Agency Perceptions of Alternative Salinity Policies: Are They Measuring Transaction Costs?

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Abstract:

Economics has looked at the decision process of politicians but the decision process of agency staff has primarily been the purview of sociologists. Agencies affect the final form of regulations, they may enforce or ignore regulations that exist, and they provide information to the political process. Policies recommended by economists for non-point source pollution control are seldom implemented by government agencies.

This study examined the relationship between preferences for a particular policy and the perceived farmer cost, farmer resistance, efficacy in salinity reduction, fairness, and administrative costs. The latter were included to find whether transaction costs of implementing policies affect preferences and whether this could help explain the existence of current policies.

To test this hypothesis, a survey of people working on the salinity issue was conducted. Contrary to what one might expect, perceptions of farmer cost and farmer resistance were not highly correlated. When preference was regressed against farmer cost, farmer resistance and administrative costs, only farmer resistance was significant. When effectiveness and fairness were included as explanatory variables, they were highly significant and the coefficients were quite large. Including perceived effectiveness and fairness greatly improved the explanatory power of the model.

Introduction

Economics has largely neglected the decision process of government agency staff. This is unfortunate because they significantly affect environmental and natural resource policy in a variety of ways. Politicians are generally not trained scientists and often rely on agency staff for information regarding environmental problems and policies. Agencies may either thwart the intentions of politicians or go beyond them. While politicians enact legislation, the agencies write the final regulations. In addition, agency staff may choose to ignore or enforce regulations that currently exist, and if laws and regulations aren't enforced, they have little effect. This seems to be particularly true in the case of nonpoint source pollution. The State of California passed strict pesticide regulations but they were not enforced because agency staff felt they were unreasonable (Sandra Archibald, personal communication). In Minnesota, there is a perception among farmers that feedlot regulations are not enforced (McCann, 1997). In Western Australia, a permit is required to clear native bush but a variety of sources have indicated that enforcement is not high. On the other hand, politicians can affect agencies via appointments and funding levels.

An examination of the determinants of agency preferences over policies is needed for two reasons: 1) to design methods to promote adoption, and 2) to potentially uncover factors that should be included in economic analyses. In the case of agricultural nonpoint source pollution, one typically observes programs or policies based on education, cost sharing, technical assistance, land retirement, mandatory land use practices, and conservation compliance. Policies proposed by economists such as input taxes, emission charges based on estimates, and marketable permits are not generally observed in practice.

What factors have hindered the "adoption" of recommended policies by politicians and agency staff? One hypothesis was that perceived high administrative or transaction costs associated with enacting and enforcing this type of policy in the case of nonpoint source pollution hindered adoption. McCann (1997) found that while administrative costs were a factor affecting agency preferences, the effect was small compared to perceived farmer resistance. That research did not address the efficacy of policies as an explanatory variable. It was hypothesized that perceived efficacy of the policies in addressing the environmental problem may have accounted for some of the effect of the farmer resistance variable since it was possible that both farmers and agency staff perceived some policies as ineffective. This previous research has shown that perceptions of farmer resistance play a greater role in the policy preferences of agency staff than farmer costs do. Resistance to policies may also stem from a perceived change in property rights. In a study of water allocations in Israel and neighboring areas, the cost of buying water wasn't very high but the government was willing to risk lives to defend water rights (Shechter, personal communication). Another factor that was highlighted by previous research (McCann, 1997) was the importance given by agency staff to the fairness of policies which may be related to the issue of property rights.

To test the hypothesis that efficacy explains the link between farmer resistance and agency preference over policies, a survey of people working on the salinity issue was conducted. In addition to previous questions on farmer cost, farmer resistance, and administrative costs, questions on perceived efficacy in solving the problem and fairness were included. Both surveys and the Delphi technique have the advantage of not being biased toward the more forceful individuals. Surveys may also provide the basis for subsequent in-depth analysis of alternative policies. In particular, interviews to obtain information on transaction costs are time-consuming and thus costly, so a method to screen potential policies may be useful in focusing future research. Mail surveys may also provide a

way to obtain information from a wide variety of people in a fairly short time frame for decision-making purposes.

The following overview of the salinity problem in Western Australia provides justification for the various policies that were included in the survey, as well as highlighting the importance of the problem.

Western Australia accounts for 70% of Australia's dryland salinity. The area of Western Australia that is the most affected by dryland salinity is the southwestern portion of the state. Annual rainfall near the coast is 700 or more mm while in the eastern wheatbelt area, it is below 300 mm. Land use in the coastal areas includes forestry, dairy, and horticultural enterprises while further inland the dominant land use is grain, primarily wheat, and sheep. The primary cause of dryland salinity in Western Australia is the removal of the deep-rooted native vegetation (AgWA et al., 1996a). Annual crops aren't able to use as much of the rainfall as the native trees and bush so groundwater levels are rising. The rising groundwater comes in contact with salt deposits in the subsoil and mobilizes them. This salt was originally carried inland by the ocean breezes. Depending on location and soil type, between 100 and 1000 tonnes of salt are stored beneath each hectare in southwest Western Australia. Stored salt is highest in the low rainfall areas. It is estimated that when groundwater levels eventually reach a new equilibrium, 30% of land may be salt affected (AgWA et al., 1996a).

Problems caused by dryland salinity include reduced crop yields, damage to native bushland and wetlands, damage to rural infrastructure such as roads and buildings, and increasing salinity of water resources (AgWA et al., 1996a). In 1996, it was estimated that 1.8 million ha of agricultural land were affected by salinity and the capital value of land lost was estimated to be $1445 million. Agricultural losses are expected to be $64 million annually in the future. Fresh and brackish wetland systems have essentially disappeared from agricultural areas due to the increasing salinity. Salinity will have a negative effect on the existing bushland with a consequent reduction in animal and plant populations and biodiversity. Rural infrastructure wasn't designed to cope with high groundwater levels and flooding. In the Kent River Catchment, it is estimated that the offsite costs will be $210 million over a 20 year period. Increasing salinity of water resources means that the cost of supplying water will increase. Currently, over a third of the state's divertable water resources are brackish or saline. Replacement water storages for the Collie and Denmark Rivers have

cost $43 over the past 8 years. A new pipeline to supply Perth, the major metropolitan area, will cost $100 million

As early as the 1920's it was hypothesized that clearing of native vegetation was the cause of increased stream salinity. The problem has become more severe and, especially in the last 20 years, research has been conducted to understand the problem and try to find solutions. It will be necessary to reverse the processes that caused the problem, i.e. increase water use and decrease recharge. Potential water management practices proposed in "Salinity: A Situation Statement for Western Australia" (AgWA et al., 1996a) include: increasing the range and proportion of perennial plant species used, increasing water use by annual crops and pastures, collection, reuse and disposal of surface water, drainage or pumping of groundwater, and increased protection of remnant vegetation. Clearing control legislation was enacted in the 1970's for some watersheds that were major water resources.

The Salinity Action Plan (AgWA et al., 1996b) outlined strategies to deal with the situation. They recommend a whole of government approach to the problem. The major strategy was to encourage the planting of trees and shrubs with a goal of planting 3 million ha in agricultural areas. Cost of planting is expected to equal 2% of gross production from Western Australian agriculture. Because of the wide variation in climate and hydrology in the affected region, the mix of strategies will differ from one area to the next. The plan recommends salinity targets being set in conjunction with stakeholders in a catchment. More recently, a workshop was held to identify salinity research and development priorities in Western Australia. The results of the prioritization activities indicated that more work was needed in 1) increasing the range and potential of perennial plant species available, 2) understanding the biophysical processes, 3) assessing the impacts of salinity, and 4) understanding the social impacts and the effects of institutional arrangements and policies.

Survey Methodology

The policies included in the survey come from the research prioritization workshop, the salinity action plan, and the economic literature. The agency survey consisted of a 4 page questionnaire that was sent to staff of government agencies, environmental groups, and other individuals that had attended state sponsored meetings on the salinity issue as well as selected individuals involved with water catchment groups. The response rate was 79 percent after 3 mailings using the system developed by Dillman (1978). A preliminary study also resulted in high response rates. Comments on the preliminary survey from respondents and attendees at a seminar were incorporated in the final design of the survey. Survey data was used to

examine the relation between policy preferences and perceptions about other factors such as farmer costs, farmer resistance, administrative costs, efficacy in reducing the spread of salinity, and fairness. In the survey, the term administrative costs was used since this was considered to be more understandable to the surveyed population than transaction costs. However, it is possible that administrative costs has a narrower connotation than the definition of transaction costs used for this study.

Results:

The correlation coefficients for the factors examined in this study are given in Table 1. The correlation coefficient for farmer cost and farmer resistance is 0.46 which is not high enough to cause problems with estimation (Kennedy 1992).

Table 1. Correlation Coefficients

	F Cost	F Resist	Admin C	Effective	Fairness	Preference
F Cost	1					
F Resist	0.46	1				
Admin C	0.23	0.19	1			
Effective	0.04	-0.08	-0.01	1		
Fairness	-0.15	-0.24	-0.24	0.37	1	
Preference	-0.06	-0.17	-0.20	0.60	0.66	1

The mean ratings for the 17 policies on the criteria examined are given in Tables 2-4. Rankings are assigned from 1 for the best policy to 17 for the worst. This was done since high scores are “good” for some factors and “bad” for others. Having the state of Western Australia plant trees in affected areas, providing subsidies for tree planting by farmers, and making tree planting tax deductible were seen as having low costs to farmers. High cost options were: a requirement for 30% tree cover, requiring protection of remnant vegetation, and allowing community based groups to require specific land management pratices. Low farmer resistance was expected for: making tree planting tax deductible, funding research on productive uses for saline land, and providing subsidies for tree planting by farmers. The most resistance was expected for: a requirement for 30% tree cover, allowing community based groups to require specific land management practices, and prohibiting subsurface drainage. A requirement for 30% tree cover is therefore expected to be costly and unpopular.

Table 2. Perceived farmer costs and farmer resistance of alternative salinity policies.

Policy	Farmer Costs		Farmer Resist.	
	Mean	Rank	Mean	Rank
Conduct more research on increasing water use by annual plants	4.42	13	3.14	6
Provide installation cost subsidies to promote drainage of waterlogged land	4.55	14	3.31	7
Provide subsidies of fencing to protect remnant vegetation	4.28	11	3.47	8
Have the State plant trees in affected areas	2.68	1	4.08	12
Conduct more research to improve the economic potential of tree production	3.85	8	3.63	9
Require protection of remnant vegetation	5.51	16	6.47	14
Fund research to find productive uses for saline land	3.76	6	2.75	2
Develop extension programs on saline aquaculture	4.06	9	3.80	11
Make tree planting tax deductible for farmers	3.53	3	2.20	1
Expand extension activities on tree production	3.59	4	3.68	10
Require 30% tree cover in affected areas	7.65	17	7.95	17
Conduct more research to develop viable perennial pasture species and shrubs	3.65	5	3.06	5
Provide a subsidy, to be used within the community, if shirewide salinity targets are reached	4.37	12	4.22	13
Provide a subsidy for tree planting by farmers	3.49	2	2.78	3
Prohibit subsurface drainage due to the offsite effects of this practice	4.16	10	6.62	15
Increase powers of community based efforts to require specific land management practices	5.10	15	6.84	16
Continue development of catchment management plans and provide support for catchment groups	3.77	7	3.00	4

Table 3. Perceived administrative costs and effectiveness of salinity policies.

Policy	Administrative Costs		Effectiveness	
	Mean	Rank	Mean	Rank
Conduct more research on increasing water use by annual plants	5.05	3	3.76	15
Provide installation cost subsidies to promote drainage of waterlogged land	6.42	15	3.92	14
Provide subsidies of fencing to protect remnant vegetation	5.16	5	4.74	10
Have the State plant trees in affected areas	6.98	17	5.20	7
Conduct more research to improve the economic potential of tree production	5.67	11	5.67	4
Require protection of remnant vegetation	5.68	13	4.49	13
Fund research to find productive uses for saline land	5.32	7	4.85	8
Develop extension programs on saline aquaculture	5.01	2	3.68	17
Make tree planting tax deductible for farmers	4.35	1	5.53	5
Expand extension activities on tree production	5.10	4	4.70	11
Require 30% tree cover in affected areas	6.82	16	5.77	2
Conduct more research to develop viable perennial pasture species and shrubs	5.35	9	6.42	1
Provide a subsidy, to be used within the community, if shirewide salinity targets are reached	6.18	14	4.77	9
Provide a subsidy for tree planting by farmers	5.67	11	5.42	6
Prohibit subsurface drainage due to the offsite effects of this practice	5.31	6	3.72	16
Increase powers of community based efforts to require specific land management practices	5.42	10	4.55	12
Continue development of catchment management plans and provide support for catchment groups	5.33	8	5.73	3

Table 4. Policy preference and perceived fairness of salinity policies.

Policy	Fairness		Preference	
	Mean	Rank	Mean	Rank
Conduct more research on increasing water use by annual plants	5.63	9	4.32	15
Provide installation cost subsidies to promote drainage of waterlogged land	3.94	16	3.56	17
Provide subsidies of fencing to protect remnant vegetation	6.41	3	6.15	6
Have the State plant trees in affected areas	4.66	14	4.39	14
Conduct more research to improve the economic potential of tree production	6.38	5	6.34	4
Require protection of remnant vegetation	5.33	10	6.18	5
Fund research to find productive uses for saline land	6.13	6	6.04	7
Develop extension programs on saline aquaculture	5.06	11	4.18	16
Make tree planting tax deductible for farmers	6.40	4	6.44	3
Expand extension activities on tree production	5.89	7	5.85	9
Require 30% tree cover in affected areas	3.89	17	4.57	12
Conduct more research to develop viable perennial pasture species and shrubs	6.87	2	7.13	1
Provide a subsidy, to be used within the community, if shirewide salinity targets are reached	4.97	12	4.59	11
Provide a subsidy for tree planting by farmers	5.73	8	5.86	8
Prohibit subsurface drainage due to the offsite effects of this practice	4.80	13	4.96	10
Increase powers of community based efforts to require specific land management practices	4.64	15	4.47	13
Continue development of catchment management plans and provide support for catchment groups	6.95	1	6.91	2

Administrative costs were expected to be fairly high for all the alternatives since no policy had a mean rating less than 4. The lowest cost policies were: making tree planting tax deductible, developing extension programs on saline aquaculture, and conducting research to increase water use by annual plants. Administrative costs were perceived to be highest for:

having the state plant trees in affected areas, requiring 30% tree cover in affected areas, and subsidizing drainage of waterlogged land. The most effective policies were perceived to be: conducting research on perennial pasture species, requiring 30% tree cover in affected areas, and developing catchment management plans. The least effective policies were: developing extension programs on saline aquaculture, prohibiting subsurface drainage, and increasing water use by annual plants.

The most fair policies according to the respondents were: developing catchment management plans, conducting research on perennial species, and providing subsidies for protecting remnant vegetation. The least fair policies were perceived to be: requiring 30% tree cover in affected areas, providing subsidies for drainage, and allowing community based groups to require specific land management practices. The preferred policy was conducting research on perennial species, followed by development of catchment management plans and making tree planting tax deductible for farmers. While making tree planting tax deductible and subsidizing tree planting are very similar policies, the subsidy was less preferred and also seen as less fair.

Regression analysis was conducted on the survey data. In McCann (1997), a model of policy preference as a function of perceived administrative costs, farmer costs, and farmer resistance was examined in the case of policies to address phosphorous runoff. In Table 5, the results of using this model for the salinity data is shown. The adjusted R^2 is 0.06 and both farmer resistance and administrative costs are significant at the 0.01 level. Farmer cost is significant at the 0.10 level.

Table 5. Model 1: Policy Preference as a function of Farmer Cost, Farmer Resistance, and Administrative Costs (n=1304)

	Coefficient	Standard Error	P-value
Intercept	7.040	0.218	0.000
Farmer Cost	0.066	0.034	0.051
Farmer Resistance	-0.161	0.030	0.000
Admin. Costs	-0.219	0.034	0.000
Adj. R^2	0.058		

In the second model (Table 6) which includes perceived effectiveness and fairness of the policies, farmer cost and farmer resistance are no longer significant. Administrative costs, effectiveness, and fairness are all significant at the 0.01 level. In addition, the coefficients on effectiveness and fairness are quite high.

Table 6. Model 2: Policy Preference as a function of Farmer Cost, Farmer Resistance, Administrative Costs, Efficacy, and Fairness (n=1304)

	Coefficient	Standard Error	P-value
Intercept	0.790	0.216	0.000
Farmer Cost	0.024	0.023	0.281
Farmer Resistance	-0.016	0.020	0.427
Admin. Costs	-0.093	0.023	0.000
Effectiveness	0.442	0.021	0.000
Fairness	0.534	0.022	0.000
Adj. R^2	0.585		

A third model (Table 7) includes factors that were examined previously as well as the rainfall category respondents had in mind as they answered the survey, the time they spent on the issue, and the type of organization with which they were affiliated. These other factors only improved the model slightly (Adj. $R^2 = 0.61$). People generally have a more positive opinion of the results that are possible in the higher rainfall areas of Western Australia and this was reflected in the higher preference scores given by people who answered the questions with these areas in mind. Time spent on the issue had little effect. Compared to the respondents from Agriculture Western Australia, local government personnel had a higher preference for policies as did people from non-governmental and non-profit organizations. It may be that for specific policies, preferences would differ according to the type of agency and this will be examined in the future.

Table 7. Model 3: Policy Preference as a function of Farmer Cost, Farmer Resistance, Administrative Costs, Efficacy, Fairness, Rainfall (1=high, 0=low), Time, and Organization (0=Agriculture Western Australia) (n=1224)

	Coefficient	Standard Error	P-value
Intercept	0.666	0.238	0.005
Farmer Cost	0.015	0.024	0.532
Farmer Resistance	0.005	0.021	0.815
Admin. Costs	-0.108	0.024	0.000
Effectiveness	0.430	0.021	0.000
Fairness	0.525	0.022	0.000
Rainfall	0.292	0.140	0.037
Time spent	0.003	0.003	0.465
Agribusiness	0.046	0.145	0.749
Other State Agency or Commonwealth	0.284	0.147	0.054
CALM	0.133	0.151	0.376
Local Government	1.285	0.200	0.000
Educational Org.	-0.350	0.199	0.079
NGO/Non-profit	0.370	0.173	0.033
Adj. R^2	0.606		

Discussion:

The use of this type of survey for policy decision-making is limited by a number of factors. In particular, the fact that the policies are not described in detail means that different people may understand them differently or assume different types of implementation, etc. On the other hand, it is useful as a screening tool so that more in-depth studies may be conducted by policy makers or researchers. The policy asked questions that elicited perceived farmer costs, farmer resistance, effectiveness, etc. so it is quite possible that the actual values would differ from the perceived values. Another issue is that some of the policies, such as tax deductibility for tree planting, are already in place while other policies, such as subsidies for meeting shire-wide salinity targets, are highly hypothetical. It is also the case that some policies were designed to slow or reduce salinity while others, such as research on saline aquaculture, were designed to reduce the negative social and economic effects of salinity. In order to examine factors affecting policy preferences by agency staff using regression analysis, it was necessary to include a broad range of policies, some of which may not be politically viable. In addition, the survey was not a random sample of the target population so the results cannot be validly extrapolated. The sample does, however, represent a large proportion of agency staff working in this area.

Similar to the results of McCann (1997), and contrary to what is generally expected, perceived farmer cost and farmer resistance were not highly correlated. Providing subsidies or tax breaks to farmers who plant trees in affected areas were popular policies on a variety of fronts. A requirement for 30% tree cover was perceived negatively except with respect to effectiveness.

Underlying many of the policies are implicit changes in property rights. A policy of allowing communities to require specific land management practices was not well received. This policy represents a realignment of property rights from individuals to communities, while others, such as a prohibition on drainage or a requirement for 30% tree cover, represent transferring property rights from the individual to the state. To some extent, the strong effect of fairness may be related to the issue of property rights. Fairness is not an issue that is incorporated in economic analyses of policy options but it is a very important issue for other members of society including farmers, agency staff, and policy makers. The policies that economists recommend will be less likely to be implemented than if the profession found a way to incorporate the issue of fairness in its analyses. This is probably more likely to be an issue in the case of non-point pollution than it has been for point source pollution, since environmental policies may affect individual liberties to a greater extent in the non-point pollution case. Administrative or transaction costs are another factor that are typically not included in economic evaluations of environmental and natural resource policies. The results indicate that they are included in agency staff decision-making and economists should also include them for economic efficiency reasons (McCann and Easter, 1999).

The addition of an effectiveness factor also improved the explanatory power of the model. This is an issue that economists generally incorporate in their analyses and it is encouraging to find that it is also incorporated in agency decision-making. Farmer costs however, do not seem to enter into the decision making framework of agency staff when effectiveness and fairness are included in the model.

Conclusions:

A survey of agency staff can serve as a useful screening tool to identify policies that should be examined in more depth. It could also be used as an input into the decision making process if the limitations are properly acknowledged. In addition, analysis of the data can be used to examine what factors affect the preference for various policies. In this study, perceived effectiveness, fairness, and administrative costs had a significant effect on policy preferences. Effectiveness and fairness in particular also exerted a large influence on the policy preferences of agency staff as measured by the size of the coefficient.

An understanding of the factors that agency staff incorporate in their decision-making will enable economists to design policies that are effective, efficient, and implementable and thus more likely to be adopted.

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Comments from surveys:

370: I…found it quite difficult as the answers are always so full of "depends", "ifs and buts" in my head. I'm struggling with definition of affected areas. Provide support for catchment groups at current levels of activity, however if increased and combined with other listed activities would be more effective. 1) Have research into real options for tree production- both biophysical (breeding) matching with land capability etc. as well as the product end (oils, woods, harvesting and milling options, i.e. mobile units. 2) SIMULTANEOUS development of markets, may require strong policy intervention, then extension appropriate. Require 30% tree cover only if implemented with cost sharing ag industry restructure, etc., not in isolation. The fair/middling numbers (for fairness) reflect the perception that someone is going to win & lose from just about all of these – the usual public/private benefit argument.

339: Subsurface drainage is one of the best ways with tree planting to decrease salt and water affected areas. It's been noted that with drains water becomes fresher after 12 months.

325: Most work at this time is focused on planting trees & plants to use water. We need research on controlling the water across the landscape. Uncontrolled water is the Basic Problem. It is being ignored.

374: We need increased subsurface drainage. There are too many blockages that need opening up. If we can't do this then all remaining works have limited potential. Rural incomes are at an all time low. We pay penalty rates of interest and are at the mercy of nature. Fencing of remnant veg wouldn't be high on people's priorities in this economic downturn, survival is.

303: Scientific and economic analysis should be used to assess the priority of various options to control salinity. Surveys and polls across the community cannot make much of a contribution to deciding best options to treat such a complex problem as salinity. The State Salinity Action Plan was sloppy in many respects but was very clear in stating that to control salinity, more water must be consumed across the agricultural landscape. It showed that there are only 5 categories of options, and 4 of these have limited effectiveness and would not be able to provide a substantial treatment even in optimum combination. The 5th option, introduction of perennials – presents the best opportunity to do something substantial. However, the perennialization of agriculture will have to be extensive and to have any chance of adoption will have to be commercially attractive in its own right (i.e. separately from the salinity benefit). There is an enormous amount of work to be done to develop a range of commercial perennial species and management practices.
The current salinity debate spends too much time on lesser priorities or in deep pessimism. The leadership coming from the profession of AgScience has been very poor.

309: 'protecting remnant vegetation is good for biodiversity but not for salinity. Apparently 30% is not going to be enough. Saline aquaculture will have no effect on salinity' Develop a proper description of property rights, and 'duty of care' for landholders. (Talk to Paul McLeod in Economics).

382: (re research on annual plants), farmers would hopefully make money, What about environmental cost (of promoting drainage with subsidies), generally farmers also contribute $ (to protecting remnant vegetation), farmers don't want all landscape in trees. No one

policy will work, need combination. What about extending need for systems change. (Re: make tree planting tax deductible) What about Q profit? May be circumstances where (prohibiting subsurface drainage) is acceptable.

341: Need whole area, long term planning, backed by legislation over a 20 year period to combat problem.

333: There are some fundamental flaws in the popular understanding of the policy suggestions listed. These centre on an understanding of the processes involved and their operation with the soils and climate of the agricultural area. Effective solutions must deal with the basic/dominant processes in each of these peculiar environments. Depending on the physical features of the environment, effective solutions need to combine

- management of excess surface water, particularly in winter
- management of excess soil-water by drainage in winter when rain > evaporation and storage capacity of the soil
- increasing the water storage capacity of soil simultaneously with increasing plant water use in spring and drainage in winter
- working only with plants that are productive and profitable
- using deep drains only where aquifers are permeable and fresh or comparatively fresh or planting trees in these situations
- storing and reusing surface water to increase production and profit over summer.

That is:

1) a combination of actions must be appropriately selected and applied for each situation and this must include engineering (surface and subsurface water control), soil management, and profitable crops (pastures?) and trees.
2) The appropriate policies and actions must be packaged

397: How affected is affected? How would this (requiring 30% tree planting) be monitored? Who pays for it? Affected areas are more effectively dealt with by planting on the recharge areas, not always practiced as these are often very productive farm land. Need more info (on state planting trees in affected areas) – who pays, who determines what is an affected area, how do farmers manage to maintain a sustainable agricultural system if 30% of their farms are non-profitable, non-competitive trees? In combatting salinity the govt. must look beyond 3 year contracts for personnel in the Ag Industry, and consider the importance of landcare coordinators in implementing the State Salinity Action Plan. Given the job description, it is also unrealistic to expect these positions to be self-funding after these 3 years.

308: Whatever the chosen course of action, farms ultimately have to implement and manage actions. The ideal method of controlling/stabilizing salinity is to:

- adopt an integrated approach
- accept salinity drainage & use as best as resources allow
- make use of currently available options. Might not be 100% but unless action is taken now, the problem will continue to grow

316: Funding for development of tree crop, harvesting, processing and marketing where no processing is available or is available but un-economic.

363: Promote understanding of the physical water flow processes of dryland salinity so that treatment can be designed to modify those processes.

311: You have to think in terms of geological time to solve this problem. Not 1-2 year funding rounds or 3-4 year political terms but in the long, long term. And there will continue to be individual and social pain and cost along the way.

360: I believe the most important actions to combat salinity are those directed to finding solution which enable landholders to profit from their implementation. Therefore I give top priority to productive use of saline land, especially as it directly helps those who have suffered most. Next is research to find profitable ways to use more water. Much of this work is of necessity long term because it deals with perennial species and the current trend to employ more and more research people on short term contracts is disastrous.

305: Implement research already done on establishing and managing perennial pastures for salinity control in a profitable whole-farm system. The benefits of profit to society are the result.

393: Farmers, rural residents, and taxpayers will perceive fairness quite differently.

304: In the low rainfall zone, it appears to me that short of the govt buying up tracts of land and replanting them, we are going to have little influence on the eventual area of saline land, given current markets, commercial plant species and technology.

390: Work in the area of water use measurement full time which is not labeled as related to dryland salinity but is probably more relevant than most activities that are labeled relevant. (re: withholding shirewide subsidy) Depends on where farm is located in catchment – handballing responsibility, depending on peer aprobium. Cannot support this, should be State Court responsibility. (Re prohibit subsurface drainage) Not all subsurface drainage has offsite effects. (Re: powers of community-based efforts) NO, reduce everything to lowest common denominator. Smacks of big brother approach.

- No one management option will solve the problem.
- Trees are not the answer
- Have to consider current adoption, future adoption rates and likely whole of landscape impact
- If everything is implemented immediately, overall impact not great
- We have to learn to live with salinity
- Available data not convincing that we will be able to correct, let alone arrest the spread of saline area.
- Most measures are common sense measures – farmers are rational people
- Support farmer in endurance (?) to manage problem
- State should look into and develop policies for managing and facilitating offsite drainage
- Involve community but refrain from imposing draconian measures based on emotion rather than fact.

357: Social and cultural reasons for non-adoption of particular practices. Bureaucratic/Legislative inability to implement strategic plans/regulations.

348: Our government now recognizes that salinity is our number 1 environmental challenge and your assumption that policies may have to be enforced to obtain a high level of compliance may not be far off the mark.

I am a great believer in Prof. Barbie Baker, the founder of "Men of the Trees" who said we could put 25% of the landscape in trees and because of its air conditioning effect we would get a lift in production of a corresponding 25% without relying on an increase in rainfall.

With only 7% of bush remaining in our Merredin Shire and that not sustainable because of lack of regrowth. Even with free trees, farmers bear the major brunt of any reforestation program. I believe Worroloo Prison Centre has a program of growing trees and planting same within a 100 km radius. There has to be the same approach within every shire to use our human resources because the community has not got the financial resources needed to buy billions of trees that will be needed. (Quote) ?

I doubt if your 30% of tree cover on affected areas can be achieved without deep drains to ? the existing salt lakes from the same areas. Our farm is now on a program of implementing deep drains to ensure the same amount of water that comes onto the property goes out the other side.

There are only (approx.) 50% of the land involved with catchment groups but I must add there is considerable amount of rehabilitation done by farmers outside the landcare movement and all this work should be collected under one umbrella to continue to justify taxpayer funded expenditures.

Before you make any deliberations that you would put to paper it may be advisable to take a plane trip from Geralton to Ravensthorpe to realize that agriculture in WA is still very much on the edge of desertification and only trees will give it the fail-safe system that is needed. If it was not for fossil fuels, there would not be a stick of wood left in WA.

Back in 1983, I was chairman of a group of local government Shire Councilors that represented 13 Shires of the eastern Wheatbelt that met with the then state Minister for Agriculture, Dick Old and the new soil commissioner Graham Robinson to update the soil conservation act which has now become the Landcare movement. This meeting took place in Jarrah Road South Perth at Dept. of Ag headquarters. I presented an introduction of the Committee to the Minister and the Comm. Presented a lengthy preamble outlining all our concerns. You should be able to get a copy of this preamble, if you do get a copy could you please send me one as it would make interesting reading 15 years down the track.

As farmers we are very much in competition with each other to survive in the industry but the feedback I get from the majority of farmers about being involved with a landcare group is "one in, all in" and the community as a whole has a vested interest to make sure this comes about. The country cannot afford to take anything less. (gave phone #)

365: Annuals cannot fully exploit rainfall. Drainage just transfers the problem elsewhere. (Finding uses for saline land) only a band-aid, not a real solution. Aquaculture only small scale, also not a solution. (Requiring 30% tree planting) too arbitrary very aggressive as a policy. The problem with pasture/perennials is that the leaf area is harvested/consumed.

378: Learn to live with salinity. Under the present economic and climatic conditions you cannot control or reduce salinity.

387: Planting of trees and other remedial measures need to be targeted rather than 30% across landscape. More research and subsidies should be focussed on "smart" farm plans using good technical information.

367: We need to think about the whole suite of potential policies. It's like asking which is the brightest streetlight when there are whole unexplored galaxies out there, but I guess we are scared to look at them in case they burn so bright our eyes catch alight.

Sorry I can't deal with this type of questionnaire. All the answers are between 1&9 depending on farmer, site, catchment. Individually they are all fiddling at the margins of fixing something which requires all of them and more. They are all predicated on the assumption that all existing farmers/enterprises remain, doing more or less the same thing but better. These 17 strategies occupy a small corner of the possible solution space for fixing salinity. I am preoccupied with the larger space e.g. with what can we replace some of our too many farmers trying to eke too large an existence out of too small a resource. Beware, reductionists at work. Come and have coffee and a chat (gave phone #)

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