



Northern Agricultural Catchments Council's Sustainable Land Use Regional Workshop

Summary Land Projects in the NAR



What is in this booklet?

1. Brief description of the Northern Agriculture Catchments Council (NACC).....	1
2. Workshop program.....	4
3. Project summaries:	
Salinity rehabilitation and extension project.....	7
Drainage benchmarking project the Northern Agricultural Region.....	9
Agronomic package & benchmarking of periodically and mildly affected saline land allowing for viable crop and pastures.....	10
Revegetation of natural drainage lines and protection of remnant vegetation in the east Moore catchment.....	13
Northern agricultural catchments council's (NACC) targeted investment program (TIP).....	14
West Koojan/Gillingarra CDI.....	16
Healthy farms - environmental management system.....	17
Soil stabilisation solutions for Nangetty Valley.....	18
“Long term <u>sustainability</u> of profitable ‘medium rainfall’ farming systems.”.....	19
Reducing erosion under high stocking rate grazing systems.....	20
Mogumber caring for country project.....	22
Rural Towns - Liquid Assets (project summary).....	25
Farming to the climate: managing climate variability and risk in the low rainfall NAR.....	26
BIOCHAR: concepts for sequestration and rural income.....	28
3. Evaluation Dart Board.....	28

The Northern Agriculture Catchments Council (NACC)

The Northern Agricultural Catchments Council (NACC) is a peak natural resource management body in the Northern Agricultural region. It's vision is to assist the development of 'vibrant communities with diversified economies and healthy environment'. It aims to achieve this through providing leadership, advice and on-ground support for natural resource management (NRM) issues and projects.

The NACC region lies north of Perth and stretches from Gingin in the south to Kalbarri in the north and from the coast of Indian Ocean to the Kalannie in the east. The NACC region is a rich farming & fishing area, covering 7.5 million hectare. It is characterised by near pristine beach and offshore islands, coastal sand plain with considerable areas of retained natural vegetation, and a fertile low-rainfall hinterland. The region is also known as a hotspot of biodiversity at both national & global scales. The region has over 30 % of the State's threatened species within its boundary. Board acre agriculture is the predominant industry accounting for 35% of the regional economy (approx 1 billion per annum). Fishing, mining and tourism also contribute very significantly to our regional economy. However, despite the economic strength and the valuable environmental assets of our region, we are also faced with some of the critical management issues including loss of biodiversity, control of introduced pests, soil quality & production levels, water quality and quantity, and salinity. The region has also been identified as under significant threat from climate change impacts.

Figure 1 Shires of the NAR



In line with Australian, State and regional priorities over the past few years, the Northern Agricultural Catchments Council has been investing in NRM projects that are located across the region and beyond. Under the Sustainable Land Use Program alone, NACC has funded projects dealing with issues of dryland salinity, waterlogging and rising groundwater level, erosion, climate, and farming systems. NACC has also funded projects that deliver incentives to community groups and land managers who have NRM priorities dealing with environmental threats to the region's natural assets.

This workshop endeavors to review projects involved with managing land issues and discuss key outcomes and future research needs in the region. It will also provide an opportunity for participants to learn more about what we are doing in the region & what innovative activities others are achieving in managing our valuable natural resources.

SALINITY REHABILITATION AND EXTENSION PROJECT

PROJECT MANAGER & TEAM.

- Mike Clarke Team leader and Project manager,
- Jessica Hasleby, Extension Hydrologist
- Andrew Blake, Saltland Agronomist

AIM

To provide a salinity extension service to landholders in the region where properties have a significant proportion affected by salinity as well as providing a fencing incentive to help rehabilitate salt affected land.

BACKGROUND

These projects is contributing to the Resource Condition Target of Maintaining or reducing the rate of groundwater rise and ensure *that all salt affected areas are rehabilitated by 2025*. Prior to this project there was market failure in provision of an “unbiased on farm” service to farmers on salinity management. Salinity is a very site specific issue to manage and farmers need to know what groundwater flow system is operating in their paddock and what range of management options are available to them.

PROGRESS TO DATE

	2006 Spring	2007 Autumn	2007 Spring	2008 Autumn	Total
Number of farms visited	34	29	41	23	127
Number of farms signed up for fencing	14	14	16	18	62
Total length of fencing (km)	53	103	85	77	318
Area to be fenced (ha)	3025	4654	3159	1292	12130

PROJECT KEY OUTCOMES

On farm salinity advice service

The service is delivered by three specialists in saltland management, hydrology, revegetation and catchment planning. They use a range of tools such as Land Monitor products, aerial photography, satellite imagery, an EM 38 and other survey results to diagnose salinity and provide the farmer with a range of salinity management options. Options covered include soil amelioration techniques, cropping and grazing solutions, engineering, farm forestry and revegetation for nature conservation outcomes.

A fencing incentive

A \$2000/kilometre fencing incentive is assisting landholders to improve saltland management by allowing them to control their grazing management. The first step in managing salt affected areas is to protect it from grazing to allow for natural regeneration, (at the very least) to occur. It is important to ensure that salt affected areas don't remain bare, lose topsoil and accumulate more salt as a result of grazing pressure.

Salinity extension to the wider public

The project also provides information to the broader rural community on groundwater trends throughout the region by explaining how different groundwater systems are operating and publishing articles in the Agmemo and other rural press.

FUTURE DIRECTIONS

Like many projects, the future direction of this project is unknown at this point in time however the region now has an experienced and capable team of scientists that can deliver salinity management advice to farmers, NRMOs or anyone wanting to diagnose and determine what management options are available for salt affected areas.

CONTACT ADDRESS

Mike Clarke. DAFWA PO Box 110 Geraldton WA 6531.

DRAINAGE BENCHMARKING PROJECT SYNOPSIS.

PROJECT MANAGER & TEAM: Angela Stuart-Street, Alison Beattie, Peter Whale, Russell Speed and Adele Kendle (Department of Agriculture and Food).

The effectiveness of deep open drains excavated to manage salinity in the Western Australian wheat-belt is subject to considerable debate. Our project aims to better understand how farmers arrive at their initial decision to dig drains and their observations and perceptions on the effectiveness of the drain they have installed. We have intentionally targeted drains which are located in a variety of landscapes in the Northern Agricultural Region ranging from sandplains to clay flats.

One on one interviews were undertaken with 20 participating farmers. To complement information from the interviews, field measurements were taken at three transects along the length of each drain and the landscapes around them. These measurements include soil characterisation, drain configuration and condition, and water quality. In addition eight transects of bores were installed at the sites of five new drains.

The interviews showed that the main driver for the farmers to install drains was that they wanted to restore previously highly productive land that is now affected by salinity or waterlogging. Most farmers obtained advice from neighbours and/or earthmoving contractors, and in most cases adequate preliminary assessments were not undertaken.

Most of the impacts that farmers are observing on their land since the drain was installed are positive. The reduction of waterlogging, removal of water, improving farm viability, stopping the spread of salinity and improving production were the factors most farmers liked about their drains. The majority also thought that their drains were both effective and value for money. A few farmers did suggest that the dry seasons since 2000 may have been a factor in the land improvements. A number of farmers interviewed, however, have seen no impact from the drain at all.

While many farmers state that they have seen improvements in productivity since their drain was installed, field studies have shown that the soil is often in poor condition and still saline - often moderately to severely - even many years after a drain has been established. Not surprisingly, heavier soils tended to be more saline than lighter soils.

At sites with water in the drain (half of the drains at the transect sites were dry), the quality was found to be mainly alkaline ($\text{pH} > 7$), with an EC range of 700-5,970 mS/m. Drain condition and maintenance were variable between sites. Depths of sediment in drains at transect sites ranged from zero to greater than 70cm.

Groundwater measurements taken at bore transects next to new drains reveal a great variability in watertable drawdown after the drains were excavated. Results range from no impact seen, to measurable impacts more than 100 m from the drain.

Drain performance appears to be specifically relevant to the land on each individual farm, therefore no clear statement about likely success can confidently be made until independent site assessment has been done and the problem has been clearly diagnosed.

AGRONOMIC PACKAGE & BENCHMARKING OF PERIODICALLY AND MILDLY AFFECTED SALINE LAND ALLOWING FOR VIABLE CROP AND PASTURES

PROJECT TEAM Lorinda Hunt (DAFWA) in collaboration with the Liebe Group and Morawa Farm Improvement Group

PROJECT AIMS

- Benchmarking of mildly saline sites & develop a paddock based benchmarking tool to allow farmers to diagnose the salinity status of a given area
- Explore cropping and pasture options suitable for mildly and periodically saline land in the North Eastern Agricultural Region (NEAR).
- Investigate the biology of slender iceplant (*Mesembryanthemum nodiflorum*)
- Investigate herbicide options for controlling slender iceplant
- Investigate soil amelioration options for managing mildly saline, sodic or slender iceplant infested soils.
- Investigate agronomic requirements for successful establishment and maintenance of saltland pastures (including herbicide tolerance).

BACKGROUND

Slender iceplant has traditionally been viewed as a plant of saline environments. It has been used in the past (probably incorrectly) as an indicator species of saline soils. Iceplant has however also been found in areas not affected by salinity. For this reason, it is not always clear whether iceplant infested soils are actually unproductive saline soils or if production has been limited solely because of the presence of iceplant stubble which may accumulate salt from the subsoil.

The topsoil inhabited by slender iceplant appears to be maintained in a saline condition, advantageous for the iceplant, but undesirable for anything else. Slender iceplant has also been found to contain oxalate levels up to 35.78%, which is well above the minimum level of 2% that may cause stock poisoning.

The spread of slender iceplant has been facilitated by soil disturbance events (e.g. floods in 1999) and our lack of understanding of the biology of iceplant, resulting in inappropriate management practices. It is suspected, that if the iceplant could be controlled, then natural leaching by rainfall could result in land rehabilitation, particularly in mildly affected lighter soil types. Ultimately if these areas could be returned to pasture or cropping, there could be much to gain for the farmer.

Departmental trials in 2004 and 2005 showed effective control of iceplant with simazine 500 g/L at 2L/ha, atrazine 500 g/L at 2 L/ha, Glean® 750 g/kg at 15 g/ha and Ally® 600 g/kg at 5 g/ha. Dicamba in a mix with 2,4-D amine is the only fully registered option in Western Australia for the control of slender iceplant. Replicated trial work was performed in 2006 and 2007 to find selective options potentially suitable for use in legumes pastures and interspersed saltland shrubs.

One of the major constraints to the widespread adoption of saltbush-based saltland pastures has been the lack of cheap and reliable methods for establishing saltbush by seed. Establishment using the Niche seeder or planting seedlings has been either too expensive, time consuming, or unreliable. By removing bracteoles and priming the seed in water or dilute solutions of plant growth regulators (gibberellic acid, kinetin and salicylic acid), improved saltbush establishment has been demonstrated.

The saltbush/bluebush seed is small however, and contains little stored energy. This can result in poor seedling vigour when germinating. Weed competition therefore becomes a major limitation for the success of the 'Niche' seeding technology.

Weeds can exacerbate moisture deficiencies, which in an already osmotically challenging (saline) environment can be a critical factor.

Developing good weed control, and good agronomic systems in saltland will increase productivity on the saltland itself. However in a climate of increased grain prices, the increased benefits may also extend to allowing a farmer to crop more of his best land classes while maintaining his sheep on less severely affected salt land.

It is suspected that some mild saltland would be far more productive if existing slender iceplant monocultures could be controlled to allow for medic and grasses. Herbicide options exist to control slender iceplant in cereal, lupin and canola crops. However these herbicides do not cater for pasture situations, nor is it known if they are safe to use over saltbush and bluebush.

To improve the establishment and maintain profitable saltland pastures, a range of agronomic tools must be developed.

PROGRESS TO DATE

- A quantitative & qualitative map of existing and at risk salt affected areas of the Morawa, Perenjori and Dalwallinu shires produced.
- Literature review has been conducted on slender iceplant and its relationship with saline and sodic soil.
- The biology of slender iceplant has been researched. In-kind support from Botanical Gardens & Parks Authority has allowed for further investigation into the biology by examining germination requirements and dormancy of iceplant.
- Herbicide trials have been carried out on slender iceplant, exploring off label options. Data collected will be used for applying for minor use permits.
- Herbicide tolerance of established saltland pastures were investigated, so that herbicide options for controlling slender iceplant in established saltland systems could be determined.
- Herbicide tolerance of germinating saltland pastures was also determined to allow for cheap and reliable establishment of saltland pastures on the large scale required to combat salinity. Direct seeding also allows for faster turn around and greater economic return, which is a significant incentive for farmers to adopt saline agriculture.
- 30 benchmarking and demonstration sites have been established over the three years of the project. These sites investigate suitable crop and pasture options for mildly affected saline land across the NEAR.
- Benchmarking includes soil type, soil landscape system, soil salinity & pH, depth to water table, water salinity & pH, and overall site variation.
- Analysis of slender iceplant tissue has given an insight into oxalate content and elemental composition.

PROJECT KEY OUTCOMES:

Oldman saltbush (*atriplex nummularia*), river saltbush (*atriplex amnicola*) and small-leaf bluebush (*maireana brevifolia*) are the stand out candidates for mild saltland production in the NEAR, given the past two dry seasons. Saltland pasture systems must incorporate quality understorey pastures with a high energy source from grasses and cereals and a nitrogen fixing source from medic pastures to allow economic viability. Controlling slender iceplant has been a key factor for successful and cheap establishment of saltland pasture systems.

Slender iceplant was found to only germinate in mild saline conditions, indicating that these infested areas may have potential to grow more productive crops and pastures, if the iceplant is controlled. Dicamba in a mix with 2,4-D amine is the only registered

herbicide option for controlling slender iceplant, post-emergent. The Liebe Group holds a minor use permit for Ally® 5g/ha, Glean® 15g/ha and atrazine 2L/ha to control slender iceplant in their registered crops. 2006 and 2007 trials indicate Stomp® at 2 L/ha, Goal® at 200 mL/ha, Broadstrike® at 25 g/ha and diuron at 1 L/ha appear to be the most promising, selective, pre-emergent herbicide options for iceplant control. These options are not registered and minor use applications will be forwarded to the National Registration Authority following the completion of 2008 trials.

There are no herbicides registered for use in saltbush, small leaf bluebush or other saltland pastures. Dicamba, 2,4-D amine, atrazine, diuron and Igran® cause severe damage to mature bluebush. Current work suggests trifluralin, Stomp®, Goal® and 2,2-DPA may be future options for weed control while sowing saltbush and bluebush by seed.

FUTURE DIRECTION:

- Extension of knowledge and tools to allow farmers to identify and accurately target 'mild saltland' in order to reduce establishment failures and increase chances of economic return.
- Extension of best agronomic practice involved in establishing saltland pasture systems and best understorey pasture species.
- Extension of saltland pasture system configurations for best integration into current farming systems for stock utilisation and opportunistic cropping.

ACKNOWLEDGEMENTS

- Australian Government for funding of the project, NACC, Liebe Group, Morawa Farm Improvement Group & Yarra Yarra Catchment Management Group.
- Geraldton & Wongan Hills Research Support Unit.
- DAFWA Pasture Research Group, South Perth
- Chris Loo, Botanical Gardens & Parks Authority
- Paul Findlater, John Borger, Mike Clarke, Andrew Blake, Dave Nicholson, Jess Haselby, Meir Altman & Dr Ed Barrett-Lennard for technical support.
- 30 farmers (from Gutha to Pithara) directly involved in trial work and demonstrations.

CONTACT Lorinda Hunt
Department of Agriculture and Food WA
THREE SPRINGS WA 6519
Ph: 99543344
Mob: 0427388642
lchunt@agric.wa.gov.au

REVEGETATION OF NATURAL DRAINAGE LINES AND PROTECTION OF REMNANT VEGETATION IN THE EAST MOORE CATCHMENT

PROJECT MANAGER: Lana Kelly

PROJECT AIM:

The aim of the project is to implement strategic, integrated conservation works that build on Local Action Plans, by prioritising remnants and natural drainage areas. A funding incentive will be provided for these areas to be fenced off, and for drainage areas to be revegetated with local, native species and saltland species to link up remnants. Such works will be completed using industry standards. Field Days will be held at local sites which demonstrate successful conservation works, while flora & fauna surveys will be conducted in selected remnants to assess biodiversity value and enable vouchering of species in the WA Herbarium. Landholders receiving funding will be required to sign some form of voluntary management agreement such as CALM's 'Land for Wildlife'.

PROJECT BACKGROUND:

The East Moore Catchment is a sub-catchment of the Moore River Catchment, covering 1600km² (160,000 ha). The area boasts a unique and diverse range of plant species, yet less than 25% of the original native vegetation is retained. Rising groundwater is a key factor threatening remnant vegetation and productivity of land. Much of the salt-affected land is in areas of natural drainage lines and while no longer suitable for cropping, these areas can be made productive with salt-tolerant species, and also act as wildlife corridors linking remnants. Farmers in the East Moore Catchment have had an active involvement landcare and the adoption of sustainable farming practices for many years. They recognise the value of remaining vegetation and the need to ensure its conservation. They also recognise the need to find alternative land uses for salt-affected, unproductive land.'

PROJECT OUTCOMES

- Priority areas have been determined and landholders within these areas are eligible.
- Since March, landholders have been visited including possible sites for inclusion in the project.
- Expressions of interest have been received and recorded.
- On 14 August, a field day was held to see rising groundwater sites & sites were revisited to GPS the fence lines.
- Fencing off of high-priority remnant vegetation has been carried
- Landholder have received funding to sign voluntary management agreements
- Four articles have been produce to promote the project
- Fauna & Flora surveys in target areas have been conducted.

FUTURE DIRECTION

Complete all milestones to the best of my ability between now and December 2008 – including hold field day for landholders in priority areas at local demonstration sites to show similar successful on-ground works and promote current project. Research other possible projects suitable for the area.

ACKNOWLEDGMENTS:

Staff at MCC including NRMOS, Project Officers, Committee members and Administration; and Donna Rayner,

CONTACT ADDRESS: Lana Kelly (Mob: 0427 364 167; lkel@bigpond.net.au)

NORTHERN AGRICULTURAL CATCHMENTS COUNCIL'S (NACC) TARGETED INVESTMENT PROGRAM (TIP)

PROJECT TEAM

Jane Bradley, Incentives Program Manager
Christel Schrank, Targeted Investment Program Officer (TIP Officer)
Georgie Colebrook, TIP Officer
Shanon Dellar, TIP Officer
Donna Rayner, Revegetation Officer
Louisa Belotti, Finance Officer
Kristy Chapman, NRM Officer

AIM

The TIP identifies high priority natural resources such as rivers, native vegetation and agricultural land that are under threat from increasing salinity and declining water quality. The program is designed to assist land managers to adopt practices that will address these threats.

BACKGROUND

Groundwater has been rising across the TIP area at an average rate of 50cm per annum, and has been doing so since measurements began in the 1960s. The rise in groundwater can be directly correlated to earlier land clearing and to past and present land management practices. Due to the unique geological composition of the Parmelia Aquifer, an area of approximately 50,000 ha (the Otorowiri Zone) will be subject to increased waterlogging and spreading salinity as water tables continue to rise.

The salinised groundwater also has the potential to migrate into the Yaragadee Aquifer, contributing saline inflows to this otherwise fresh water resource. Another effect of this groundwater migration will be an increase in saline baseflow entering the important Moore, Minyulo and Hill Rivers, and a corresponding increase in salt load. The Otorowiri Zone is considered highly productive agricultural land, and has been identified as being under high threat from salinity and waterlogging. Without large scale intervention across the Dandaragan Plateau/Parmelia Aquifer over the next 20 years, the combined impact of the loss of these natural resources will be significant. Low-lying land in the TIP area is already showing signs of waterlogging and spreading salinity, and this will be reflected on a much larger scale in the next 5–10 years unless on-ground action occurs immediately.

The rationale behind the TIP is that large-scale land use change from leaky annual systems to higher water use perennial systems will see an increase in soil water uptake, a corresponding drop in the level of recharge and less water percolating to the groundwater tables.

Landholders in the area have the opportunity to access incentives for the establishment of perennial pasture, management of remnant native vegetation, management of saline/waterlogged land, establishment of farm forestry and strategic revegetation.

PROGRESS TO DATE

The TIP has recently celebrated its first birthday. In the twelve months since it began we have worked with farmers to achieve the following:-

103 voluntary management agreements signed between NACC and landholders to:-

- Establish 2,039 ha of perennial pastures involving 71 km of fencing
- Protect 4,542 ha of remnant native vegetation involving 126 km of fencing, 10ha of weed control and 6 ha of revegetation
- Establish 52 ha of farm forestry including oil mallee, sandalwood and eucalyptus saw logs
- Protect and repair 212 ha of saline/waterlogged land involving 12 km of fencing and 42 ha of salt-tolerant plantings
- Working with landholders to prepare 7 management agreements for strategic revegetation in winter 2009.

PROJECT KEY OUTCOMES

\$918,503 of on-ground works committed since Sept 2007

\$110,275 of on-ground works in offered agreements since Sept 2007

Perennial pasture seeding workshops run in August 2007 and July 2008

Prograze course run in the Moora-Dandaragan area during July-August 2008

Benchmarked soil chemical characteristics, in particular soil carbon, at over 500 GPSd locations on our 2007 and 2008 perennial pasture sites.

FUTURE DIRECTIONS

The TIP will continue to deliver its current incentives, but will also undertake an incentive review process in September 2008. With the rise in the price of fuel, fencing materials and inputs, it is timely that we review the guidelines, criteria and incentive rates we offer against the actual costs of undertaking the works. Small working groups consisting of landholders, technical experts and on-ground staff will make recommendations to the NACC Incentives Working Group on changes to the existing incentive.

We will also be looking at the potential for new types of incentives and new ways of delivering funding to assist landholders undertake land use change.

We will continue to benchmark soil chemistry, in particular soil carbon, at our perennial pasture sites, and are currently looking at methods for benchmarking soil carbon on other sites where we pay for land use change from annual to perennial systems. A method for benchmarking soil biology is also being developed.

CONTACT ADDRESS

Jane Bradley

Incentives Program Manager

Tel: 9964 9774

Fax: 9964 9776

Email: ipm@nacc.com.au

WEST KOOJAN/GILLINGARRA CDI

PROJECT MANAGER: Mark Weston
NACC, GERALDTON

The West Koojan Gillingarra area south of Moora is playing a vital role in establishing management practices that make farms more sustainable and profitable through a Catchment Demonstration Initiative (CDI).

The CDI is one of four similar projects throughout the State aimed at mitigating rising groundwater and improving farming practices and has attracted \$1 million of funding from the State and Australian Governments to implement the project.

The project will assist the implementation of new and more sustainable (triple bottom line) farming systems or practices, in particular those based on the use of perennials, which will reduce rising groundwater, the frequency of waterlogging and an associated incidence of primary, but more commonly secondary salinity. Reductions in groundwater and associated effects will also help preserve the quality of surface water entering the Moore River and reduce the threats to significant areas of both public and private owned remnant vegetation.

The use of perennials will be targeted primarily at areas of groundwater recharge in a series of 5 sub-catchment areas, although in some instances, and in the sub-catchment specifically, perennials will be used to take greater advantage of the freshwater available in discharge areas.

Investment will also support the construction of shallow or better aligned and engineered shallow drains so as to prevent or reduce ponding of surface water and the associated negative effects on production and the environment.

Implementing perennial based farming systems will involve supporting understanding of the methods used in establishing a range of perennials and in the changes required in livestock management practices when moving from an annual to a perennial based pasture system.

PROJECT CONTACT: Mark Weston
NACC, P.O.Box 95
Perenjori 6620
Tel (08) 9965 0502
(Mob) 0427 244 525
cdipl@nacc.com.au

“HEALTHY FARMS” - ENVIRONMENTAL MANAGEMENT SYSTEM

PROJECT TEAM: Kristy Chapman Mingenew Irwin Group
Dave Brindal Mingenew Farmer

WHAT DOES BEING A HEALTHY FARMER MEAN?

- Healthy farmers are adopting practices that ensure that their land and natural resources are managed in the best way for the benefit of future generations.

WHAT DOES A HEALTHY FARMER DO?

A healthy farmer – Is environmentally sustainable!

- They use EMS (Environmental Management Systems). This is a process where they plan, do, check and review management techniques used on their property to make sure there is minimal impact on the environment

PRODUCES FOOD THAT IS SAFE TO EAT!

- Healthy Farmers have a QA (Quality Assurance) system in place to ensure that all of their products are – food safety etc.

MAKES SURE CHEMICALS ARE USED SAFELY!

- They undertake training in chemical accreditation (ChemCert) to ensure safe use of chemicals on the farm

KEEPS A SAFE WORK ENVIRONMENT!

- Healthy Farmers undergo training in occupational health and safety requirements

HOW DO THEY DO THESE THINGS?

- By being trained in Environmental Management Systems, Quality Assurance, Chemical Certification and Farm Safety. Through these programs the farmer identifies what he/she does well and what he/she does not do well and then constructs management plans with actions and targets to improve the management of these problem areas. They then monitor and record their efforts in meeting these targets.

WHY DO FARMERS WANT TO DO THIS?

- To show the community they are using the best and up-to-date farming methods and technologies
- Make sure their resources are managed in the best possible way for the future
- Provide information to future generations about how the land has been managed
- Protect Australia’s “clean and green” image
- Maintain and develop new markets for “Healthy Farms” products.

PROJECT MANAGER: Kristy Chapman
Mingenew-Irwin Group
P: 08 99281646; F: 08 99281540; M: 0427 574008
E: k.chapman@westnet.com.au

SOIL STABILISATION SOLUTIONS FOR NANGETTY VALLEY **SOIL STABILISATION SOLUTIONS FOR THE NANGETTY VALLEY**

PROJECT MANAGER: Kristy Chapman

The focus of this project is to demonstrate and evaluate likely rehabilitation techniques for one of the most degraded landscapes in Western Australia. The Nangetty Valley (north of Mingenew) is severely eroded and contributes the majority of the sediment load in the Irwin River system. The soils within the valley are unique and extremely erodible and therefore require special treatment to stabilise. The vegetation is predominantly made up of saltbushes and other arid landscape plants.

Apart from erosion, salinity is a major risk in the valley with DAFWA piezometers showing that large parts of the landscape are at risk. The groundwater in this Irwin Sub Basin area is of sea water quality and thus is toxic to plant growth.

Unfortunately, the valley is far from productive and economics of stabilisation / revegetation limit the ability of landholders to take them up. Thus, this project will see the implementation of large-scale demonstrations of a range of stabilisation options (the placement of which will depend on landscape position and the severity of degradation). Each option will be carefully assessed for suitability and economic viability. The options to be demonstrated and tested include:

- Gully fill / land reclamation
- Revegetation of different parts of the landscape with a focus on
 - Destocking to allow natural regeneration of saltbushes and blue bushes, etc
 - Planting of 'other' saltbush species
 - Planting via a range of methods of native species such as Acacia (to stabilise soil & minimise changes in ground water level)
 - Planting alternative tree species that may have a commercial benefit in the future
 - Planting on northern-facing, breakaway slopes which are currently denuded
- Permanent destocking
- Development of alternative, best management grazing practices (i.e. cattle only during winter, etc)

The project will allow farmers owning parts of the valley to see first hand the works and observe the impact over a period of time. Farmers will also be able to evaluate the cost effectiveness of each option, as each will be costed out in full detail (i.e. cost and return on investment).

PROJECT CONTACT: Kristy Chapman

“LONG TERM SUSTAINABILITY OF PROFITABLE ‘MEDIUM RAINFALL’ FARMING SYSTEMS.”

PROJECT MANAGER: Rob Grima

PROJECT DESCRIPTION:

This project will plan, analyse, develop and deliver workshops and information packages aimed at helping farmers to decide on best bet options for the management of herbicide resistance with a specific focus on soil and other resource impacts / risks

AIMS:

- To develop an understanding of the threats posed by resistant weeds to farming businesses and their NRM
- To analyse new systems to counteract these said threats

BACKGROUND

The NAR medium rainfall zone consists of 4.5M hectares of farming land. This region is divided between sandy soils and loamy soils. The sandy soils are dominated by the lupin and wheat rotation, while loamy soils tend to have a higher concentration of cereals. Farmers do employ non cropping phases on both soil types in order to alleviate potential resistant weed problems. Despite this, weeds still pose a significant threat to the economic sustainability of farms in this region, as well as the natural resource base. It is believed that any and all methods aimed at alleviating the threat of these resistant weeds will in turn reduce the threat they pose on the natural resource base.

ACTIVITIES TO DATE:

The project started with a grower’s survey pertaining to their farming business and the perceived threats to their business. Over 50 growers from the catchment took part in the survey, and the results were presented at the Agribusiness Crop Updates in Perth 2007. The survey provided an insight into the types of farms in the district, as well as their major threats.

The second stage was to use the economic model STEP to build “standard” farms that these growers could identify with. It was decided that 6 farms were required to fully cover all the soil x rainfall interactions our catchment contained. These were:

- Yellow sand high production,
- Yellow sand medium production,
- Coastal sand plain mix high production,
- Coastal sand plain mix medium production,
- Red loam, and
- Sand and red loam mix.

All sand plain farms have been analysed fully and results have been distributed to growers and industry. The final two farms have also been analysed fully and are currently being mailed out. These analyses looked at the sensitivity of each farm to enterprise mix that is the ratio of crops to pasture and the impact altering this makes on profit. In doing this we gained a clear insight into the key drivers of profit for each farm.

FUTURE DIRECTIONS:

We intend to use the information once again from our survey, and that of other surveys, to explore the potential impact alternative weed control methods may have on both the economic and environmental sustainability of our developed farms.

PROJECT LEADER: Rob Grima: Farming Systems, DAFWA, Geraldton office;
Phone (08) 99 568 545 ; Email rgrima@agric.wa.gov.au

REDUCING EROSION UNDER HIGH STOCKING RATE GRAZING SYSTEMS

PROJECT LEADER: Rob Grima

PROJECT DESCRIPTION:

The purpose of this project is to identify profitable stocking rates that both minimise erosion and control herbicide resistance within the whole farm. This will be achieved by identifying and demonstrating those grazing practices and crop rotations which data and anecdotal evidence indicates that high ground cover levels can be maintained under high stocking rates.

AIMS:

- To better understand of the strategies and tactics that farmers currently use to minimise erosion under high stocking rates.
- To determine potential grazing systems and crop rotations based on current knowledge and their ability to control seed set of weeds, optimising production.
- To communicate the learning's principally through large scale on farm demonstrations.

BACKGROUND

The major farming system of the northern agricultural region sand plain is the very profitable wheat lupin rotation. The lack of diversity has resulted in a number of threats developing and the system is fast becoming unsustainable in its current form. The development of herbicide resistance is seen by growers as one of their greatest threats to profitability in the future. In the bid to maintain the sustainability of sand plain farming, there has been some significant interest in integrating livestock back into the system due to better livestock prices, alternative sheep breeds, availability of improved pasture legumes, as well as other pasture species. However, it is well known that high stocking rates have led significant erosion in this Region. Wind and water erosion occurs every year on some properties and significant erosion occurs every 5 to 10 years in the Region. Erosion has been identified as one of the top threatening processes in the Regional Strategy. Despite this it was demonstrated in the dry season of 2004 by a Binu grower that stocking rates can be increased (from 0.4 DSE/ha to 7.2 DSE/ha) through the use of both alternative feed supplies as well as alternative grazing management. It was also shown in the same experiment to not increase wind erosion. This demonstration ultimately led to this project.

ACTIVITIES TO DATE:

A committee within the Northern Agri group was set up consisting of 8 growers and departmental staff. These growers became the core of the study and have each year attempted to do something different in one or more paddock that increases their stocking rate and/or reduces their erosion risk. These activities included sowing perennial species, grazing cereals, sowing legumes, and investing in permanent fencing or electric fencing. All 8 growers have participated in training through DAFWA containing information on grazing management, animal husbandry and maximising production. Grazing data was collected from these growers to gain information on the differences either feed supply or grazing management had on stocking rate, and its resulting effect on autumn ground cover. This process is ongoing.

FUTURE DIRECTIONS:

The group continues to record their stock movements and its resultant effect on potential erosion events. All growers are economically analysing their current enterprises, and also assessing potential economic impacts of changes to their enterprises.

PROJECT LEADER: Rob Grima: Farming Systems, DAFWA, Geraldton office;
Phone (08) 99 568 545 ; Email rgrima@agric.wa.gov.au

MOGUMBER CARING FOR COUNTRY PROJECT

AIM

To set up a framework for the sustainable management of Mogumber Farm, the site of the former Moore River Native Settlement, by conducting a natural and cultural heritage survey of Mogumber and incorporating this into a Management Plan outlining NRM actions to be undertaken.

Inclusive of the aims of the project are capacity and skills building workshops for the Noongar community in collaboration with relevant experts and local officers, to extend Noongar engagement in the Project and wider NRM processes and facilitate community engagement and change.

BACKGROUND

In 2007 the Mogumber Natural Resource Management Advisory Group (MNRNAG) was established as a steering group for the project. The MNRNAG was endorsed by the Yued Traditional Owners through the Working Party under the South west Aboriginal Land and Sea Council (SWALSC) the Yued Native Title Representative Body. But ultimately the Yued Working Party has the final say. In collaboration with the Caring for Country Project Officer the role of MNRNAG is to make recommendations for planning, on ground works and set directions for the project. The Advisory Group and other Yued community members have been the motivation for all works. Engaging TO's in planning, development, decision making and the schedule/on ground works for the projects outcomes has been intrinsic in the success of the project.

The work includes:

- Protection, conservation and enhancement of the 5,054ha property, which over half is remnant vegetation.
- Raising awareness in NRM and caring for country, and Yued community capacity building.
- To get a better understanding of species populations and biological diversity on the property, to be protected and conserved.

MOGUMBER FARM MANAGEMENT PLAN

Protection and conservation on Mogumber Farm has been developed in the Management Plan from information gathered through community consultation and research, including a literature review. Inclusive in the Management Plan are recommendations for 24 small scale projects from community involvement in the planning process, and a dieback management plan and protocols as it has been indicated as dieback free.

The Implementation Plan currently being carried out scheduled until December 2008. Information gathered goes into recommendations in the Management Plan, for example, future protection of species such as the endangered Carnaby's black cockatoo, of which Mogumber has habitats that support the species, e.g. feeding grounds.

Awareness was raised through four Caring for Country Workshops were held during 2007. The focus was to start to identify skills gaps and areas of interest and need within Caring for Country in the Yued community. Identifying individuals to represent Aboriginal views in the decision making process and their involvement in the project was most important.

THE WORKSHOPS INCLUDED:

- Mapping of threats, opportunities, and priority areas for protection and enhancement as per NACC and Yued community priorities.

To get a better understanding of species populations and biological diversity on the property surveys were conducted. A vegetation survey was conducted and through the WA herbarium a species list of over 130 plants has been established. A Dieback survey has cleared Mogumber farm Dieback free. A Water Quality and Foreshore Assessment was done also. All of the survey sites were mapped. Land degradation threats such as weeds, erosion, salinity, and where pest species have been found have also been mapped.

PROGRESS TO DATE

- The Management Plan is now complete
- 4x Caring for Country Workshops
- Flora surveys completed, two unnamed plants found- *Philotheca spicata* subspecies, and *Dampiera sp.* “an interesting collection not readily identifiable to species. Probably closest to *D. triloba* but may well be undescribed”
- On ground works include site auditing and registering sites, Aboriginal Heritage site protection including fencing and signage
- Heritage Walk Trail development
- Weed management and pest control
- Revegetation of saline land 1500 plants
- Proposal for a large scale fencing project
- Full Aboriginal Green Corps team
6 month project, to do the implementation of small scale projects
Certificate 1 in Conservation and Land Management
- Water quality monitoring and river assessments done, salinity is a known and increasing threat
- Dieback Free- dieback audit done on the property
Signage delivered to property, will be put in by the Green Corps team
- Fencing of Mogumber Burial
- Fencing of priority wetland site
- Creation of maps for the property including priority areas for protection, recommendations from the implementation plan, and areas subject to threatening processes.

PROJECT KEY OUTCOMES

- Identification of places of high significance to Aboriginal people and prioritisation for management actions
- Conduction of planning activities as result of mapping processes in partnership with key agencies and local government
- Development of a Management Plan for the Mogumber Farm Property
- Institutional change; have worked with local government and heritage organisations to encourage proactive management of high priority sites of significance.
- Quality community engagement continued through all implementation stages through a ‘bottom up’ and targeted approach.
- Developed working relationships with the Aboriginal Reference Groups and local Aboriginal organisations
- Capacity building including the understanding of spiritual values of natural resources and knowledge in this area has grown.

- On ground works from the implementation plan are currently being undertaken for Aboriginal sites of significance.

FUTURE DIRECTIONS

Implementation of small scale projects and, monitoring, and research into carbon emissions trading.

ACKNOWLEDGEMENTS

Yued community, Mogumber NRM Advisory Group, NACC, Chittering Landcare Centre staff, CDI Project (Mark Weston), Marieke Jansen, Donna Rayner, Project Dieback (Jenna Brooker) and all those that have helped the project with expertise, advice, and support.

CONTACT ADDRESS

Philippa Schmucker & Brendan Moore
South West Aboriginal Land & Sea Council

Ph: (08) 9358 7427

Fax: (08) 9358 7499

Mobile: 0428 911 994

philippa.schmucker@noongar.org.au; Brendan.Moore@noongar.org.au

RURAL TOWNS - LIQUID ASSETS (PROJECT SUMMARY)

PROJECT MANAGER: MARK PRIDHAM

BACKGROUND AND PROJECT SUMMARY

Urban salinity has a significant economic impact on at least 40 rural towns in Western Australia. The WA Salinity Investment Framework (2004) predicted that damage within those towns will be more than \$55 million statewide over the next 30 years. With increasing water restrictions, economic and social development is also being stifled by declining water supplies.

Salinity management based solely on water abstraction is not often cost effective. However, an integrated approach incorporating salinity management with new industries (based on local water production) can be viable and produce multiple benefits. This project shows how locally sourced saline groundwater may be treated and turned into a resource for the community.

Delivered across 16 'Priority Towns', Rural Towns – Liquid Assets (RT-LA) will demonstrate how to control townsite salinity and produce water supplies from urban groundwater and stormwater. It does so within partnership arrangements between the Department of Agriculture and Food, Local Government, the Chemistry Centre (WA), CSIRO, CRC LEME and four Regional Catchment Councils.

RT-LA has been designed to fill the knowledge gap between current understanding of groundwater systems and the practical application of water production and utilisation technologies. It is strategic in nature, crossing regions, and targeting the highest priority towns identified within the Salinity Investment Framework.

PROJECT OBJECTIVES

- Increase awareness of townsite salinity and its management
- Develop Water Management Plans for controlling surface water and rising groundwater
- Provide technical and financial assistance to local government to improve townsite water management and control the salinity threat to their towns
- Monitor the condition of the resource base - groundwater movement, surface flows and water quality in country towns
- Improve self-sufficiency in town water resources.

PROJECT OUTPUTS

- A Rural Town Water Management System Model
- Water Management Plans (WMPs), for each of 16 Priority Towns
- Four Integrated Water Management Pilot Schemes with on ground work demonstrating: salinity management, water supply and new industry options

BENEFITS OF THE PROJECT

- Cost effective salinity control in WA townsites.
- New water resources - to enable a range of economic and social benefits through development of alternative water supplies.
- Resource base improvement. Improvements to the natural resource base within townsites (water, soil and vegetation), and reduced reliance on imported water.

CONTACT: Mark Pridham (08) 9368 3919 (or visit: www.agric.wa.gov.au/RTLA)

FARMING TO THE CLIMATE: MANAGING CLIMATE VARIABILITY AND RISK IN THE LOW RAINFALL NAR

Kari-Lee Falconer, Geoff Anderson, Siva Sivapalan, Caroline Peek
Department of Agriculture and Food WA

PROJECT AIM

- Improve the knowledge of growers and agribusiness in the NAR on climate variability and risk management
- Evaluate and develop farming systems and management practice performance under climate variability
- Apply climate risk management to farming systems to improve water quality, reduce salinity and erosion through maintaining and improving ground cover.

BACKGROUND

The low rainfall farming system functions within a highly variable seasonal climate and must be able to withstand the pressures of drought with enough flexibility to be highly productive in good seasons. This project is about providing information and tools to growers and industry to improve the management of current climate variability and develop robust farming systems.

WHAT HAVE WE DONE?

- An economic analysis on the benefits of using climate predictions to make farm management decisions based on crop rotation choice and fertiliser strategy.
- Monthly newsletter bulletins sent to participating farmers in Morawa and Perenjori evaluating crop yield decision support tools; Yield Prophet, PYCAL (potential yield calculator) and STINxl throughout the last 3 growing seasons.
- Raised industry awareness of climate information through regular AgMemo newsletter articles and presentations on climate rainfall outlooks.
- Developed and delivered 10 workshops on Managing Seasonal Variability; covering understanding the weather, climate and applying it to management decisions.
- Established a long term demonstration site at Mullewa to examine managing climate risk in farming systems focusing on the profitability of rotation choice, nitrogen fertiliser strategy and soil moisture conservation.
- An economic analysis on the impact of management decisions in drought on a low rainfall northern wheatbelt farm. Paper published at the 2008 Agribusiness Crop Updates by C Peek and A Blake.
- 3 Demonstration sites with farmers looking at aspects of climate risk management in farming systems. A further 3 demonstration sites established on Mullewa Research station looking at fallow based farming systems, early establishment grazing cereals, establishment of perennials in low rainfall
- 7 case studies on farmers applying seasonal climate risk management collated with 3 case studies published in Kondinin Group's Farming Ahead magazine.
- Contribution to DAFWA's new e-newsletter AgTactics. Providing timely and tactical information to farmers and industry and incorporating the climate message into a risk management framework. This has allowed grower to make more informed decisions at seeding.

WHAT WE PLAN TO DO

- Bulletin on climate risk management options

- Evaluation of climate decision support tools used over the last 3 years

PROJECT CONTACT

Kari-Lee Falconer
Department of Agriculture and Food WA
Moora District Office
20 Roberts
Moora WA 6510
P (08) 9651 0537
F (08) 9651 0575
E kfalconer@agric.wa.gov.au

BIOCHAR: CONCEPTS FOR SEQUESTRATION AND RURAL INCOME.

(Based on a Paper offered to Soil Summit convened by the Agricultural Alliance on Climate Change Canberra June 18th 2008)

Paul Blackwell (DAFWA), Stephen Joseph (UNSW) and Dale Park (Badgingarra WA)

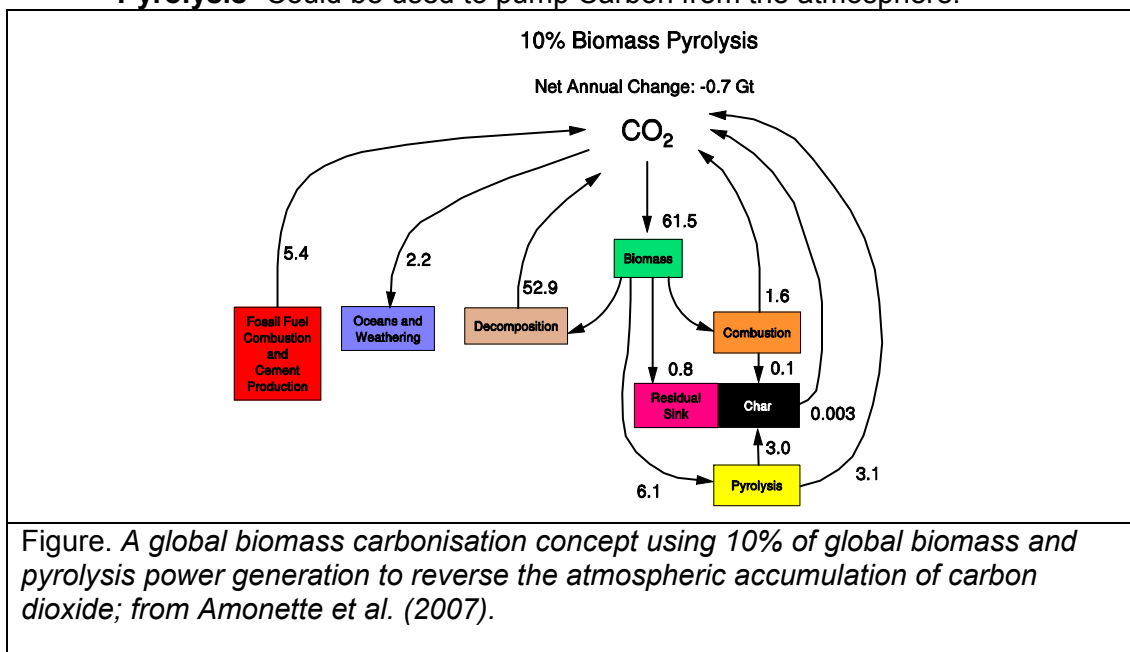
BACKGROUND

Examination of possible systems of sequestering stable forms of carbon in soil and associated potential economic benefits may help identify knowledge gaps to progress development of rural mitigation and adaptation strategies for climate change.

Carbon credits within proposed emission trading schemes are part of this potential economic benefit. One potential source of carbon available to producers is Biochar an anthropogenic stable carbon known to persist relatively safely for at least 70-100 years.

Summary

- **Pyrolysis**- Could be used to pump Carbon from the atmosphere.



- **Pyrolysis** – May potentially increase farm income as part of a carbon trading scheme.
- **Biochar** potentially has other benefits, may drive income more than Carbon trade and encourage more sequestration for example the use of biochar in detannification of livestock feed and the production of Biofuel from algae.

FUTURE RESEARCH

- Optimal influence of biochar on humus deposition?
- Design and evaluation of biochars for value added and sequestable products?
- New biomass based C capture systems, (synthetic terra preta)?
- Models integrating natural and anthropomorphic stable soil carbons.

CONTACT ADDRESS

Dr Paul Blackwell. DAFWA PO Box 110 Geraldton WA 6531.