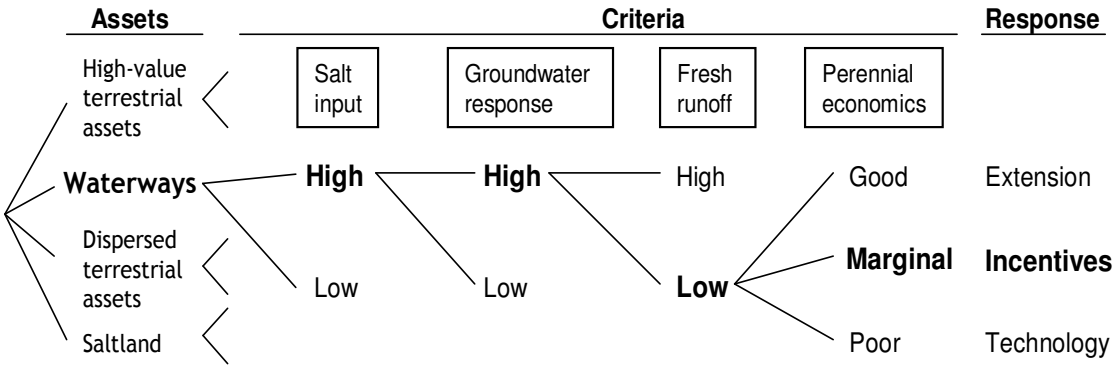
SIF3 Methods - North Central CMA region

Anna Ridley (Department of Primary Industries and CRC Salinity)
David Pannell (University of Western Australia and CRC Salinity)
Geoff Park (North Central Catchment Management Authority)

Introduction

SIF3 is an asset-based approach to assessing the 'best-practice' policy response for salinity management. It is based on the latest research knowledge from hydrogeology, biology, farming systems, resource economics, social science and policy mechanism design (www.sif3.org). Salinity impacts in four different asset classes are considered: (i) water resources, (ii) high-value terrestrial assets such as built infrastructure and key biodiversity assets, (iii) dispersed assets such as agricultural land, and (iv) salt-affected land. Investment responses are dependent upon the public and private benefits that result from possible interventions (www.sif3.org, see Pannell discussions 73-80) and chosen from the following broad groups (i) extension, (ii) incentives, (iii) penalties, (iv) engineering; (v) technology development, (vi) other R&D; (vii) land retirement, (viii) no action.

Identifying the appropriate response is illustrated, with the choice depending on the type of asset and on several other influential factors. These factors are different for each asset type. For waterways, as outlined in the example, the important factors are salt input, groundwater response, fresh runoff and the economics of perennials. There are different decision trees for the other asset classes - see Ridley and Pannell (2005)[1].



At present the SIF3 decision trees have been developed for salinity nationally and trialed with the North Central CMA and South Coast (SCRIPT) regional body in WA. We know that CMAs want to assess investments for multiple natural resource benefits. Both the process of valuing assets and the investment response can be used for any natural resource management threat. It is the branches of the decision tree (the set of critical factors) which need considering for other threats. We will do this in the next phase, but have concentrated on salinity because the science is well developed.

[1] Ridley, A.M. and Pannell D.J. (2005). SIF3: An investment framework for managing dryland salinity in Australia. Australian Journal of Experimental Agriculture 45, 1341-55
http://www.crcsalinity.com.au/newsletter/sea/articles/SEA_1901.html

Methods for implementing SIF3 in the North Central CMA

Methods for implementing SIF3 are summarised. Rather than detailing all steps, this document is designed to help others implement an asset-based approach. We used only available data and recognise that other regions may have other or additional data.

Consultation, participation and building on existing knowledge

Understand the history and knowledge base of the current approach to salinity management. This includes the science, its limitations and the processes used to make decisions. In the North Central CMA the approach to salinity decision making has evolved over 25 years, initially being fairly non-targeted, to salinity hazard-based and then development of a targeted approach where 10 sub-catchments receive all the salinity incentive funding and extension. The current 'target area' approach recognises that funding for salinity is insufficient to fix the problem and that a thinly spread 'vegemite' approach is unlikely to deliver salinity benefits. As an asset-based approach such as SIF3 also results in unequal distribution of public resources, it is useful to know if the region has resolved this perceived equity issue previously.

Establish the level of interest, receptiveness, participation and processes for engaging and involving key stakeholders. In the North Central CMA the Board, Implementation Committees, CEO and senior staff were already actively questioning the current approach. We presented and explained SIF3 to audiences including the CMA Chairman, CEO, key staff, the Board, Implementation Committees, DPI, DSE, the Victorian NAP Office, and the City of Greater Bendigo. We established the level of participation, processes and reporting between the project team and key staff within the CMA. Without the positive response from key staff, the CEO and the Chair of the Board, trialing SIF3 would have been difficult.

Local knowledge needs to be respected, used and built upon. We held a field tour of the region enabling us to meet people, learn about existing knowledge and discuss issues in a casual and grounded setting. We were able to identify people who we relied on for involvement and access to local knowledge and previous studies. It provided an opportunity for issues to emerge that we were not aware of. Our approach has been continuously adapted, building on people's interests and knowledge.

Identifying key assets and their values

Work out an agreed set of high value assets. SIF3 uses 4 asset classes, waterways, high-value terrestrial assets (eg infrastructure, priority wetlands, potentially icon biodiversity sites), lower-value dispersed assets (agricultural land, dispersed remnant vegetation) and salt-affected agricultural land. Assets can be valued using scientific criteria (e.g. International, National, State and bioregional priorities) and/or community values, provided the community values are agreed through a process that the CMA endorses. Agreeing on a realistic short list of high-value assets was challenging but important as the current salinity budgets will not permit adequate protection of all threatened assets.

In the North Central region we started with the following and used GIS to assist assessment of the overlap between priority assets, threats and tractability of treatment:

– For high-value waterways we used priority waterways within the River Health Strategy (incorporated economic, environmental and social values). This resulted in a list of 42 (of the 101) priority waterways. Although not all were threatened

by salinity, further priority setting was needed. The GIS layer that formed part of the priority setting process within the River Health Strategy was ISC_REACH.

– For wetlands (high-value terrestrial assets) we used current lists of wetlands of National and State significance (including wetlands of bioregional significance produced about 200 wetlands for consideration but way too many). GIS layers used were RAMSAR100 and WETLAND_1994.
– For native vegetation we initially used classification of 'very high' conservation significance using a modelled layer of conservation significance (GIS layer CONSIG_ARI) to assess whether some areas (other than large blocks such as state and national parks) should be considered in the high-value this category. This resulted in too many 'very high value' remnants to reasonably protect. Until we work out a realistic approach, we have considered all remnant vegetation as 'dispersed assets'.
– For infrastructure (high-value terrestrial assets) we used town boundaries as assessed through the property layer (GIS layer PROPERTY25) and length of road (ROADS500) and rail threatened by salinity (GIS layer RAIL_V).
– For dispersed lower-value assets, we used all land and dispersed native vegetation, other than that affected by salinity.
– For saline land we used mapped saline discharge (GIS layer SOILSAL25_A).

We further reduced the priority asset lists (there being too many for salinity protection) and gained community acceptance of priority assets by:

(i) Holding workshops for 'the community' (people invited by the CMA and included Implementation Committees, selected community and local government members, DPI and DSE) to identify their most valued assets.
(ii) Asking CMA staff responsible for waterways, wetlands, native vegetation and towns to come up with a 'Top 20' list. If they felt uncomfortable about this, they were asked to indicate assets of 'very high', 'high' and 'medium' priority.

We used this information along with the initial science-based classification. The overlap was close and in a few cases assets were elevated in status. The workshops revealed that some assets identified by the community were not well represented through national and state classifications of scientific value. Also, some of the scientific values were dubious, based on a narrow selection criteria, being known to be of less ecological value than some non-assessed assets or being in poorer condition than when assessed. An on-going (perhaps annual or biennial) CMA consultation process to assess asset values and priorities would be useful. Participants in the workshops reported that this was an extremely valuable process, encouraging ownership, and incorporating local knowledge into asset priority setting.

Assessing the salinity threat to key assets and urgency of the problem

Different regions might have different information but for the North Central CMA region, readily available information included:

– Reports and work undertaken before the NAP. There were a number of useful salinity risk assessments and groundwater conceptualisation reports. These were used as a starting point and later for a 'reality check' against derived GIS layers.
– Depth of watertable information. We used 3 data layers 1) North Central Salinity Audit (2000) depth to watertable data - watertables of less than 5 m depth were assessed as having a potentially urgent salinity threat (GIS layer D2000_EST_I); 2) New Sinclair Knight Merz (SKM) maps integrating watertable height and trend

data and saline discharge information (GIS layer SGS_5M_2004). Assets at risk are those estimated to have moderate (P=0.5-0.75) and high (P=0.75-1.0) probabilities of watertables at less than 5 metres depth in 2004; 3) Saline discharge layer, which used in combination with depth to watertable from the North Central Salinity Audit gave us additional confidence of the risk of salinity.
- Local expert opinion (hydrogeologists, extension staff and Implementation Committee members) was sourced through a workshop where they were shown the layers of watertable information and asked to comment on accuracy.
- Hydrogeologist expert opinion was used to make sure we were not including areas affected only by waterlogging.

We recognise that using depth to watertable is problematic to assess salinity hazard, for example the North Central Salinity Audit data was known to over-estimate it. The new SKM layer has not been ground-truthed and in some areas experts tell us it over-estimates risk and in others under-estimates. Local and expert knowledge is crucial, especially where scientific information is limited. Salinity concentration of watertables was not available for the region.

Tractability of treatment

Groundwater flow systems (GIS layer groundwaterflow100), combined with expert hydrogeologist knowledge was used to assess whether the problem was likely to be tractable within reasonable time frames. We assumed that local groundwater systems presented tractable salinity management options. The time-frame for responsiveness of particular groundwater systems created constructive debate amongst hydrogeologists. The current scale of information available in North Central (1:250, 000) too coarse for asset-protection assessment and this information at 1:100,000 scale plus local watertable trend and bore pump test information would better assess tractability and feasibility of protection.

Economics of perennial farming systems options

SIF3 requires assessment of whether available perennial farming systems options are profitable, marginally profitability or not profitable. Whatever economic information is available can be used. In the North Central CMA region we started with the economic analyses performed as part of the NAP process. These were gross margin analyses with inadequate consideration about risks of establishment of perennials and subsequent management requirements for pasture persistence. We therefore relied on the knowledge of local extension officers, Implementation Committee members, farmers and observations on the field trip to understand the proportion of landholders in areas who are likely to adopt appropriate perennials (largely lucerne or phalaris). We asked extension officers how much difference they believed current incentives ($60/ha) made to adoption. They usually told us that without incentives establishment would not occur. This suggests that economics were marginal (at best) to poor, even before considering management issues.

Demographic issues

SIF3 was initially developed on the basis that farmers are strongly commercially motivated. In many regions of Victoria, as in the North Central region, there is a mix of farmers, in categories that we have labelled as commercial, lifestyle, and hybrid. In some areas, lifestyle farming dominates. We have modified SIF3 slightly to date to simply cover both lifestyle and commercial farmers, but recognise that more changes

are needed. Roger Wilkinson has interviewed 'lifestyle', 'hybrid', and 'commercial' farmers to assess issues such as their attitudes and motivations, their responses to current incentives and their requirements for management practices that have low cost and ease of management. His work will result in further modifications to SIF3 analysis, but we don't expect overall results to change markedly.

Use SIF3 tables to assess investment response

Working through the process of getting assets put in the appropriate category, and referring to the relevant factors, should result in easy use of the appropriate asset table and set of criteria that leads to the appropriate investment response. The SIF3 tables (available in the SIF3 paper on the web site www.sif3.org) establish the investment response for the high-value assets threatened by salinity and also suggest some broader catchment-wide recommendations (responses commonly that apply to dispersed assets) about technology development and/or research. Each of these assets and broader recommendations can be considered as discrete 'projects' for investment.

Feasibility and cost-effectiveness

Assessing the feasibility of treatment (technical and community acceptability) and cost-effectiveness of protection of the asset short-list is required. The essence of this is, for a defined set of responses, how much of the salinity problem will be abated and when? The detail of the feasibility analysis will differ according to whether there is additional information (for example prior bore 'pump-tests' to assess likely response of groundwater to engineering). Sometimes expert and local knowledge will be sufficient, and in others, additional information may be required. Similarly, consideration of the likely acceptability of the proposed treatment (eg. engineering that requires disposal of saline water) to the community needs to be assessed. Local workshops and working with local and state governments could be required.

Where technical feasibility is established, the cost of the response needs to be assessed (including taking account of disposal issues). A rigorous asset priority setting process should result in the case to be made for sufficient benefit of public investment for asset protection. Assuming this is the case, then costs of intervention for each short-list project need to be established. Costs need to include initial and recurring costs. Given a particular budget for salinity investment, a process is needed to make the trade-off decisions about funding of particular 'projects'.

Conclusions

SIF3 has been successfully applied in the North Central region. It is the most rigorous and accountable approach to salinity investment available in Australia. SIF3 can be applied using existing information and refined with new knowledge. It uses available science and can incorporate community values and processes. SIF3 is likely to result in different results than currently and will challenge some stakeholders. It is crucial to have willingness within the CMA for continuous learning and improvement and people who will champion it during the analysis. Getting a relatively short-list of agreed high-value assets can be difficult. Stakeholders need to be involved in the process to the extent they want, and they need to understand the logic and basis of SIF3. Participation and inclusion is as important in SIF3 being accepted, as is using available science. Implementing SIF3 in the North Central CMA region has been a successful and rewarding experience and will result in strongly defensible public investment in salinity management.