CASE STUDY 1: Reclamation of Salinity Affected Farmland

Large areas of Australia were once covered by the Sea. Calcium rocks from the Victorian Mallee through to Western Australia show remains of aquatic crustaceans. The presence of soil salt is a natural consequence. Negative effects of saltation on the environment and plant production were hardly noticed 40 or 50 years ago, but have come increasingly, even devastatingly, to the fore in recent decades.

The reason for this increase is generally assumed to be deforestation for agricultural purposes. Trees draw water from the soil to transpire through leaves. An average gum tree has been measured to transpire 380 litres in 24 hours. Trees are being replanted on agricultural land to reduce the salt problem.

This is of some purpose in the much publicized saltation of Riverland irrigation areas where ever rising water tables bring salt to the surface. Far less so with the vastly larger areas of dry-land saltation.

The real cause of saltation is not the actual loss of trees, but the loss of what these trees enacted in the soil on which they grew.

Mainly due to climatic conditions, the biological activity in much of Australia's soils rate poorly on a world scale. Yet, even more important for biological soil activity than regular and adequate rainfall is the provision of sufficient a i r in the soil - essential for any living creature.

Air is provided in a soil s t r u c t u r e d like a building, where many floors, rooms and passages provide for air pockets, see photograph 2. By comparison the c o m p a c t e d soil depicted in photograph 1 provides no air spaces and is devoid of the dark humus shown in picture 2 (created by microbes and worms in o n e year from soil 1).

Soil s t r u c t u r e provides not only room for air, it provides equally for d r a i n a g e of water, i.e. it counters water-logging which occurs on compacted soils.

In pristine Australian conditions all trees, even Nullabor scrub, provided adequate soil s t r u c t u r e for appropriate soil biology a n d for sufficient d r a i n a g e to keep salt b e l o w the prevailing root zone.

It is not the loss of trees which caused saltation, it is what happened to the soil after the trees were removed.

In the past 50 years land clearing was undertaken with increasingly heavier machinery and followed by equally heavy agricultural equipment cutting (hardpans), mincing, powdering and compacting soils (see photographs in "Bio-Dynamics Agriculture of the Future", A. Podolinsky, 1999), i.e. destroying the original soil structure. And the input of large amounts of readily available NPK to the soil water further compounds the problem

as this negates the main purpose of worms and microbes: to free insoluble minerals from rock and old plant residue; to build these into humus colloids, therewith m a i n t a i n i n g the ongoing process of building soil structure. Worms and microbes become inactive like a man condemned to sit and not walk for 6 months - eventually becoming unable to walk altogether.

Replacing soil compacting tillage with "no tillage" methods using Glyphosate perform for only short periods. Weeds so sprayed become tissue paper like and are virtually taken out of biological recycling into humus. Direct seeding of grains into biologically active mixed pasture has proven very successful under European climatic conditions ("FiBL Lecture 2004", A. Podolinsky). In Australia, with limited moisture, such practice is only feasible under restricted conditions.

A slower progressing, but eventually equally soil structure and air content depleting effect, is caused by constant grazing in a set stocking regime, especially by close grazing sheep. Even the most prolific species, grazed continually, become visibly smaller and smaller, or may eventually disappear, whilst the root zone reduces in depth and becomes unable to reach minerals and moisture deeper down. Compaction results through absence of root and microbial activity.

40 years ago saltation was barely noticed because natural soil biology and therewith soil structure were still less impaired. Advancing compaction affects both dry-land **a n d** irrigation saltation by reducing drainage.

Compacted soil – compressed like blotting paper – provides for Sun-Warmth stimulated capillary action to draw salty water to the top (white crust on soil). Whereas in soil of sufficient biological activity and **structure** such capillary action is impeded, as the friable top soil acts like a "soil mulch" – under which moisture is retained.

Saltation slowly creeps from lower lying areas u p h i l l. With stimulation of soil biology and structure of the still semi-healthy higher lying region, saltation slowly reduces d o w n w a r d s, meter by meter.

Conventional soil scientists **assess** soil structure. Less is known about humus. The ability to **c r e a t e** new soil structure and to r e d e e m compacted soils – is another matter and is achieved on wide acres world-wide by Bio-Dynamics. The following DOLA, Western Australia, aerial photographs and accompanying letter provide an example.

While provision of physical means of drainage (channels, pumps, pipes) can aid wetland saltation problems to a degree - but would be impractical in most dry-land situations - the only permanent overall solution is the re-establishment and **maintenance** of active biological soil conditions, soil structure and therewith d r a i n a g e. The vast quantity of salt in the affected regions can not "be taken off", but can be held below the root zone as was the case before the advent of prevalent agricultural methods.

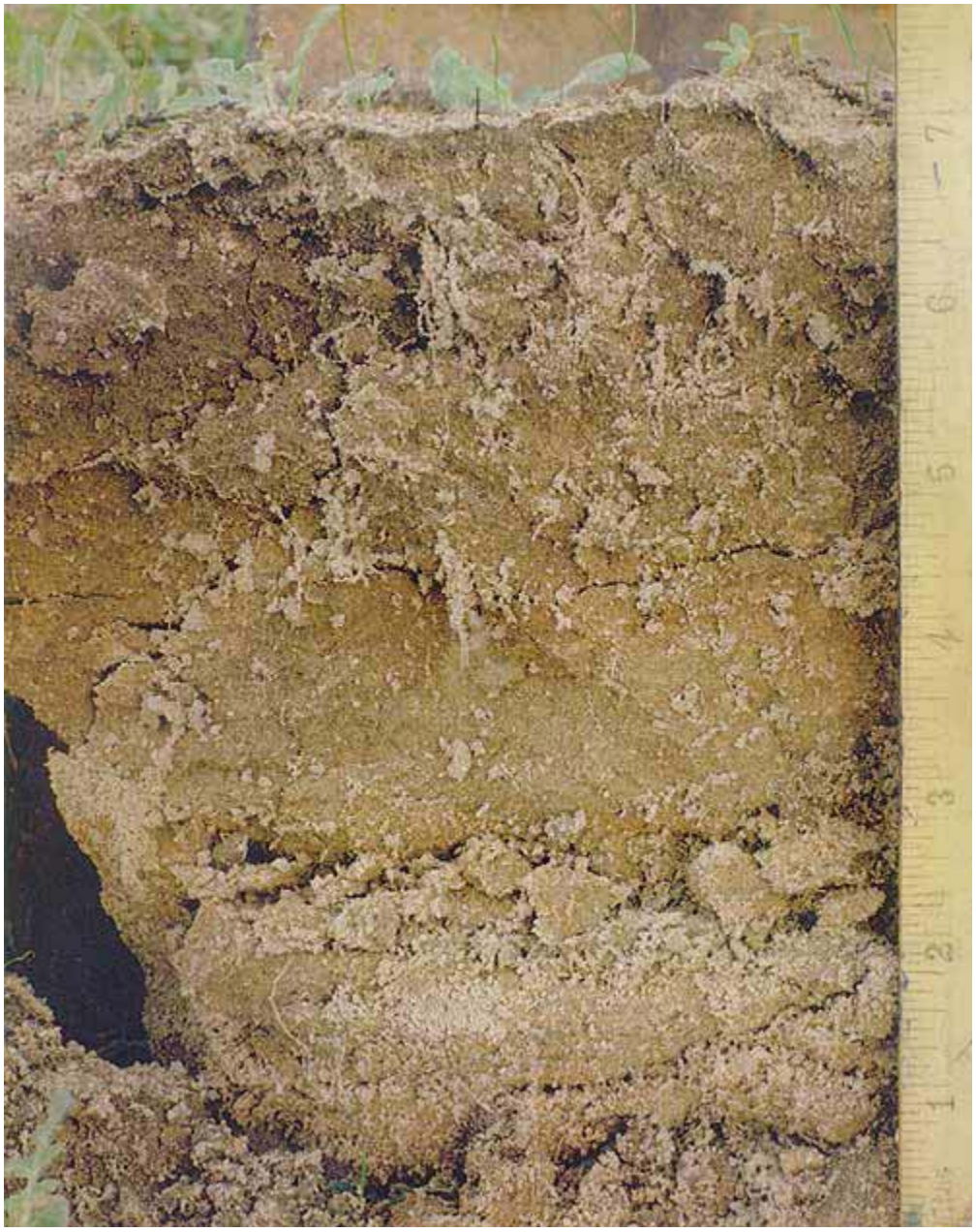


Photo 1

Photo 2

Monday, February 21, 2000

Mr. Alex Podolinski & colleagues,
Bio-Dynamic Research Institute,
Main road,
Powelltown. Vic. 3979
Ph 03 59667333 : fax 03 5966 7433

Re: SALINATION AND BIO-DYNAMICS

Dear Alex And Frances,

We thought these four aerial photos (see below) of some **receding salt scalds** on our farm and the increasing soil degradation on our conventional-farming neighbour's property would be of interest to you. All photos were taken by DOLA in WA. Photos 1 and 2 seek to show BD 500 influence only. Photos 3 and 4 compare Bio-Dynamic with conventional-farming practices.

Photos 1 and 3 were taken on **21/10/1994** after **three** BD 500 sprayings. Photos 2 and 4 were taken on **22/10/1999**, five years later, and after **eight** sprayings of BD 500. DOLA informs us that the only other aerial survey of our farm area was in 1980. This is too long ago for us to bother getting copies to see our farm pre Bio-Dynamics.

We have included rainfall statistics below as relevant information. Whereas **two very dry** years preceded the 1994 photos, **five very wet** years preceded the 1999 photos. Normally we would expect more water logging and hence salt scalding within these last 5 very wet years **(see area east of line K in Photos 3&4).** Photos 1 & 2 (Bio-Dynamics) clearly show the opposite to be the case.

It is very exciting confirmation to us that the 500 **really is** bring back soil structure to our collapsed, salty, water logged, non-arable soil areas. By reverse osmosis the salt is able to return to the depths from which it came up (when water tables rose with all the vegetation clearing) during the last 40 years. The top part of the soil in which we grow crops and pastures can now be used again. Adequate soil structure has been created with the eight sprayings of 500. We expect further improvement.

Another one of many comparisons of BD versus conventional farming is to study photos 3 & 4. For Bio-Dynamic improvements see area **B.6** and **E.4** on both photos 3 & 4. Now do the same looking in the conventional area east of line **K**. This is upstream from us. The degradation is alarming. We would have been far worse off, especially in these recent wet years, had we not practised Bio- Dynamic principles.

Production of these four photos was possible using our new computer and scanner.

Yours Sincerely,

John and Bernedette Cashmore
"Nyonger",
Box 62,
Hyden. W.A. 6359

Rainfall on "Nyonger"

Annual Average 325 mm (13")

Year		
1993	325mm(13")	
1994	225mm(9")	Photos 1 & 3 taken
1995	350mm(14")	
1996	400mm(16")	
1997	388mm(15")	
1998	375mm(15")	
1999	525mm(21")	Photos 2 & 4 taken

Photo 1 October 1994

N

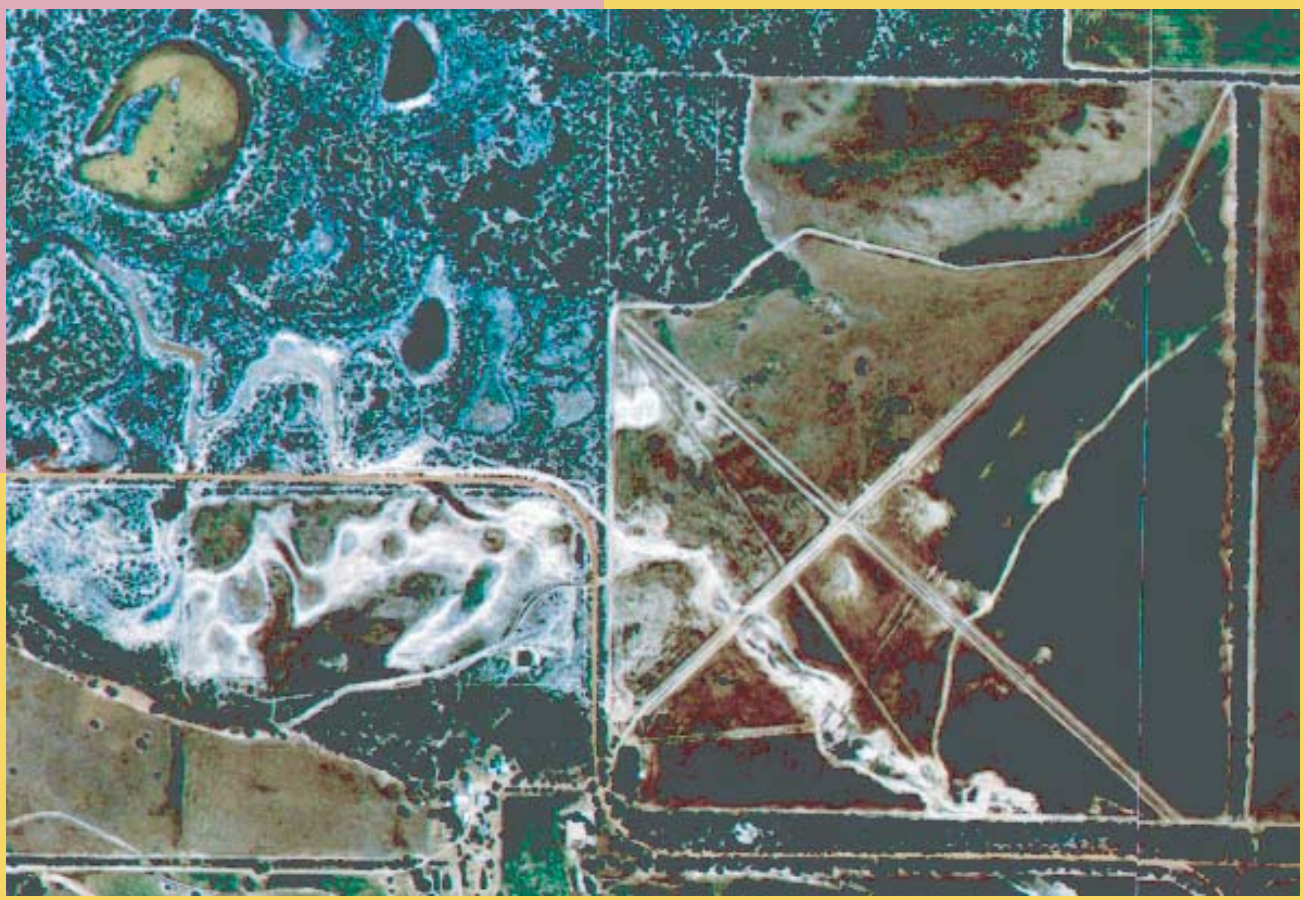
Crown Land

Bio- Dynamic

0 0.5 1

KM

Photo 2 October 1999



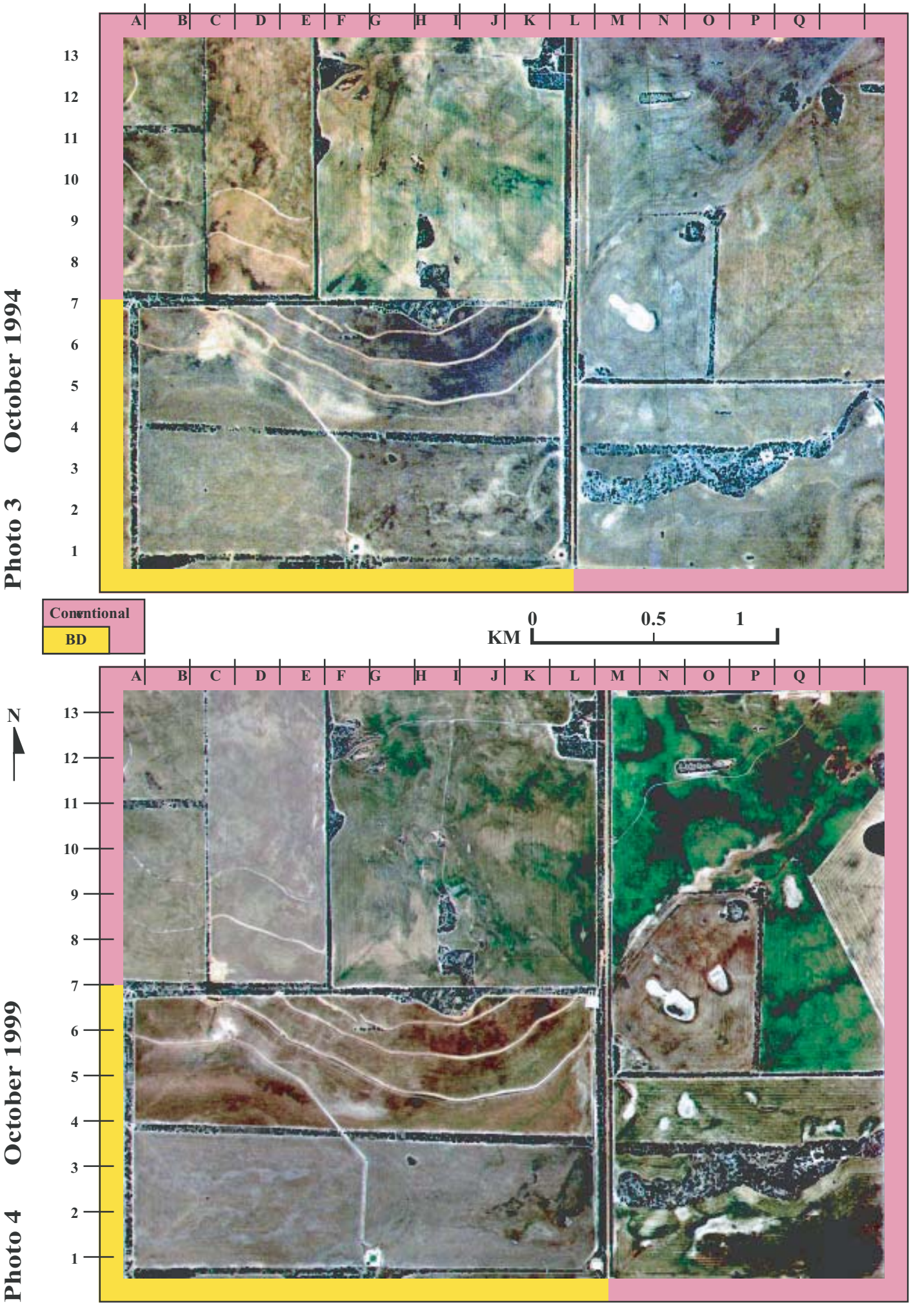


Photo 3 October 1994
A B C D E F G H I J K L M N O P Q
13 12 11 10 9 8 7 6 5 4 3 2 1
Conventional
BD
0 0.5 1
KM
N
Photo 4 October 1999
A B C D E F G H I J K L M N O P Q
13 12 11 10 9 8 7 6 5 4 3 2 1