Rotorua Lakes Nutrient Trading Working Paper

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Purpose

This working paper sets out preliminary advice on issues raised in considering possible arrangements for nutrient allocation and trading in the Lake Rotorua catchment, for further discussion and development of policy options with stakeholders and staff of Bay of Plenty Regional Council.

Context

The problems caused by nutrient enrichment of Lake Rotorua have been recognised and have been the subject of research, policy development and practical action by the regional council and other stakeholders for more than a decade. Decisions have been made on the need to reduce the load of nitrogen leached from pastoral agriculture by approximately 50%. Agreed policy splits the economic responsibility for achieving this reduction between pastoral landholders and a funding mechanism supported by the regional council and central government. A body to administer the funding (Incentives Entity) will be established by the council to negotiate and contract with pastoral landholders to make reductions to nitrogen leaching additional to their baseline obligations.

In order to track progress and appropriately share the burden of the task of reducing the nitrogen load on the Lake, allowances that limit permissible nitrogen leaching levels for each property will be issued to land holders by the council. Annual leaching from properties can be estimated using the OVERSEER nutrient budget model, and these results would allow assessment of performance against allowances held. The issuance of allowances requires an allocation policy to be agreed and the development of such a policy is now nearing completion.

A further component of related regulatory regimes for natural resource management (such as in the management of fisheries, water quantity and carbon emissions), is the ability for holders of resource use allowances to transfer them to others. A system of transfer or trading enables scarce resources to move to the use that is most highly valued, by allowing different potential users to compare the value that they can achieve with market prices. Nutrient trading becomes an option that producers may choose to use as part of their business decision-making if it provides a benefit.

Regional council staff have sought engagement of the Ministry for Primary Industries to support development of options for a practical trading regime appropriate to the circumstances of the Lake Rotorua catchment. This paper discusses the potential for a trading system to add value to the reduction programme, responds to some common concerns about potential risks of introducing trading for nutrient allowances in the catchment, and begins to map out some potential mechanisms to allow the benefits of trading while mitigating the risks.

It is emphasised first that it is the detailed design of a trading system that will determine whether or not it is effective in particular circumstances. The approach recommended here is to examine the objectives and potential benefits of developing a trading system and to identify the risks involved, and to address these factors in the system design. The costs of implementation will need to be assessed and weighed against the expected benefits once a design has been agreed.

The key stakeholders in the design and funding of the Lake Rotorua nutrient management scheme – the StAG, Bay of Plenty Regional Council, and Central Government – are currently all understood to be willing to consider the potential for using nutrient trading to enhance outcomes. This paper is intended to support that consideration.

[1] This paper represents the professional views of the the author and is not government policy.

Why Consider Nutrient Trading?

The consideration of trading systems for natural resource access can be controversial. It generally happens where resource use has already become a problem for one reason or another and therefore current users may need to reduce their use. Allocation involves debates over equity that are usually not able to be fully resolved. Regulatory intervention is mostly not welcomed in situations that have not been subject to it previously. Trading can seem like perhaps it is an unnecessary complication in an already fraught situation.

The reasons for considering trading of nutrient allowances are primarily economic, as they are for any trade. Regardless of initial allocations, trading will allow nutrient leaching targets to be achieved at a lower cost than without it. A well-designed trading system with low transactions costs will enable the least-cost reductions to be made at any point of the load reduction programme. Trading will allow the same (least cost) measures for mitigation to be taken in same places, regardless of the initial distribution of entitlements. Trading allows a resource to move to its highest valued use.

A key factor in the success of regulation is an acceptance that those affected are treated fairly. In moving from a situation of unconstrained resource use to restricted access, changes in allocation of resources will determine who bears the costs of achieving the objectives of the scheme. Allowing trading of allowances will ensure that the equity decision of initial allocation (the distribution of costs and benefits) can be made without compromising the efficiency of the scheme. That is, regardless of initial allocations, trading will allow the overall costs of meeting the objectives of the scheme to be minimised.

In short, under such “cap and trade” programmes, the key equity issues are determined in the initial allocation of allowances because this determines who bears the costs of mitigation. With trading, the distribution of allowances can adjust so that the lowest cost mitigations can be carried out first.

Trading is important when costs of mitigation vary. If we consider the catchment as a whole, per kilo costs of reducing N leaching will vary from place to place, across farm systems, and will depend on how much mitigation or good practice has already been adopted in each circumstance. The greater the variation in costs, the greater the overall savings from trading will be. In a catchment with a diversity of farm types and environmental conditions, we can expect considerable cost savings from trading when compared with a system that required significant reductions from all farms without the ability to transfer entitlements.[2]

If large reductions are required, with trading the lowest cost measures will be taken first and costs of mitigation per kg/ha will rise as the total amount of mitigation increases. That is, we can expect, under full allocation and a requirement for reductions, that the price of Nutrient Discharge Allowances (NDAs) will rise over time.

Why does trading in any commodity or service occur? Because both parties believe they will be better off. The green-grocer or supermarket sells fruit and veges at a price that is greater than the cost to them, and we buy them because this is cheaper than growing them ourselves. Our calculation takes into account what else we want to do with our time, costs of land and other inputs for growing the food, and the value we place on the ability to decide on a week-to-week basis what we want to eat. Still, some people like to grow their own food, or at least some of it. Again, there are a number of reasons for that: they like the activity, assurance about use of sprays, nutritional status, and so on.

In these decisions there are personal value judgements involved as well as just cash totals. That makes it very difficult for someone else to decide what the best thing is for you, or what the most

[2] Analysis of economic impacts of a currently proposed scheme in a NZ catchment that needs to reduce discharges indicates annual net revenue is likely to drop by $46 million (14%). This could be reduced to $28 million (8%) through the introduction of nitrogen trading.

efficient distribution of NDAs will be in a catchment. Someone who holds NDAs in a scheme where trading is possible may choose to keep them despite someone offering to buy them for more than the value they represent in terms of extra income received from their current use. The current owner may value the lifestyle activity that the use of the NDAs allows more than the difference in income they could have by selling, a choice that still represents the highest valued use of the resource. In the end, income is a contributor to well-being, not the sole determinant. This balancing of values is something we all do every day.

In a trading system for NDAs there is no compulsion to trade, and therefore trading will only occur where both parties believe there is a gain for them from the transaction. This does not mean that a nutrient management scheme for Rotorua that includes trading will necessarily result in everyone being better off. Large reductions in resource use are required, and this is likely to involve an overall reduction in production and annual income for the catchment, compensated to some extent by the incentives scheme. However, adding trading to the mix of measures taken to achieve the goals that have been set should result in no-one being worse off than they would otherwise be, and those that trade will end up better off than without trading. The key result from trading is that total costs of achieving the desired reductions will be significantly lower.

Frequently Asked Questions

This section discusses some of the questions that arise in considering trading schemes in general as well as in the specific context of the Lake Rotorua catchment. As mentioned above, most risks can be managed adequately in the institutional design if they are thought through before becoming wedded to a particular solution. Such possible outcomes as “Queen Street lawyers” swooping in to buy up NDAs and monopolising trade to make money can be easily designed out of the system from the start. Even the potential for landowners within the catchment to play monopoly games with the system can be constrained by limiting the maximum holdings of NDAs per hectare of land owned.

In the end there is still an assessment to be made as to whether the potential savings and flexibility in farming system adaptation that trading systems might offer really outweigh the costs of implementation of the scheme. This has to be weighed up in the light of a realistic assessment of how likely it is that individual farmers will actually participate in trading.

Market risks - Will trading compromise our ability to meet the “buy-back” target of 100 tonnes (which carries significant risk, such as losing the $, not meeting the lake target etc.)?

This is definitely one of the challenges of system design. If the Incentives Programme is not successful in meeting its target by 2022 it risks losing the government funding provided for this purpose. At that point one option is to further reduce farmers’ allocations administratively.

The question can only really be answered through the process of considering options that include protection of this objective. There are some design features that could ensure that the “buy-back” target is met, but these will need to be tested against the possibilities enabled by the broader legal framework and stakeholder views.

For example, the regional plan could set N load targets for 2022 and potentially for other dates that automatically become binding limits on the specified dates. Rules could then specify how NDA holdings will be reduced at that point, if required, to meet the target and specify how compensation (if any) would be made. Under such a scheme the Incentives Programme could operate in the period up to 2022 to buy back NDAs directly in “the market” or through negotiated contracts over mitigation actions with land-owners. If the 100T reduction has not been fully achieved by the due date, the reduction rules would kick in to acquire the remainder. They would need to set out how this would happen in an equitable and predictable manner. Details of this approach, with options, can be developed.

Did trading work in Taupō and what is different here? Are the drivers actually in place for a functioning trading system?

The Taupō experience is clearly a learning opportunity. There have been some trades in each year from 2009 to 2013, with a total of 13 trades to June 2013, compared with 24 trades made by the Trust buy-back scheme. Most of these have been small and the total amount traded privately was only 12% of the total amount transferred including the buy-back.

There are a number of factors that may limit market trading in such schemes. Key issues are the opportunities for win-win transactions, and the transactions costs faced by prospective traders. Win-win opportunities in this case will depend on variation (heterogeneity) in the catchment in terms of the diversity of farms systems with different cost structures and profitability. Because profitability is not directly correlated with nitrogen leaching across different farm systems, soil types and so on, some farms will have more profitable uses for NDAs than others. The other side of this coin is that some farms have lower costs of nitrogen leaching abatement than others. Where such diverse conditions exist in a catchment, trading is more likely to occur because it offers clear gains to both parties.

Transactions costs include "search costs" – the time, effort and expense required to find someone to trade with and negotiating a price that is acceptable, any fees associated with carrying out a transaction such as drafting and legal checking of contracts, charges for changing consents, and so on. Where these costs are acceptable for a single transaction where the seller and buyer have matching needs, it may not work in practice where a farmer may have to find several sellers/buyers and negotiate deals with each of them. In addition, farmers will not be well informed about the "true market value" of NDAs, something that can only be determined in a situation where the supply and demand for NDAs is out in the open. These transactions costs issues need careful consideration in system design so that they are minimised.

In an analysis of the Taupō scheme Barnes and Young (2013)[3] suggest that "historical allocation" (or grand-parenting) allowed farmers to continue with business as usual, and that trading was not necessary to maintain normal operations. Thus only those changing farm systems (e.g. converting to forestry) were in a position to sell NDAs and these were bought up by the Trust. This has worked to reduce the overall nitrogen load to the target level fully funded by the Trust.

In the Rotorua case, the pastoral sector will also be required to reduce the load significantly without compensation. This is a significant driver for trading, as minimisation of costs to businesses will be critical. In addition, the sector averaging approach to allocation will mean that without some rebalancing of NDA holdings through transfer, economic losses are likely to be significantly greater, and some farm business may just not be viable at the level of allocation allow for them.

A key to success with a scheme for Rotorua will be to make what is going to happen along the way as clear and as certain as possible through plan rules, and to have good information availability and easy low cost means of trading. Given a degree of heterogeneity and a scheme that minimises transactions costs, trading should be an attractive option in meeting reduction targets.

Do farmers even want to trade?

Farmers are in business and are therefore traders. NDAs are really no different to any other input to farming; they are just a new requirement. A few years ago, palm kernel was not something that farmers bought and nor was GPS guidance for tractors or a number of other inputs that are now becoming more widespread.

[3] Barnes, Sandra and Justine Young, 2013. Cap-and-trade of diffuse emissions of nitrogen in Lake Taupo Catchment. Reviewing the policy decisions and the market. Waikato Regional Council Technical Report 2013/34. Available online at http://www.waikatoregion.govt.nz/tr201334/

People trade because there is an advantage to them – it is the classic mechanism for "win-wins." I buy something at the supermarket because I value it more than the cash I give up to get it. The seller is happy because they get more money than it cost them to provide the goods. We both win.

In the case of N mitigation, let's consider 2 farmers Alan and Ben in a catchment where there is a need to reduce N leaching due to a cut in the cap. If Alan can mitigate to satisfy all the required reductions for $80 /kg, but Ben's cheapest option is $120 /kg then it makes sense from a total cost point of view for Alan to do the mitigation. Assuming a "user pays" approach – meaning the farmers need to bear the costs of mitigation – how should the costs of Alan's mitigation be shared?

Without going to the method of initial allocation of the required reduction, we assume that both Alan and Ben must contribute to reductions in specified amounts. Without some method of cost sharing, Ben will have to spend a minimum $120 /kg. If they are allowed to trade (not compulsory) Alan would likely be interested in reducing his costs by selling NDAs to Ben for more than his own costs of mitigation, and Ben is likely to be interested in buying NDAs off Alan for less than it would cost him to mitigate. They should be able to negotiate a price between $80 and $120 where they both will be better off after a trade.

Clearly the transactions costs of trading will be important. If mitigation costs are not that different for Alan and Ben, and/or if the costs of negotiation, registration of the trade and so on, are significant, there may be no net benefit. Also the costs of learning how to negotiate and execute a secure trade will be something of a barrier at the start up of a trading system. These issues need to be analysed, clarified and options for addressing them evaluated.

The bottom line is, if there are significant differences in mitigation costs then trading should be attractive to farmers. If everyone had the same costs there would be no dollar advantage from trading (although there may still be some demand for trading due to differences between farmers in values placed on lifestyle). The analysis of the catchment to date suggests that costs for dairy will be significantly higher than for marginal dry-stock areas. This should create and environment conducive to trading.

Is there potential for third parties to be involved in trading as brokers or as buyers/sellers - those without a connection to the issue who could benefit at expense of the locals/lakes?

Arbitrage (ticket clipping) can be perceived as a negative or predatory activity, but some say it makes the world go round! Brokers are one means to assist information flows between buyers and sellers, but there are other ways. The key issue here is transactions costs. Stock brokers, for example, employ staff to research company backgrounds, history, operating models and prospects so they can provide this information to a number of clients. This saves those people from having to do that work themselves individually, duplicating effort and wasting resources. The broking firm may have several hundred clients they can inform with the same information. The clients will be able to access it more cheaply than doing it themselves and overall the firm charges out more than their costs by re-using the same information over their client base. Of course the firms also provide convenient and legally secure access to the stock transactions for the client, again reducing transactions costs, and encouraging confidence in using the system.

It would not be necessary to have a competitive brokerage system to service an NDA trading system for Rotorua. Values for NDAs will not change from one day to the next. However, we do need to develop options to minimise the information search costs and other transactions costs for potential participants and build confidence in the system. If brokers were allowed as part of a system, steps could be taken in instrument design to ensure they could not own NDAs themselves if they did not own land in the catchment.

The number of players in the market: will we have enough to make certain approaches work?

In the end you only need one willing buyer and one seller with a need for a trade. There are more than 160 potential traders here with lots of adjustment required. If there is an easy and cheap way to transact then trading is very likely. There is also a question to consider about the application of trading to what are, in effect, temporary NDAs during the transition period to 2032. The arguments for trading apply just as much if not more so to these "rights" as to the long-term NDAs, which are likely to form the "base load" for all farms that remain with current farm systems. Flexibility will be a key factor in the adjustment period, and the ability to move NDAs around provides one degree of flexibility in an uncertain environment.

What about the administration costs of more complex trading arrangements – we just don't have the resources available to run a costly scheme

This is a transactions costs issue. If this is "user pays" then an expensive system will discourage trading. The challenge is to reduce costs to a minimum so there is a net benefit from trading. There are clearly options for a low cost trading scheme, but with or without trading, the costs of implementation, monitoring, accounting and auditing need to be taken seriously if the regime is to be effective.

Will the simplicity of rules/arrangements be compromised by trading?

Let's look at the options. It may involve more rules but the extra rules would only apply if a farmer wanted to trade. On the other hand, to achieve the ambitious reduction targets that have been set without trading, the rules may need to quite complex, or risk imposing very significantly higher costs than necessary on farmers.

The risk of trading 'nothing' given Overseer uncertainty

The uncertainty around Overseer is not really about whether it is "right" in its predictions – it's a model and therefore by definition is not a true representation of reality. The uncertainty at present is about how potential changes in the model as it is further developed will be dealt with by the system of rules, and whether that will be "fair." This issue is closely related to the initial allocation problem in that it is unlikely that all parties can be satisfied as to the equity of any particular arrangement, but it is equity that needs to be the focus of the policy decisions and these decisions need to be clearly stated at the beginning of the regime. The recent advice on the treatment of Overseer in the system provides a sound basis for considering these issues.

Towards Potential Arrangements

A trading regime could be established in a number of different ways. The issues discussed below are intended to open the discussion on features of a regime that could address the goals of the programme overall and some of the potential problems discussed above. For example, keeping transactions costs low and ensuring all potential participants have a means of accessing the market easily is a key matter.

Accounting and Overseer

A primary issue with any arrangement for trading, or even constraining and reducing N loads through buy-back without other trading, is the accounting and compliance regime. Recommendations on the use of Overseer have been made, but BOPRC staff have indicated they don't believe the council will be able to resource a regime to run or check Overseer runs for every farm every year. It is unlikely that any scheme that does not monitor and enforce compliance will effectively tackle the problem, but where NDA allocation is proposed as part of the solution (with or without trading), accountability mechanisms will be essential.

Various arrangements are possible to reduce costs and complexity. Every farm, every year could be possible in this catchment given the limited number of farms, but this could set a precedent that would be difficult to live up to across the rest of the lakes and the region. Other approaches include doing baseline Overseer runs for all farms and then requiring Overseer input data to be kept for all years by landholders. Each year a sample of farms would be selected and data run through the model. Sample selection might take a random or a risk-based approach. Another issue that needs to be considered here is the potential use of rolling averages[4] of Overseer results to monitor compliance.

The emphasis placed on input standards for Overseer by the owners, and the need for qualified operators, suggests that a centralised system for running the model would be desirable. This could be contracted out to a third party provider or run by the council, but would consist of a requirement for consent holders to provide the requisite input data by a certain date. This process may be able to be automated to some degree after data checking and is certain to be more cost effective and consistent than using individual consultants working with each farmer. The process could be partially or fully cost recovered from consent holders.

An audit of a sample of farms could also be carried out each year to check the veracity of input data. The proportion of farms covered would be set to balance costs against the incentive provided to comply with the input data requirements. For example, an annual audit of 20% of properties would mean a one in five chance of a particular farm being audited in the current year. Without significant changes to farm systems that would likely involve adjustment of NDA holdings, input data should be reasonably consistent for year to year meaning that farms audited one year could be excluded from the potential sample for one or two years, ensuring greater coverage over time. Again a risk weighted sample procedure should be considered. Audit schemes could also be geared to compliance rates so that under improving compliance the number of audits could be reduced and vice versa.

NDA Balancing and Transfer

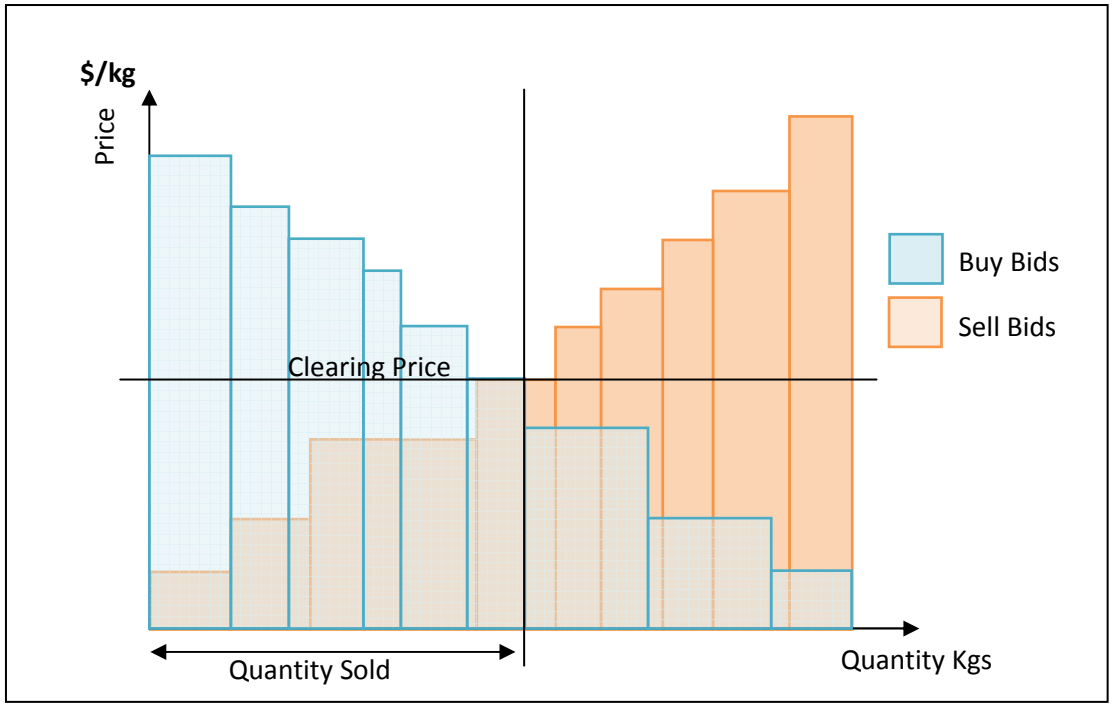
Centralised Overseer processing would allow checking of all results against NDA holdings and the need for any balancing to be identified, as well as the opportunity to provide feedback on relative

[4] It is noted that rolling averages could add complexity when practices are changed significantly, effectively establishing a new baseline. Rules could specify that under these circumstances the new NDA requirement will be the old rolling average plus/minus the predicted change, and the same degree of percentage variation in annual output established under the previous average will be acceptable until the averaging period has been completed under the new conditions.

performance back to individuals. In effect, it is only at the point of assessment of performance of farms against their NDA holdings that any need to trade will become apparent. Although the scheme could also permit NDAs to be traded at any time, transactions costs and process complexity could be significantly reduced by a once a year centralised "clearing house" approach.

Once balances have been generated, bids could be submitted to the clearing house to buy or sell NDAs at nominated prices. These would be assessed collectively as supply and demand schedules to strike one clearing price that would be paid for all transactions. In this process, all sellers (bar those right at the clearing price) will be paid more than their bids and all buyers will pay less than theirs. This will encourage participants to participate and to bid the real value of the NDAs to them, generating accurate market price signals.

Figure: Striking the Clearing Price



Those who find mitigations at costs significantly below the market clearing price will incentivised to do more in the following years, while those with profitable uses for additional N will only pay the "going rate" and should also profit. This system will prevent coercion or bluffing in private transactions that might see some parties profiting unfairly at the expense of less powerful players.

This type of system should be simple to understand and operate, would eliminate most costs of search and negotiation for individuals, and would be low risk for participants. By aggregating the buy and sell offers, each successful bidder is only involved in one transaction to get what they need to buy, or to sell their surplus allowances.

Some Practical Considerations

In practice, any new system will take time to become fully effective as people come to understand how it works and to appreciate the advantages of participation. For the first year or two under the above system it may be advantageous to run two bidding rounds to allow the more cautious to see what prices emerge from the first round, or for those that did not achieve a trade in the first round to adjust their bids.

There are also some added complexities to consider. These include:

- Trading of differentiated classes of NDAs:
    - perpetual and annual rights (leases); and

    - long-term NDAs and expiring rights (the reductions farmers must make by 2032);
- Dealing with failures to balance;
- How the buy-back entity would interact with the bid market.

Decisions will need to be made on whether differentiated classes are justified, but these could be accommodated in a clearing house system reasonably easily. There may be an issue with this reducing the number of bids within each class to the point where the market does not provide a satisfactory outcome. This will need to be explored a bit more.

A mechanism could be added to deal with failures to balance holdings with predicted leaching, in a similar way to the deemed values mechanism in the fisheries quota management system. This would impose a charge per kg on consent holders who are leaching more than their allowances. This charge should be set equivalent to the clearing price for annual NDAs plus a percentage for transactions costs and to provide an incentive to buy NDAs if they are available rather than just pay the charge. The fisheries system also applies a "ramp" whereby charges increase as the proportion of overuse of the resource increases. Such charging may not be possible under current RMA provisions.

Participation of the Incentives Entity in Trading

The buy-back entity will be seeking to acquire long-term NDAs. The mode used by the Taupō Trust could also be applied in this case – negotiating arrangements around land use change with land-holders, and potentially buying whole properties with NDAs (e.g. dry-stock farms) and selling them again with reduced allocations (e.g. for forestry). In addition, the entity could participate directly in the bidding process for NDAs. Here are some options for how this might work:

1. The Entity could bid for NDAs blind (as farmers would) and have their bids considered in the standard process of determination of the clearing price;
2. The Entity could be given access to the data to decide what quantity of NDAs they might buy, after all other bids are in:
    - If the Entity quantity requirement was then incorporated into the schedules to calculate the clearing price, this price (that all buyers pay) will be higher than if the Entity did not participate (this would apply to the blind option above as well if the entity offers were above the clearing price);
    - Alternatively, assuming there were sell offers remaining above the clearing price, the clearing price could be determined without including the buy-back requirements and the Entity could then enter direct negotiations with those offering to sell at a price higher than the clearing price achieved.

The second option might appear to offer an advantage to the Entity over others, and any participation of the Entity (again assuming sufficient "sell offers" are made) would likely increase the clearing price. However, the Incentives programme is key to achieving the overall objectives and has a shorter timeframe than the other reductions, so some priority is justified.

Linking NDAs to Consents

The Taupō scheme legally links a specific allocation of NDAs to land ownership through registration of the NDA amount on a resource consent. This means that consents must be changed in the event of a trade, increasing transactions costs. If legally possible, it would be preferable for the resource consent to reference the holder's account in an NDA Registry such that the number of NDAs in the Registry account could be changed according to specified rules and procedures without having to amend or re-issue the resource consent. This would enable essentially costless and instant changes to account balances following a trade.

Possible Zoning and Maximum Rates

Maximum allowable leaching rates may be advisable, particularly for properties near the lake with likely short lag times. The transfer of NDAs to very intensive (high leaching) farms close to the lake will worsen net emissions in the short term while lags from the more distant properties flow through.

Other Possibilities

The above are some suggestions about features that could address some of the issues identified in system design. There are lots of possibilities but most have not been tested under the RMA, and the Rotorua case has very specific objectives. Motu Research has provided a model based around annual rights that can only be used in the year for which they are created. This is similar to the two tier system used in the fisheries quota system that has long term entitlements that give rise to rights to use the resource in a particular year. Both types of rights can be traded. This type of scheme is compatible with the clearing house type mechanism for trading. However, the relationship between the amount of monitoring of actual discharges and the ability of holders to sell allowances will need further exploration and costing before decisions can be approached.

Next Steps

This paper establishes a starting point for detailed design of a potential trading scheme and raises issues for discussion with council and stakeholders in the catchment. Other issues will need to be covered in those discussions and a range of options will need to be developed and considered before final decisions can be made.

Some of the issues discussed here will also require more refined explanations with supporting evidence from real-world situations. Although nutrient trading is new territory in New Zealand and world-wide, other common pool natural resources are governed by schemes with similar characteristics. Lessons may be able to be drawn from these schemes to assist in effectively communicating the issues in the Rotorua situation.