Agriculture and pollution in Western Australia. Part 1. Background

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Agriculture and Pollution in Western Australia

By C. V. MALCOLM, Research Officer, Soils Division

PART I—BACKGROUND

For centuries there has been awareness of pollution but it has received dramatic publicity in recent years. In Western Australia, provisions for its control are written into the Health Act and many other Acts besides the Environmental Protection Act of 1971. A number of factors have acted worldwide and locally to increase awareness and concern about pollution, and to justify careful examination of the problems it causes.

Improved technology and increased funds have enabled scientists to diagnose and define pollution problems with increasing precision. For example, since the second world war the influence of photochemical air pollutants on crop growth has generated a whole new field of research.

Increase in public awareness of pollution in Western Australia has generally come from outside news rather than from inside action. Much work is being done on pollution problems in W.A., but the results are not generally published and much of the information for this review was obtained by personal interview. Although it appreciably affects his well being, the average citizen is ignorant of most of this work. Authoritative information on the problems that exist and the work being done on them is now needed.

Not all sources of information have been acknowledged. However, the author is extremely grateful to the many people who have assisted with this review.
What is pollution?

There are many definitions of pollution, for example, "destruction of purity"; "impairment of function which has, or may have, effects on subsequent use"; and "additions to a balanced environment of quantities of external matter greater than the environment can safely absorb, resulting in its partial or total destruction".

Pollution may affect the environment, specific resources, or products such as food; its significance depends on the degree to which the subsequent use of the resource or product is impaired. Sometimes the effects of pollution can be dodged by applying alternative uses to resources. For example, water too salty for irrigation may be used in septic tanks. Therefore pollution involves changes in resources or products resulting in impairment of their service to mankind now or in the future.

Pollution in agriculture affects other environments and other people besides those within agriculture. It is increasingly recognised that pollution must be considered in the context of the national and even the global environment.

Fragility of resources

The more fragile a resource, the more critical are the effects of its pollution. Resource fragility may be considered in three grades (Table 1). Some resources may be irrevocably destroyed and are therefore of great fragility. For example, some species of plants and animals have become extinct and cannot be replaced. Landscapes may be permanently changed for better or worse by agricultural, urban, mining, or industrial developments. Fragile qualities such as beauty, interest or solitude may be permanently impaired. Individuals may have their health of body, mind, or spirit irreparably damaged by environmental pollution. Impaired hearing due to tractor noise, for example, is an occupational hazard for farmers. In some respects resources such as health and people may be considered either as fragile or renewable.

The values of fragile resources are difficult to assess. It is comparatively easy to calculate the agricultural potential of the now developed sandplain areas of the central wheatbelt, and to maintain or even improve them as an agricultural resource. However, to assess the aesthetic, tourist, or genetic value of the same areas in their natural state is far more difficult.

Less fragile resources, those which can be renewed after degradation (pollution), are typified by air, water and land. Natural processes of chemical breakdown, filtration and bio-degradation are responsible for continual renewal of air, water and land. Pollution problems become critical for these resources when rates of pollution exceed rates of renewal.

Renewal may be slow or expensive, as in the case of some soils degraded by high salt content, or it may be rapid as when a strong wind disperses a smoke pall over a city.

Finally there are some resources that are unlikely to be polluted. For example, agriculture may proceed for centuries on a mineral deposit without reducing the usefulness of the mineral. It is most unlikely that the activities of man would have any effect on the existence of tidal power, but possibilities for harnessing it may be altered. Climate, solar energy and hydro power, once considered non-fragile, can be affected by carbon dioxide and dust in the air.

### TABLE I

**Resource pollution, its evaluation and correction**

<table>
<thead>
<tr>
<th>Fragility</th>
<th>Resource</th>
<th>Polluting Agents</th>
<th>Economic Evaluation of Resource</th>
<th>Correction of Pollution</th>
<th>Main Importance of Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fragile</td>
<td>Flora, Fauna, Landscape, Soil, Ecological balance, Genetic material, Beauty, Solitude, Interest, Health, People.</td>
<td>Agriculture, mining, urban development, industrial development, war, population.</td>
<td>Difficult</td>
<td>Difficult and sometimes impossible</td>
<td>Quality of life</td>
</tr>
<tr>
<td>Renewable</td>
<td>Water, Air, Soil, Climate, Solar energy, Hydro power, Capital works, Health, People, Knowledge, Technology, Social and Political systems.</td>
<td>As above</td>
<td>Moderately easy</td>
<td>Possible but sometimes expensive</td>
<td>Quality and Quantity factor in life</td>
</tr>
<tr>
<td>Non-fragile</td>
<td>Tidal power, Minerals, Knowledge, Technology.</td>
<td>Nil</td>
<td>Easy</td>
<td>Not necessary</td>
<td>Quantity and Quality factors in life</td>
</tr>
</tbody>
</table>
From the dawn of history, polluting and destroying factors, such as agriculture, mining, urban and industrial development and population, have grown at relatively slow rates. But in the last century a dramatic increase has occurred.

The environmental crisis

The environmental crisis has been highlighted by Bormann (1970), who compares growth rates of a number of factors as indicators of rates of growth of pollution. He suggests that the total effect of the U.S.A. on the world environment is growing at about the same rate as the Gross National Product, 4 per cent per annum, and concludes “we would have to improve pollution abatement by 1200 per cent in the next 63 years merely to maintain the unacceptable environmental conditions we have today”. Growth rates for several factors for U.S.A. and Western Australia are shown in Table 2.

<table>
<thead>
<tr>
<th>Criterion</th>
<th>U.S.A. (Bormann)</th>
<th>W. Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Electricity Generation</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Industrial Production</td>
<td>5</td>
<td>6 to 11</td>
</tr>
<tr>
<td>Trash</td>
<td>4</td>
<td>...</td>
</tr>
<tr>
<td>Nitrogen Fertilizer Use</td>
<td>4</td>
<td>...</td>
</tr>
<tr>
<td>Superphosphate Use</td>
<td>...</td>
<td>11 variable</td>
</tr>
</tbody>
</table>

The growth rates for Western Australia are all higher than those for U.S.A., suggesting that pollution is growing faster here than in U.S.A. Population growth in Western Australia was slow for many years but is now extremely rapid.

Because each person now consumes more power, goods etc. than before, growth factors for power production, pollution etc. are higher than for population. The unprecedented growth rates of population, technology, production, pollution etc. as opposed to the finite nature of the world’s resources are leading towards an environmental crisis. (See Diagrams 1 and 2.)

During the past 145 years the agricultural and pastoral industries in W.A. have irreversibly transformed huge tracts of land from their natural state. Some areas have been abandoned due to erosion, salinity and lowered productivity. Huge acreages of sandplain vegetation have been cleared for wheat farms.

Areas not used for agriculture or the pastoral industry are either regarded as useless due to low rainfall, low fertility, or ruggedness, are urbanised, or are pegged for mining. Exceptions include some reserves and areas of State Forest. It has recently been
suggested that no further Crown land should be alienated for agriculture, Martin (1972).

Population increase, higher living standards, the greater proportion of time available for leisure, and the need to escape from expanding urban environments are increasing the demand for outdoor recreation facilities. A substantial sandplain vegetation reserve in the widely cleared central wheatbelt, and similar areas in the now entirely used Gascoyne and Murchison areas may have been a better use than pastoral or agricultural activities in the long term.

But hindsight is only useful if it now gives us greater foresight.

**Is pollution important?**

The relative importance of various forms of pollution depends on a number of factors. Firstly, the implications for people must be known, and some of these will be far from obvious. It is easy to appreciate the importance of rat poison in bread, or typhoid in food or water. Salting of agricultural land, and discharge of meat processing effluent into the sea are less direct in their effects, and the implications of changes in nitrogen or phosphorus contents of surface or ground waters are relatively difficult to assess.

Secondly, can the pollution be corrected easily and cheaply? It may be easy to ensure that there is no rat poison in bread, but avoiding salting of agricultural land or preventing pollution of groundwaters is more difficult. The value of resources lost and the cost of correcting the pollution is a measure of importance. Again, some resources cannot be measured in terms of dollars.

Thirdly, the seriousness of pollution is partly determined by the lack of alternative areas for the polluting activity, or new uses for polluted areas or resources. The benefits of creating playing fields on garbage-filled swamps are obvious, but swamps are in short supply and in any case land for garbage disposal should be well drained, Wooding (1965).

Finally there are the worldwide implications. Our additions to pollution and transformation of the natural environment are a part of what may become a world crisis. With our relatively undeveloped countryside and our high standards of living and education, West Australians could make a unique contribution to alleviating the crisis.

The responsibility rests upon each individual to become aware of the environmental implications of his actions.

**References**

