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Erratum
Should be in Volume 8 No. 11 November 1967 Page No 446-453

This article is available in Journal of the Department of Agriculture, Western Australia, Series 4: https://researchlibrary.agric.wa.gov.au/journal_agriculture4/vol8/iss1/3
1. THE NATURE, EXTENT AND CAUSES OF EROSION IN THE ORD RIVER CATCHMENT AREA

OF the 17,800 square miles of Ord River catchment area, an estimated 1,450 square miles of country is subject to varying degrees of erosion. This lies astride the Ord River and its major tributaries, the Elvire, Negri, Stirling, Panton, Turner, Nicholson and RB rivers. The bulk of the eroded country lies in W.A. but part projects into the Northern Territory.

The erosion-susceptible area was accurately defined by a Lands Department survey as long ago as 1944. It was subsequently detailed and soils types were defined in a CSIRO Land Research survey in 1952.

A more recent aerial reconnaissance by Department of Agriculture officers pinpointed further areas of active erosion and confirmed CSIRO statements that most of the erosion is confined to one major region of susceptible soil types.
The area concerned

In the main, the affected country is formed over Upper Cambrian limestones, mudstones and siltstones that have weathered into fine textured calcareous soils prone to both wind and water erosion.

The country is gently undulating, with an occasional limestone outcrop; it is now almost devoid of trees except on the streamlines, and is highly dissected with steeply walled creeks, gullies and rivers. Dead trees with a "perched" layer of roots 9 to 12 inches above present ground level indicate the severity of sheet erosion by wind and water.

Originally this country was a grassland and grass-savannah woodland complex dominated by the perennial grass species Astrebla, Dicanthium, Chrysopogon and the annuals Isetlema, Enneapogon and Brachyachne species. The main trees were small eucalypts resembling bloodwood, a small leafed Terminalia (nut wood) and Bauhinia.

Causes of the decline

As this is primarily a pastoral area with an industry based on "open-range" conditions utilising natural waters, degradation and subsequent soil erosion have been generally confined to areas adjacent to the river systems. The degree of erosion reflects the use to which the areas have been subjected.

The removal of the surface plant cover over the years by continuous, uncontrolled grazing, under marginal rainfall conditions and on susceptible soils, has been the underlying cause of the erosion, although the effects of fire and drought cannot be overlooked. Once stripped of the protective vegetative cover, these erodable soils quickly deteriorate under action of wind and water, to be gullied, stripped and laid waste.

The average annual rainfall for the area is only 17 to 18 inches, which is not conducive to stability or to a capacity to accommodate heavy and continuous grazing. Under the tropical conditions of the region the rainfall is often inadequate and ineffective. The incidence of rainfall is often variable in both quantity and spread, often with heavy downpours over a few hours, followed by long, dry spells. January and February are the wettest months.

Severe erosion of the Ord River catchment area poses a potential siltation threat to the proposed main dam on the Ord River—basis of the Ord River Irrigation Project.

This is the first of a series of articles describing a Department of Agriculture programme which aims to halt the erosion and bring valuable grazing land back into production.
Part of the East Kimberleys, showing the location and extent of severely eroded country in the catchment area.
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One of the few fences to be found on the eroded catchment area before the regeneration project began. Uncontrolled grazing by stock and vermin removed the surface plant cover, leaving the soil vulnerable to the action of wind and water.

Actively eroding fan gully on an area stripped by sheet erosion. Water penetration is very poor on the bare soils and one result of this is severe gully erosion.
Only the hardiest perennials persist under these conditions and when subjected to continuous overgrazing they are likely to be killed out in the less favourable seasons. Annual grasses are a poor substitute for perennials and are completely inadequate for effective catchment protection.

Many of the gullies would have originated as cattle pads where cattle made their way from the higher slopes down to the permanent water holes in the rivers.

Types of erosion

Gully and sheet erosion are widespread and severe.

Within the gullies, erosion is active on the gully walls while both stream bank and stream bed erosion are active in the larger rivers.

Severe wind and water erosion have combined to remove the surface soil. Water erosion is responsible for most of the damage, having a serious effect on the productivity of the soil and tremendously increasing the silt load of the rivers.

Wind erosion removes the surface soil, compacts and glazes the surface and cuts into the subsoil, thus reducing soil fertility and further reducing the chances of establishment and survival of seedlings, even after good rains.

A direct result of the soil surface compaction and glazing is the reduced water penetration onto these bare soils. The lack of water penetration is one of the major limiting factors to successful re-establishment of grasses on the catchment area.
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