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A logical approach to wheatbelt water supply

by S. T. Smith
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My particular task at this seminar has been to enunciate a logical approach to water resource utilisation in the wheatbelt, based on the points made by the speakers.

Policy is a matter for governments and it would be most unwise for me to state clear suggestions which may be at variance with policy being formulated, or at a cost which could not be met. The area to which the seminar papers apply is the alienated agricultural land in the 250 to 625 mm rainfall zone.

Farm water is supplied either through the comprehensive mains or on-farm sources supplemented in certain instances by public key dams or from standpipes on the comprehensive scheme. It is therefore necessary to look at these various alternatives.

Mr. Kelsall outlined the history of the Comprehensive Water Supply Scheme, the area it serves and the cost which it has incurred. This scheme originated with the initial pipeline designed to take water to the Goldfields, and no one would deny the need for that. Subsequent modifications involved providing water to a number of wheatbelt towns, where undoubted water supply problems occurred, and in the process the adjacent farmlands were reticulated. We now have a situation where about 2.4 million hectares are reticulated out of about 13.8 million hectares alienated.

Assuming there was a need for such reticulation one could not disagree with this approach. However, the economic arguments used in the 1963 submission, then supported by the Commonwealth Bureau of Economics, that reticulation would enable greater productivity by allowing more sheep to be carried, was entirely false.

In few places does one find the number of stock carried on a property dictated by available water supplies once some supplies have been established. Stocking rates are almost always governed by the feed supplies available, and there is a tendency for water conservation
to lag behind the increased stock numbers placed on farms.

Subsequent submissions concerning the York and Corrigin areas, based on similar economic arguments, have been refused by the Commonwealth Government.

The inevitable conclusion from Mr. Kelsall's summary is that reticulation of water to farms is extremely expensive, and even in the vicinity of existing mains can amount to about $40 per hectare serviced. This means there is a capital input of some $60 000 to a 1 600 hectare farm.

Throughout the history of the farmland reticulation such work has been hampered by rising costs. Mr. Kelsall indicated that the first stage estimated to cost $8.6 million, finally cost $20.4 million. Stage 2, finally completed in 1974, cost $29.7 million.

The remaining 1.7 million hectares of farmland within the 1946 boundary not yet reticulated was estimated to cost $50 million, or about $30 per hectare. Current costs could be in the vicinity of about $40 per hectare.

The cost of key dams is highly variable in terms of cost per unit volume of water stored. Mount Roe contains about 90 000 kilolitres, with an initial cost in the order of $232 000. This compares favourably with a 4 500 kilolitre concrete tank on a rock catchment which might be built for perhaps half this figure. In the latter case the water stored is equivalent to only six small farm dams full of water.

It should be noted that the Public Works Department has about 160 key dams, plus some 60 former railway dams throughout the agricultural areas.

Within the total area under discussion there are about 30 million sheep, and one could estimate the annual water demand for those sheep to be about 23 million kilolitres of water. Clearly, these needs cannot be met from off-farm key supplies.

Comprehensive Water supplies 6 million sheep, but the needs of the remainder must be met from on-farm water.

Apart from Comprehensive Water, underground water is the most secure water supply on farms in a drought situation. Mr. O'Driscoll outlined the sources of ground water, the factors affecting its occurrence and quality and other hydrogeological aspects, and referred to the previous drought relief drilling programme in 1969/70.

Overall, only 40 per cent of farms have useful underground water supplies. In some districts, such as Salmon Gums, stock-quality groundwater is almost non-existent. The groundwater in this district is mostly highly saline. Mr Laing's surveys have shown an overall average of successes in water drilling is about one success in eight tries. This varies considerably between districts and between farms in an individual district. For instance, in a survey of the Goodlands area, while the overall average is one success in eight tries, it varied between properties from one in two to one in 20.

As indicated by Mr. O'Driscoll, in 1969/70 the Government instituted an exploratory drilling programme substantially subsidised by the Government.

Overall on farms, a total of 60 000 metres were drilled on 683 properties with a recording of 262 successful bores with an estimated potential of about 6.0 million litres per day.

The success rate varied in different shires, but it is worth noting that 10 successes were obtained out of 166 bores on 25 properties in the Mount Marshall/Koorda area. There were 22 successes in Weston, 12 in south Burragoppin, 12 at Mount Walker, 10 in Kondinin/Kulin but only one in south Yilgarn (106 bores tried). Lake Grace had 11 successes in 246 tries and a surprising number of successes were obtained in the Holt Rock area where 43 successes were obtained from 207 bores.

This exploratory drilling programme was hurriedly organised and as a result lacked perfection. Overall, however, it indicated that given sufficient effort reasonable success could be obtained in some districts. In other districts it could not be recommended.

The cost of this programme was nearly $200 000 to the Government, and it could be claimed that this was a worthwhile investment. It is a small cost compared with Comprehensive Water, and is roughly equal in cost to one or two off-farm key supplies. I believe that a continuing programme of this nature on the basis of Government contribution would be very worthwhile.

Mr. Laing's paper outlines information obtained from numerous farm surveys in the wheatbelt. These surveys of underground and surface supplies indicate water problem areas.
In some cases they have revealed a tendency to not upgrade "on-farm" water supplies with increasing stock numbers.

He highlights a number of problems such as saline water tables, leaky dams, poor catchments and so on. The main essential with farm dams is that they have to be able to carry water through a dry summer, a subsequent winter of low runoff and a following dry summer. Even if dams are large, evaporation restricts the amount of water available for sheep.

In a 1970 survey in 63 shires there were 73,714 dams on 9,603 farms.

Within the area under discussion there are roughly 12,500 farms, of which more than three-quarters are not serviced by reticulation. Many of the dams were built before large machinery became available and hence their size is limiting, and there are areas affected by problems such as shallow saline water tables, leaky clays and so on. It is now recognised that the prime essential for farm dams to give an effective drought-proof supply is that dams fill in almost every winter. The original Farm Water Supply Loan criterion of a large dam was not an answer in itself because over two dry summers with an intervening winter without runoff, a large dam could not sustain many stock because of the substantial amount lost through evaporation.

The need for annual replenishment in dams has led to intensive studies in catchment improvement and the areas required for different sized dams in different districts with various amounts of runoff from rainfall events.

Arisng from this Mr. Frith has concluded that a dam of 2,300 cubic metres with 2 hectares of good roaded catchment at Jerramungup or Katanning would never have failed to fill in any year in the last 60 years while supporting 1,000 adult sheep.

This clearly indicates that beyond certain limits the size of the dam is not as important as the catchment and one should very carefully choose the size of excavation in relation to catchment, or alternatively modify the catchment in relation to the size of dam.

Because of the importance of catchment the farm water supply loans are now given for improved catchments and less emphasis is placed upon the size of the dam. However, I would not necessarily personally favour small dams because siltation can reduce the capacity of the dams, and dam maintenance tends to be one aspect of farming to which inadequate attention is given.

Mr. Jennings explained how the Farm Water Supply Loans Scheme operates and the modifications made to it in the light of experience over a period of years.

The initial emphasis was on a large dam or underground water source. There is now less emphasis on large dams and more emphasis on catchment treatments and various alternatives.

The object has been to obtain flexibility in the scheme so that money can be used to the best advantage, depending upon the situation on any individual farm.

The scheme, of course, is not without defects and problems. For example, a farmer has to be refused a loan from his own bank, and this refusal may not be given if the bank desires to lend the farmer the money itself. Mr. Jennings has pointed out other problems of the current scheme. In the light of these defects further modifications are necessary.

Mr. Eckersley submitted some interesting cost data on farm water supplies which clearly indicate that farmers could not find Comprehensive Water attractive if the full cost was loaded with charges. On-farm water from other sources is far more attractive under these conditions.

Although a system of financing similar to S.E.C. or telephones deserves investigation as suggested by Mr. Eckersley, a very substantial outlay would still be required by the Government. This outlay has to be viewed in the light of a current annual loss, operating costs and current charges for water.

In conclusion, one might make a final summary:

1. Future extensions of the the Comprehensive Scheme are in many circumstances justified to serve townships. They should cater also for providing emergency water supplies for farmers and reticulation to farms which have water problems so severe that they cannot be solved by any other means.

2. There does not seem to be justification for building additional public key supplies unless they are remotely situated from Comprehensive Water, and then only if they can store substantial quantities of
water such as at Mount Roe or Dingo Rock.

3. Exploring for underground water on farms should be encouraged and there is even merit in considering whether an on-going subsidised exploratory drilling programme limited to areas where underground water is known to exist should be implemented.

4. Technical assistance in providing dams safe against dry winters should be intensified.

5. The Farm Water Supply Loan Scheme should be modified to overcome present defects.

6. On the basis of the capital inputs into farms with Comprehensive Water, farmers without it suffer disadvantages, and there is some merit in taking cognisance of this fact. Furthermore as a single underground water supply in the Midlands (where dams are unreliable due to leakage) costs $14 000 and this expenditure has to be incurred to carry the first stock, farmers in this area and other areas with similar hardships deserve a modified scheme.

7. Because of the importance of water storage on farms to the farmers in Western Australia and to the State, further effort should be applied to convince the Commonwealth Government that all expenditure on exploring for and developing water supplies on farms should be a 100 per cent taxation deduction in the year the expense is incurred.

Loans obtained from the Commonwealth do of course have to be repaid, and one can arrive at a point with State borrowings where a substantial portion of the annual budget is required to service loans. In the case of the Comprehensive Water Scheme there is a very substantial annual loss, and Mr. Kelsall has indicated that loans originally obtained for comprehensive water are now being serviced by obtaining new loans for that purpose.

The implications of the financial problems associated with reticulation of water is that farmland reticulation should only be carried out where no other alternative is possible.

This implies a need to evaluate thoroughly all the agricultural areas and define, with a reasonable degree of accuracy, the specific areas where alternatives to reticulated water are not available. There are known areas of this type in the northeastern wheatbelt and small pockets with various types of problem scattered throughout the agricultural areas.

The Department of Agriculture prepared a report in 1973 which listed, in order of priority, 16 areas with water problems greater than the remainder of the agricultural areas.

These areas included the Midlands, the Eradu plains and the northeastern wheatbelt.

It must be emphasised that these areas as listed did not constitute priorities for Scheme water. They constituted problem areas caused either by cost of underground water, or areas with low rainfall intensity making dam supplies unreliable, areas with technical problems or areas where expense of obtaining water was a major inhibiting factor.

The Public Works Department in 1974 undertook a feasibility study on providing reticulated water from bores to 240 000 hectares in the Midlands at a cost of about $22 per hectare. This means that on a 1 600 hectare farm a capital input of $36 000 would be required. To my mind such an area has no priority for reticulated water. There is bountiful underground water but because of depth, the cost of a single farm supply is in the order of $12 000 to $14 000.

Clearly, the development of such on-farm supplies is far cheaper in initial capital outlay without any future operating and maintenance costs for the Government. One could readily conclude that it would be far cheaper for the Government to give each property holder enough money to construct his own bore, although such an approach may not be an acceptable one.

A similar situation exists on the Eradu sandplain, but as a pipeline has been constructed from Wicherina to Mullewa, there is now at least an emergency supply of water in that vicinity. The additional cost to reticulate water to 125 000 hectares would be $2.3 million, which is about $19 per hectare. Again there is underground water present at depth on the Eradu sandplain.

A third area east of Merredin would have cost about $37 per hectare and serving 580 000 hectares, was estimated to cost $21.2 million.

These figures strongly support the contention that areas with no other possibility of establishing drought-proof on-farm supplies should be clearly defined and any reticulation given to those areas as a first priority.

Basically the Comprehensive Scheme was designed to supply townships, and the reticulation to farmlands has been to areas through which the trunk mains pass in the early days of agricultural settlement as a source of water for the early settlers.

In this regard they served a very useful purpose. They continue to serve a useful purpose as emergency supplies for some farmers. In the main, however, they are too small to provide emergency water in the case of severe widespread water deficiency.

While constructions such as Mount Roe, Dingo Rock and others have a substantial capacity, the remainder are quickly depleted if many farmers are required to draw on them. This was highlighted in 1969/71, when over 90 000 kilolitres of water were carted into districts, particularly the north-eastern wheatbelt.