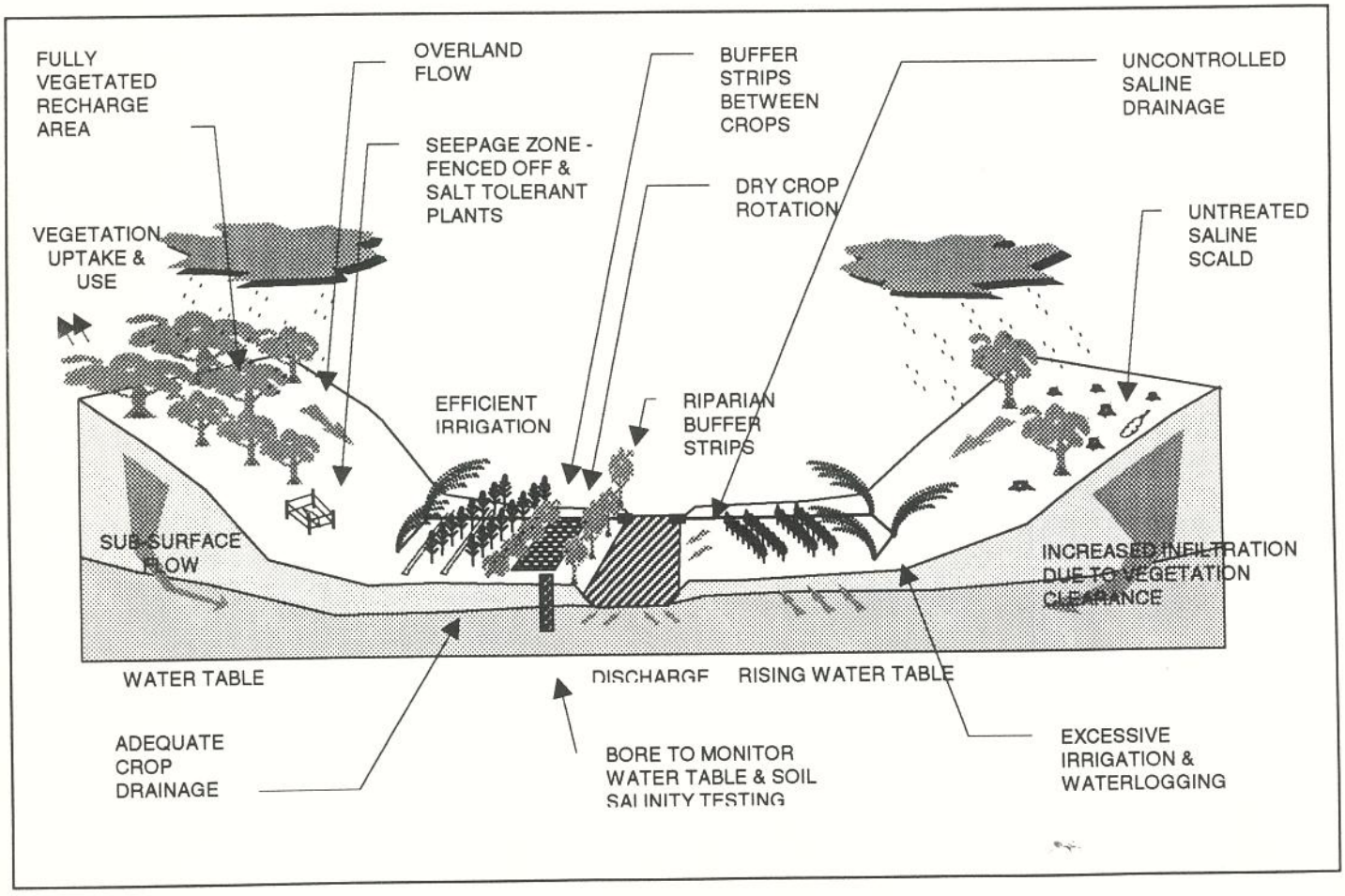
VEGETATION

- **Dry-crop rotation within irrigated areas** to lower water table and salinity levels. More perennial pastures. More lucerne to reduce recharge and remove soil moisture. Earlier start for annual pastures.
- **Controls over regional vegetation clearance**
- **Preservation of remnant vegetation** needs to be included as part of catchment management strategy.
- **Recharge areas require identification, revegetation and fencing** (to keep out stock) to reduce erosion, rainfall infiltration and watertable rise. This may require between 15 and 50% crown coverage to lower watertable. The rate of groundwater recharge increase x100 as result of cropping and clearing, with recharge higher in lighter textured soils than heavy textured.

I. ***tree selection*** - primary requirements are adaptability to site conditions and high water use, with the secondary benefits of wood products (sawlogs, pulp and fenceposts), livestock shade and shelter, wind erosion control, faunal habitat, honey and eucalyptus oil production).

II. ***site selection*** - plant as many areas as possible without reducing agricultural production : roadsides, easements, steep areas, bogs, homesteads in addition to other purpose grown sites (woodlots, shelter belts etc.). Highlands - trees on non-arable rocky areas and deep rooted perennial pastures on the arable slopes together with grazing management. Foothills & plains - deep rooted legumes such as lupins to increase water use.

- Salinity management strategies must **resolve issues preventing tree-planting on farms** - typically financial constraints, lack of technical knowledge or competition with agricultural requirements.
- Use **salt tolerant species where seepage or scalds** although this may not prevent wider spread of salinity



REMNANT PROTECTION / REVEGETATION

The view of two independent working groups, expressed in a paper to the Prime Minister's Science Council in 1992, was that the factors causing biodiversity loss centred primarily on habitat destruction or modification and that 'first and foremost, by far the major factor has been clearing of natural vegetation'.

Clearance is defined as the removal of a significant proportion of one or more of the major vegetation strata in an ecosystem by mechanical or chemical means. It includes removal of woody vegetation such as forests and woodland communities, the loss of grasslands, and drainage of wetland ecosystems.

It is a common wisdom that most of the native vegetation cleared in Australia occurred last century and early this century. This is not the case. **In the last 50 years as much land was cleared as in the 150 years before 1945**. Extensive clearing for agriculture occurred in the 1960s and 1970s and significant clearing is still taking place.

Glanznig, A. 1995. Biodiversity Series, Paper No. 6: Native Vegetation Clearance, Habitat Loss and Biodiversity Decline : An overview of recent native vegetation clearance in Australia and itsimplications for biodiversity. Biodiversity Unit. Commonwealth Department of the Environment, Sport and Territories.

Why keep remnant vegetation?

- cultural and social benefits - providing a sense of identity and place as well as recreational area
- productive capacity - timber use, stock feed, honey and flower production
- aesthetics - especially where tourist area or near urban centre
- weather protection (stock shelter, windbreaks for crop protection etc.)
- conservation significance may extend beyond remnant vegetation boundary as habitat for natural predators of crop pests (i.e. birds to keep down pests; *E. viminalis* [white gum] habitat for 40 spotted pardalote which eats psyllids which can enhance dieback)
- catchment health (salinity, erosion control etc)
- remnant vegetation usually more deeply rooted and structurally diverse than agricultural crops - hence better at intercepting rainwater and lowering watertable
- soil conservation
- protecting water resources
- storage and cycling of nutrients
- contributing to the maintenance of regional rainfall patterns
- has ecological, conservation and biological diversity (genetic, taxonomic, phylogenetic or evolutionary & structural) values
- loss of native species minimised
- drought/fire resistance
- providing carbon sinks which absorb greenhouse gases
- oxygen production

VEGETATION CLEARANCE

Given these benefits why do we continue to clear remnant vegetation?

The big picture...

- fragmented nature of State, Federal & Local approach to proper management
- poor definition of goals/objectives
- no government strategy to invest in public benefit aspects of remnant vegetation
- confusion and suspicion over responsibilities for public benefit issues
- economic situation works against adoption of longterm or public viewpoint
- Local government often has poor skills in terms of remnant vegetation management
- spread of rural sub-divisions with associated vegetation clearance
- small % of landcare budget for remnant vegetation protection
- publicity more on tree planting than remnant vegetation protection
- lack of collaboration on research projects & general paucity of ecological research
- value of vegetation corridors unclear
- lack of social research into factors influencing vegetation retention
- lack of research into legal and institutional mechanisms
- insufficient understanding of the role of financial and other incentives
- low level of research into economic valuing of remnant vegetation
- difficulties in communicating results to end users
- farmer scepticism, benefits of remnant vegetation often oversold
- pressure to overexploit even marginal land
- contribution of utilities (power, roads etc.) to vegetation clearance

At farm level...

- lack of on-ground expertise and appropriate techniques for remnant vegetation management
- farm advisers (bankers, consultants etc.) not convinced of remnant vegetation value
- bad experiences/advice to farmers in the past
- remnant vegetation management can be expensive in terms of revenue foregone, upfront expenses and ongoing management
- degradation can be slow process so farmers get used to it, inability to comprehend cumulative effects
- culturally unacceptable to talk about nature conservation
- scale of the problem/solution bigger than one farm so best ignored
- vegetation causes problems (pest and weed refuge, hides stock, fire hazard etc) so should be minimised
- waste of productive land - although remnants typically won't be located on / representative of the best land
- many remnants too small to be driven by internal processes - need buffers, as they will be influenced by surrounding ecological (agricultural) processes
- passive mismanagement arising from financial constraints
- resistance to changing traditional production patterns
- inappropriate management: grazing intensity, clearing & ploughing, drainage & agricultural runoff
- problems when change in management regime through land sale, inheritance etc.
- disturbance from farm infrastructure: fences solely to mark property boundaries, too many tracks etc.

What can be done to retain or expand areas of remnant vegetation?

At a regional level...

- need greater regional co-ordination and information transfer
- catchment committees to take on more strategic role
- to be self-sustaining, need management at landscape level not remnant level
- need management structure and planning framework for setting appropriate community goals
- for successful natural resources management community and private interests must coincide
- find out who is removing bush and then shape the response
- gather useful data on resource conditions and trends to guide decision making
- necessity for clear link between revegetation programs and remnant vegetation protection
- increasing farmer activity in terms of conservation (Landcare etc.)
- farmers must accept ownership of nature conservation values of their land
- greater appreciation of lifestyle/aesthetic values of native vegetation
- education regarding ecological values of remnant vegetation in farm and regional context
- use key species or habitat for publicity purposes
- development of clearer government strategy relating to farm management issues: fencing off, spelling land to allow habitat recovery/revegetation, controlling weeds and pests, removing land from production, environmental payments where areas of particular environmental sensitivity
- provision of financial incentives/assistance to farmers where there is no direct financial advantage in retaining remnant vegetation - tax credits, rate relief (eg. abolition of rates on areas of native bush) or other payments.
- should be cost sharing where public benefit
- increased support for fencing programs
- legislate land capability/ land condition assessment at ownership changeover
- covenants on titles to ensure remnant preservation
- need to support and promote options for private commercial gain from native vegetation
- highlight farm size restrictions on vegetation removal as a long term strategy
- set aside payouts, providing paid managers on private as well as public land
- use industry groups to promote bush preservation

At farm level...

- set objectives and define the process for farm management (whole farm planning)
- identify important ecosystem processes (nutrient and water cycling, plant pollination etc.)
- to minimise edge effects (disturbance from adjacent land use) large remnants preferable to small
- establish vegetation/wildlife corridors
- protect watercourses and water quality with riparian vegetation
- avoid nutrient enrichment of remnants from livestock, fertiliser drift etc.
- protect high and low nutrient sites, don't just target species rich areas
- exclude exotics and reduce disturbance
- use a variety of plant species and establish multiple layers of vegetation
- manage for different successional stages of vegetation
- on farm/local area seed collection to reflect original vegetation cover
- utilise road verges as remnants which cover more landscape types
- retain or add dead woody material and inoculate with micro-organisms and invertebrates where necessary
- assess mobility and habitat specification of animals requiring protection
- disturbance regimes of larger areas may need to be managed
- regulate fire, typically low intensity fires with patchy distribution
- monitor progress towards objectives

What type of information is useful for vegetation management?

- information on past vegetation distribution, rates of clearing, representation of each ecosystem in existing reserves, location & size of reserves, species list, climatic records, wind direction etc.
- regional ecological surveys - flora & fauna
- the ecological significance of sites in relation to similar ecosystems within region
- a methodology to evaluate sites and incorporate them into regional plans
- priority ranking of respective sites (relative degradation) to determine resource allocation
- a sociological survey of landowner perceptions towards remnant vegetation
- land evaluation
- regional planning information
- revegetation design across different landscape units
- the cause of local tree decline
- hazard management strategies in relation to remnant vegetation
- use of remote sensing as rapid assessment technique

What about Tasmania?

Since European settlement native vegetation cover in Tasmania has decreased by nearly 36% (4,878,000 ha to 3,109,400 ha).

Between 1972-80 approximately 15000 ha per annum was cleared mainly for agricultural purposes. This fell to 6000 ha per annum between 1980-88, possibly due to the reduction in available areas of native vegetation on flat private land with deep soils. Nearly 94% of the 1972-80 figure was clearance of dry eucalypt forest.

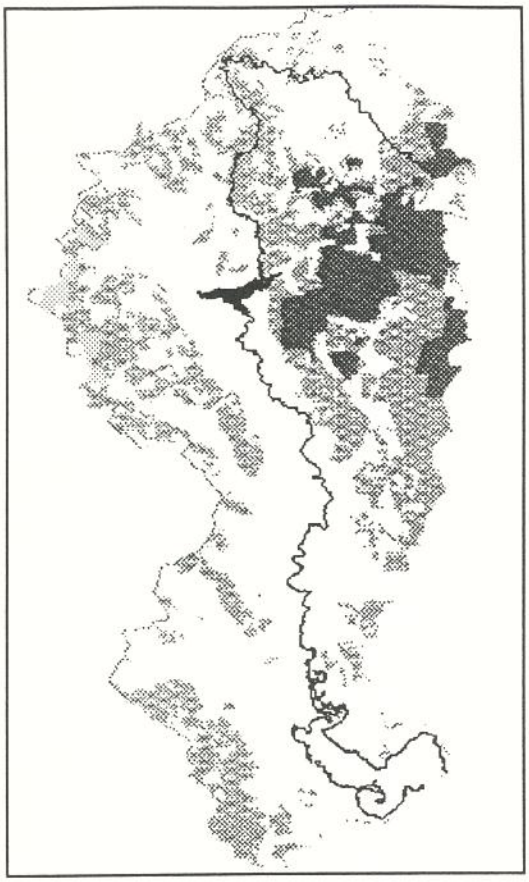
Dry eucalypt forest is the prominent forest type in the Midlands bio-region, of which the Coal River catchment is part. Typically occurring forest communities are *Eucalyptus amygdalina* forest; *E viminalis* grassy forest; *E. pulchella*, *E. globulus*, *E. viminalis* grassy/shrubby forest; *E. tenuiramis* forest; *E. obliqua* dry forest and *E. delegatensis* dry forest.

Approximately 235 square kilometres of the catchment (out of 630) have forest cover. Considerable resources are located on private land (175 square kilometres) with additional areas of State Forest (60 square kilometres). Areas with the potential for commercial forestry include Eastern Hills north of Black Charlies, Flat Top Tier, Quoin Mountain, Gunners Quoin and Grass Tree Hill.

Preservation is largely voluntary, with little legislation controlling clearance of native vegetation

- *Forest Practices Act 1985* - governs environmentally acceptable clearance on Crown and private land via Forest Practices Code. But riparian strips can be cleared after logging for cropping or grazing purposes.
- *Public Land (Administration and Forests) Act 1991* - provides compensation for private forestry operations if restricted due to presence of rare or endangered species
- *National Parks and Wildlife Act 1970* - provides voluntary mechanism for protecting native vegetation on private land (private wildlife sanctuaries, conservation covenants and agreed management plans). It is binding on property title but is hard to enforce.
- *Threatened Species Protection Act 1995* - accredits practices and processes when dealing with rare species and their habitats.

SHELTERBELTS? WILDLIFE CORRIDORS? HABITAT LINKS? GREENBELTS? BUFFERS?



Catchment Forest Cover

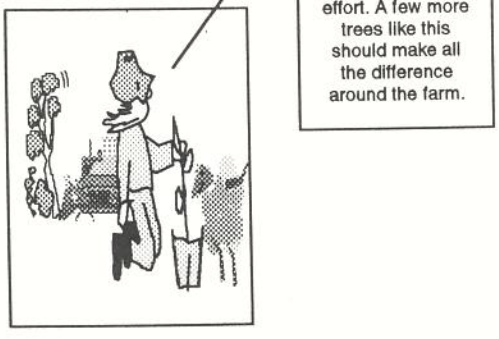
While the Coal River valley has a long history of agricultural use, it still has considerable areas of forest cover (approx. 235 square kilometres of the catchment out of 630). Most is located on private land (175 square kilometres) with additional areas of State Forest (60 square kilometres). The dolerite hills and ridges flanking the catchment generally have extensive vegetation cover. Some of this area is subject to periodic logging. The upper catchment shows evidence of the tree decline widespread in much of the Midlands area. Below Craigbourne Dam, the lower slopes and river flats are marked for intensive cropping. Broad-scale revegetation programs may not be compatible with this type of farming. Linear plantings of vegetation (ie. shelterbelts) appear to be more acceptable in that they minimise land removed from agricultural production.

* * *

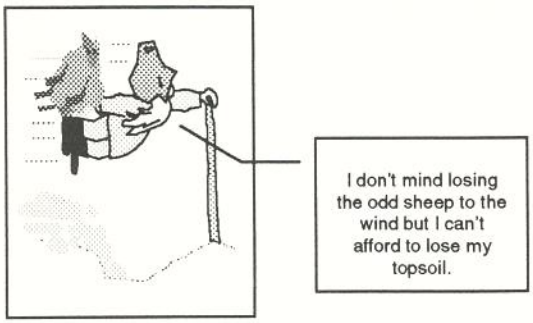
As a first priority, however, it makes sound economic and ecological sense to protect existing remnant vegetation. Efforts in this direction now, reduce the scale of revegetation programs required in the future. Revegetation projects require commitment of significant resources in terms of labour, equipment and material costs. Ongoing management is required to ensure project success. While remnants require some degree of management, larger areas may approach a self-sustaining basis.

Fred Duncan from Forestry Tasmania has done some work near Jericho with the Midlands Tree Committee looking at the effect of grazing on native vegetation. A summary of the resultant management implications are outlined below -

- Winter grazing, at conservative levels, can maintain native understorey species in grassy forests and woodlands. It will also maintain opportunistic exotic species (mainly annuals) if they are already on a site.
- Excluding grazing from grassy forests and woodlands for long periods (greater than 20 years) can markedly reduce diversity of native species (and exotic species)
- Burning at intervals (eg. 5-15 years) can keep tussock forming perennial grasses in check and maintain species diversity. However, frequent burning followed by grazing can reduce abundance and diversity of native species and encourage colonisation of exotics.
- The survival and health of eucalypt trees and regeneration are related largely to climatic stress. On exposed sites, such as northwest facing upper slopes and hilltops and where soils are shallow, prolonged drought will kill or weaken trees and regeneration. This will be exacerbated by damage from stock (browsing, trampling of roots, nutrient enrichment) and subsequent attacks by insects and wildlife. There is more chance of native vegetation surviving drought in these environments if they are not being grazed during drought periods.
- Retaining native vegetation takes a great deal less effort and resources than restoring it.

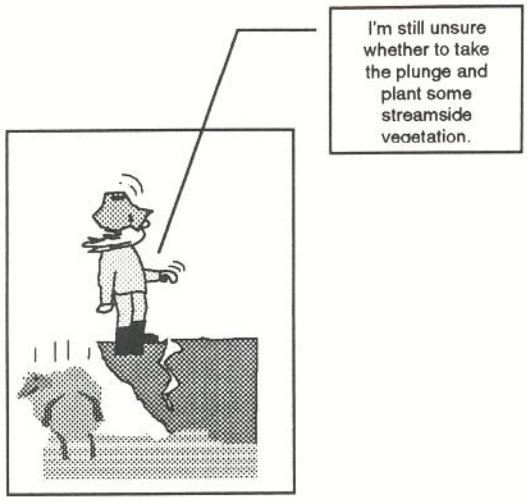


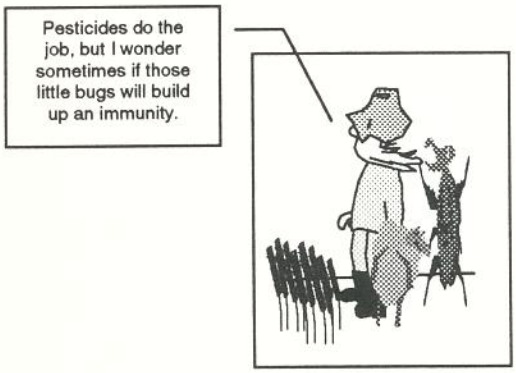
WHY SHELTERBELTS ?



- weather protection such as stock shelter, windbreaks for soil and crop protection (see attached *Shelterbelt - Local Experience*).
- contribute to maintenance of native species.
- occasional grazing resource.
- wildlife corridors - allow for movement of wildlife between remnant vegetation through agricultural landscape (enhance/maintain biodiversity).

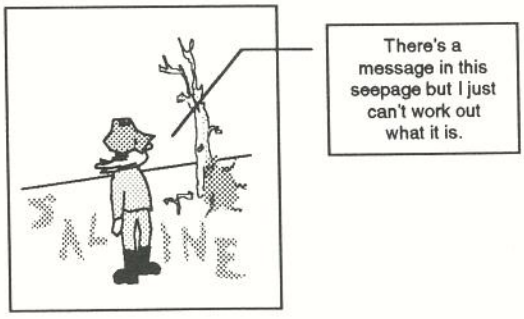
- linear habitat - for some species may provide permanent habitat not just movement corridors. Edge effects mean corridors may be too narrow to provide quality habitat.
- riparian/riverbank corridors provide bank erosion control.
- soil conservation effects of groundcover.
- streambank vegetation protects water quality by acting as filter for overland flow.
- fire management - smooth barked trees on windward side reduce embers and can act lower wind velocity near buildings.
- add to capital value of farm.





- productive capacity of corridors can include timber use, stock feed, honey and flower production.
- provide corridor or habitat for birds which also control insect pests (eg. cuckoo shrike feeds on insect defoliators of eucalypts; magpie feeds on pasture scarab pests; mashed lapwing or plover forages on pasture pests such as beetles, caterpillars and grasshoppers).
- habitat for insect predators of pasture and crop pests (eg. red legged earth mites and aphids eaten by native predators such as lycosid spiders, ants, carabid and staphylinid beetles). Reduced usage of pesticides.

- deeply rooted and structurally diverse corridors are better than agricultural crops at intercepting rainwater in recharge zones and lowering the watertable. This is important in saline susceptible areas.
- shelterbelts in crop or pasture areas create a vegetation mosaic landscape which contributes to the aesthetic appeal for tourists and locals. Planting of exotic species may have a role.



POSSIBLE DISADVANTAGES

- pathway for spread of animal and weed pests into agricultural landscape.
- high cost of shelterbelt establishment and ongoing maintenance.
- loss of farming land.
- corridors may be too narrow to be either movement corridor or habitat.
- may divert scarce resources from protection of existing remnant vegetation.

CORRIDOR DESIGN

- identify function of corridor/greenbelt development (i.e. recharge area, windbreak) and design accordingly
- corridors should be used in tandem with, rather than a substitute for, other conservation strategies such as remnant vegetation protection
- fencing is crucial
- maximise use of native plants - local seed collection ideally
- fence off lagoons, swamps, floodplains or dams as nodes (larger areas of habitat) for corridors
- don't ignore understorey shrubs and bushes - vegetation structure is critical both in terms of providing diverse habitat and "plugging" gaps in windbreaks
- aim for continuity as gaps in vegetation corridors may act as barriers to wildlife movement
- use existing stream and road corridors as fundamental revegetation targets. Road corridors generally offer easier access for planting and management.
- try to capture variation in topography within corridors to maximise habitat types and biodiversity (ie. restricting revegetation belts to riverbanks may exclude non-riparian species)
- in theory corridors can be designed to target/exclude species as usage will vary between species according to characteristics of diet, foraging behaviour, mobility etc.
- in terms of wildlife movement, width is important. Wide corridors will be more effective than narrow in minimising edge effects. Minimum of 3-5 rows of trees with understorey for shelterbelts
- use grazing and fire as management tools

SHELTERBELTS - LOCAL EXPERIENCE

Kerrie White of the TFGA is working on a project "Does Landcare Pay?" which includes information gathering from local farmers on the economic/production benefits from their development of shelterbelts. Some information gathered to date ..

Livestock enterprises

- pasture growth is 25% higher in areas sheltered from the wind, compared to unsheltered areas
- livestock are warmer in sheltered areas and require less feed to stay warm
- milk yield is 1-2 litres / head higher when dairy cows are put into sheltered paddocks
- increased grass growth and reduced requirements for feed enable higher stocking rates - *taking ground out of production but increasing stocking rate*
- lambing percentages are 15% higher in sheltered paddocks

Cropping enterprises

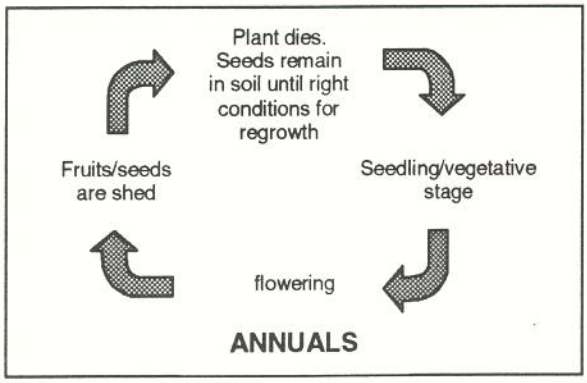
- higher yields are realised (eg. 4 tonne/ha more potatoes from sheltered areas, bean yield 50% lower in unsheltered areas)

Other

- economic benefits will be realised from the harvest of trees for timber and pulp where suitable species planted
- reduced wind erosion
- increased bird life
- development of more pleasant living environment
- increased capital value
- feelings that "I've done the right thing"

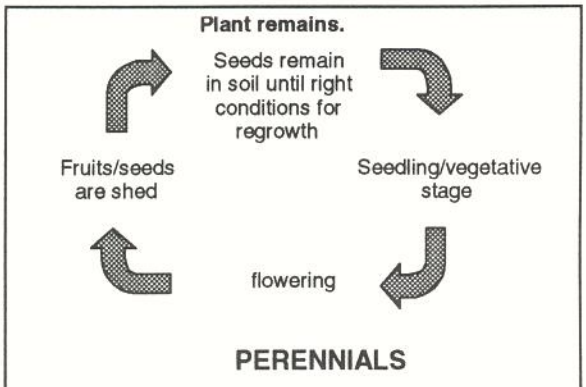
WEED MANAGEMENT

- **GOOD MANAGEMENT AND TIME SPENT PREVENTING THE LIKELIHOOD OF WEED INFESTATIONS IS THE BEST FORM OF WEED CONTROL**
- **IDENTIFY WEEDS EARLY**. Although mature weeds (ie. flowering or seeding stage) are easier to identify, seedlings are easier and cheaper to control. Identifying and controlling them at this earlier stage restricts their damage to crops and their capacity to spread.
- **KNOW THE DIFFERENCE BETWEEN <u>ANNUAL</u> AND <u>PERENNIAL</u> WEEDS.** Time and money can be wasted using inappropriate control methods on target weeds.



CONTROL

- Prevent seed germination so that they die in the soil.
- Stop any germinated seedlings from flowering and setting more seed. These weeds generally carry buds at or above ground level. This makes their control by competition, cultivation, contact herbicides, grazing and slashing relatively easy.
- <u>Contact herbicides</u> applied to above ground growth may be sufficient to kill the plant.



- Do not die after flowering
- May take 2 or more years before first flowering
- Typically have thickened root systems or woody stems
- Frequent presence of underground stems or dormant buds at the base of the aerial stem
- After flowering herbaceous perennials may die back to ground level while woody perennials continue to grow in size

CONTROL

- Unlike annuals, it is necessary to kill both the individual weed and prevent flowering and setting of seed.
- <u>Translocated herbicides</u> move through the sap stream to kill roots as well as above ground growth

- **THE REMOVAL OF THE WEED AND ITS REPLACEMENT BY USEFUL OR DESIRED SPECIES IS THE BASIC PRINCIPLE FOR ALL WEED CONTROL.** Unless the replacement species forms dominant long-term pasture or vegetation, the weed will return.

- **GOOD MANAGEMENT, CULTIVATION (AND OTHER MECHANICAL METHODS), HERBICIDES AND BIOLOGICAL AGENTS** are the four main methods of weed control. A brief outline of each is given below.

- **GOOD MANAGEMENT** involves
  - preventing entry of new weeds onto the farm via contaminated stock feed or crop seed, on stock or machinery, and being alert to new weeds introduced by wind and water
  - replacing weeds with competitive pastures or crops as soon as they occur and optimise the conditions (nutrients, irrigation etc.) for crop growth
  - limit or prevent the flowering and spread of existing weeds through a well managed grazing regime which avoids overgrazing and uses grazing as a tool for weed control

- **PHYSICAL AND MECHANICAL METHODS** should be integrated with other methods of weed control. Options are
  - hand removal of occasional scattered weeds
  - timely cultivation which uproots, buries or cuts off annual and young perennial weeds and disturbs underground parts of established perennials with possible follow up herbicide application
  - slashing or mowing to prevent flowering and reduce competition

- **HERBICIDES/CHEMICAL WEED CONTROL** allow the destruction of large populations of weeds over large areas without soil disturbance. Herbicides can target specific weeds over variable time frames in areas which may be hard to manage using other forms of control. Herbicides have the potential to adversely impact upon non target plants and fauna. Thus considerable thought needs to be given to both the type of herbicide and its correct application.

- **BIOLOGICAL AGENTS,** while not generally a control tool for individual farmers, may be available as part of a larger regional release. One, apparently successful, Tasmanian example of this was the release of the ragwort flee beetle *(Longistarsus flavicornis)* in the Meander Valley by the Dept. of Primary Industry and Fisheries and the Deloraine Landcare Group.

Adapted from – *Principles of Weed Control for the Small Farmer.* By Ross Watson of the Dept. of Agriculture. NSW.

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