Phase-Out Of Highly Water Soluble Phosphate Fertiliser In South-West Western Australia – A Waterways Protection Strategy

Rod Hughes, General Manager, Swan River Trust, Perth, Western Australia

Fertiliser use as a major cause of river system decline

Many of the soils of Western Australia’s South-west coastal areas are sandy and have naturally low fertility. Since clearing of native vegetation for agriculture and urban development, high phosphorus fertilisers have been applied annually to these soils to maintain production. Superphosphate is the most commonly used fertiliser as it is readily available for plant growth when applied. However, it is highly soluble in water so a high proportion - up to 80% - can be lost to production with winter rain.

Phosphorus that is leached through the coarse sandy soils accumulates in rivers, wetlands and estuaries. While there are many other factors contributing to ill-health of our waterways, the excessive over-load of phosphorus is a major cause that must be addressed for investment in other actions to be effective.

There are substantial research findings for catchments of the Peel-Harvey estuary, south of Perth, which has suffered a long legacy of dense algal blooms. These show that a 50% reduction in the annual phosphorus load to the estuary is needed to meet the set water quality targets. While many sources of phosphorus have been identified, by far the most extensive is from land used for agriculture. Annual phosphorus loss from pastures for beef and dairy cattle is estimated to be 64% of the total load to the estuary.

Urbanisation is an increasing cause of phosphorus loss, particularly in catchments of the Swan-Canning estuary (e.g. in Southern River and Ellen Brook catchments), but even in these areas, agricultural land use remains extensive. Importantly, modelling in Western Australia has shown that in many circumstances, converting rural land to urban use can increase nutrient export and the State has recognised that highly water soluble phosphate fertilisers applied for both rural and urban land uses are causing environmental impacts.

Adoption of low water soluble phosphorus fertilisers

The need to fertilise the relatively infertile sandy soils of the Swan Coastal Plain is well-recognised. But in the face of continuing environmental problems in West Australian rivers, it has been decided that phasing out of highly water soluble phosphate fertilisers is needed. If low water soluble products are adopted at an appropriate scale, it is expected to reduce the annual nutrient load to estuaries by 30%. This action alone is insufficient to meet the annual nutrient load reduction targets but is an essential component of a set of actions that, together, will meet the desired outcomes.

As noted above, the most commonly used highly soluble phosphate fertiliser is ‘super phosphate’ but there is a range of other products in use. Table 1 lists the HWSP fertilisers and their product analysis. This shows the water solubility of most P fertilisers that are currently available to be well above 40%.

Table 1 Typical analysis of a range of highly water soluble P fertilisers
In the past, a range of low water soluble or slow release fertilisers was developed, including rock phosphates, partially acidulated rock phosphates, lime-reverted superphosphate, and ‘Red-mud’ coated (or impregnated) superphosphate. The very low solubility of some of these products should be noted.

Table 2  Typical analysis of a range of low water soluble P fertilisers

<table>
<thead>
<tr>
<th>Product</th>
<th>Total P (%)</th>
<th>Water Solubility (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lime Reverted Super</td>
<td>7.0</td>
<td>39</td>
</tr>
<tr>
<td>CSBP ‘coastal super’ (Mk I)</td>
<td>7.2</td>
<td>6</td>
</tr>
<tr>
<td>CSBP ‘coastal super’ (Mk II)</td>
<td>9.0</td>
<td>27</td>
</tr>
<tr>
<td>Agmin</td>
<td>4.5</td>
<td>17</td>
</tr>
<tr>
<td>‘Red mud’ coated Superphosphate</td>
<td>7.1</td>
<td>39</td>
</tr>
<tr>
<td>Reactive Phosphate Rock</td>
<td>10 to 18</td>
<td>0</td>
</tr>
</tbody>
</table>

Clover pasture trials demonstrated that given the right soil and climatic conditions, some of these options can be at least equivalent in production value to superphosphate, and in some situations they are more productive. Use of ‘Red-mud’ coated superphosphate for example has provided additional production benefit in the year of application and in subsequent years.

However, following low voluntary uptake and a fall off in supporting extension effort there are currently no low soluble products commercially available to the market. The Government – through the proposed Fertiliser Action Plan - has embarked on a strategy with its partners to address this issue and to make a dramatic change in land manager behaviour in sensitive areas in south-west Western Australia.

The approach taken by the Government in developing the Fertiliser Action Plan

Clearly, the Government and its agencies in Western Australia are well aware of the many programs, plans and initiatives that have been and are being implemented to improve land use practices in both the rural and agricultural sectors. In most cases, agencies worked together with the various parties to devise these programs and over the years, varying levels of resources were applied to support land managers with extensive and generally highly-regarded extension programs. But for all the advances made, we continue to see nutrient enriched water making its way off the catchment and into the rivers. That in some instances we have seen a reduction in nutrient loads to the waterways is generally taken as a function of yet another problem facing the rural sector especially – low rainfall and even lower streamflow. But that is another issue.
The approach taken in developing the Fertiliser Action Plan was somewhat unorthodox and certainly not without risk. During early 2006, there had been an exchange of correspondence between the Fertiliser Industry Federation and the then State Minister for the Environment followed by an announcement by the Minister of the Government’s intention that water-soluble P fertilisers would be phased out and that he was looking to the fertiliser industry for leadership and to help determine how this might be achieved. It was, as mentioned above, well-recognised that fertiliser application is essential in many or our poor soils and that user groups would see the ability to apply fertilisers as critical to production. But the hope was that a positive replacement product could be developed which would allow farmers to maintain their productive capacity, but to minimise unwanted offsite environmental impacts.

A Joint Government and Fertiliser Industry Working Party was set up by the Minister, headed by the chairman of the WA Environmental Protection Authority and made up of representatives of the relevant state agencies plus key representatives of the fertiliser industry. This was the unusual part of the approach. User groups were not represented in this first phase and, understandably, this drew some concerns. Some consultation with user groups and catchment managers occurred but this was limited in scope and mainly to provide information. The Minister had set a very tight timeline and wanted a report from the working party within three months. Clearly, the focus was on industry and its capacity to deliver a useable product, recognising the many complexities and barriers that lay ahead.

The Joint Government and Fertiliser Industry Working Group used a suite of sub-groups to develop background papers and details of the Action Plan within a very tight timeframe.
The working party met its deadline and delivered a report to the Minister for the Environment at the beginning of March 2007, recommending a series of actions, including a communications and engagement plan, and a general timeline for adoption.

It is important to note that this document – now circulated as the *Fertiliser Action Plan* – represents the deliberations of the Working Party alone and is essentially the basis for the consultation and engagement program now under way. It is also important to note that while much in the implementation plan is open for consultation, the Government has made clear that what is not negotiable is the core aim to phase out highly water soluble phosphorus fertilisers in critical areas of south-west WA.

**A summary of the main actions in the plan**

The *Fertiliser Action Plan* provides a blue-print for the actions required to phase out the use of highly water soluble phosphate fertilisers in coastal areas over four years. The change in fertiliser use is proposed to apply to a defined area of the coastal plain extending south from the Moore River to the Scott River plain east of Augusta, with some excluded areas. Importantly, the change will apply to all land uses within the defined area and does not simply target rural land uses. Alternative, low water soluble products will be made available. These will have the water solubility of phosphorus (P) reduced to 40% or less (as shown in Table 1, the most commonly used P fertilisers currently have water solubility of around 80% or more). Recognising the impacts of urban fertiliser use, all bagged P fertiliser will have a reduced amount of water soluble P (a maximum of 1% for lawns and turf, and 2.5% for general garden use). It is expected that when applied according to recommended practices, there will be little change in growth or productivity in most situations. Preparation of a Nutrient Management Plan will be promoted as best practice management for all relevant fertiliser user groups and will form the basis for exceptions where the soil is low in phosphorus and highly retentive.

It is proposed that the change to use of low water soluble phosphate (LWSP) fertilisers will occur through an Implementation Framework. This would be structured as a *State Environment Policy (SEP)* under the *Environmental Protection Act*, that enables voluntary and regulatory processes to be engaged. A Management Council would coordinate activities of the four-year phase-out period and report annually to the Minister for the Environment. The key activity areas of the Implementation Framework are to:

- Replace current stocks of bagged P fertiliser with easily recognised ‘River Friendly’ products (which will have reduced P content),
- Demonstrate the use of LWSP fertilisers linked to improved fertiliser management practices particularly with beef producers and horticulturalists within the defined area,
- Arrange bulk supply of a range of conforming LWSP fertiliser products,
- Engage and communicate with all fertiliser user groups to ensure full understanding of the reasons for change and to ‘learn as we go’ while change occurs during the four-year phase-out period,
- Encourage preparation of Nutrient Management Plans for larger landholdings,
- Require an accredited Nutrient Management Plan for commercial landholders seeking an approved ‘exception’ to the phase-out,
- Develop Partnership Arrangements for industry-based ‘self-managed’ nutrient management programs that are to meet targets of the *Fertiliser Action Plan*,

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Regulate non-compliance by both suppliers and users of fertiliser products following a reasonable period of time for voluntary change to occur within the four-year phase out period, and

Monitor, evaluate and report on the change management activities.

The processes of change in the use of P fertilisers are recognised as being complex. Some fertilisers, such as ‘Superphosphate’ have been used traditionally for many years. Actions of the Fertiliser Action Plan will be implemented through engagement with the provision of information and development of understanding. The responsibility for change will be shared between those who supply and those who use fertilisers with a lead and guidance provided by State Government agencies.

Implementing actions will be progressive with processes to adapt to new information or experience gained during the four-year phase-out period. Importantly, it is proposed that regulation will apply to the supply or use of non-conforming P fertilisers within the defined area as a part of these change processes.

Recognizing the need for change and also the needs of the many suppliers and fertiliser users involved, the State Government through its agencies will undertake a wide-ranging consultation process before implementation of the Fertiliser Action Plan begins early in the first year of the plan.

The change in fertiliser use is to apply to all within a proposed ‘Environmentally Sensitive Fertiliser Use Zone’. Users are broadly categorized as follows:

- Rural (commercial farm enterprises),
- Horticulture/viticulture,
- Rural lifestyle (including hobby-farms),
- Commercial, municipal and recreational turf,
- Urban domestic (further categorised as ‘lawn’ and ‘general gardens’)

The expected outcomes by the final year of the Fertiliser Action Plan are that there will be substantial change in the use and type of P fertilisers by all user groups with support through supplier organisations. It is expected that field demonstrations linked to improved nutrient management practices will encourage voluntary adoption of change processes by individual landholders or industry organisations. Regulatory processes will be applied to phosphate fertiliser suppliers and users for non-compliance.

We should not expect to see significant change in the condition of waterways within the four-year period. Restoring the health of our coastal waterways is a long-term endeavor. This important initiative is to address the cause of nutrients in waterways so that there will be major social and environmental benefits into the future. It may take many years for these benefits to be fully appreciated but it is believed that without strong preventative action, the full impact of waterway ill-health will be revealed in a much shorter period of time.

The experience of the process as viewed from Government

Acknowledgement must be paid to the Fertiliser Industry Federation and some specific West Australian industry members who were involved in the working party and its sub-committees. Without their agreement, willingness to negotiate and intellectual effort, this first stage of the task would surely have failed. As noted above, embarking on a process with a tightly focussed group with a short timeframe carried the risk of
alienating stakeholders who remain critical to the success of the plan. However, it also meant that the basis of a plan could be drawn together very quickly and with sufficient expertise to be built on strong science, technical knowledge and recognised experience in the field. The approach also recognised that much work has been done in this area over many years and that generally, all parties are accepting of the need to take decisive and long-lasting action to address the problems facing our waterways. The introduction of a regulatory element will be challenging for some, but it would appear that the previous decades of volunteerism have not delivered outcomes at the pace required. Much important work lies ahead in the consultation phase.

Next steps and timetable for implementation

The Working Party Report was released by the Minister for the Environment on 2 March 2007 for public comment closing at the end of July. A symposium has already been held in Perth, with representatives of the government, the Fertiliser Industry Federation and users groups able to put forward their perspectives. Understandably, there are concerns among user groups at the impacts on producers and a strong desire that industry be (justifiably) recognised for the progress in good industry practice made in recent years. But encouragingly, there was consensus on the need to continue to take action to protect the State’s waterways. The next steps involve further consultation to facilitate groups understanding the proposals and making their views known. A report will be prepared for the Minister for the Environment before the implementation plan is finalised. The course recommended by the Working Group is outlined as follows, noting that these may be changed as a result of the current consultation and review process:

**Benchmark Targets**

**YEAR ONE**

(2007/08)

1. All user categories within the specified zone consulted, informed and engaged,
2. Suitable products made available for demonstration purposes,
3. Demonstration project established,
4. Behaviour change surveys completed in priority areas,
5. Communications and promotion campaign arranged,
6. Endorsed labelling adopted and recognised,
7. Regulatory framework developed and implemented,

**YEAR TWO**

(2008/09)

8. ‘River Friendly’ labelling adopted and recognised,
9. Information available and models developed for nutrient management planning,
10. Accreditation for products and processes established,
11. Extension (behaviour change) programs developed and being implemented for relevant each user categories within identified priority areas,
12. Formal partnership agreements developed with key organisations,
13. Monitoring program for natural resource condition improvement developed,
14. Suitable LWSP fertiliser products commercially available (for rural and rural lifestyle users),
15. Annual reporting on implementation of actions and the environmental condition of waterways,
YEAR THREE  
(2009/10)  
16. Monitoring and reporting shows at least 20% adoption of practice change to LWSP fertiliser use for relevant all user categories,  
17. Nutrient manage plans are being implemented by more than 20% of commercial rural, horticulture/viticulture and turf management fertiliser user groups,  
18. Suitable LWSP fertiliser products commercially available (for horticulture and viticulture users),

YEAR FOUR  
(2010/11)  
19. Monitoring and reporting shows at least 50% adoption of practice change to LWSP fertiliser use for all user categories,  
20. Nutrient manage plans are being implemented by more than 50% of commercial rural, horticulture, ‘viticulture and turf management fertiliser user groups,  
21. Regulations are applied for non-compliance by fertiliser suppliers and users.

Conclusion  

The Fertiliser Action Plan can be seen as exactly the kind of strategy where it is very easy to sit down and give at least 10 good reasons why it can’t be done and won’t work. This opinion has been voiced within Government and outside. In favour of the strategy however, is that much good work has already been done. Also, helping to support this strategy is a genuine and widespread belief across many interest groups that environmental values must be protected while maintaining productive capacity and that voluntary adoption of more environmentally acceptable nutrient management practices has not resulted in broadscale change. The value of the genuine constructive engagement in this endeavour and the ongoing development of a pragmatic approach to implementation of better fertiliser management practices in partnership with the fertiliser industry – and its customers - cannot be overstated.  

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REFERENCES  


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