

## EPA Workshop on erodible soils

I attended the workshop on Tuesday 27/2/96 in its entirety commencing at 10.00 am and ending at 4.00pm. DLWC was well represented, as was SF NSW whose delegates included Charlie Bell. The non-aligned group was very small and, apart from myself, included John Mc Garity, Pam Hazelton (?Uni of NSW; a soil chemist and forthcoming president of the Australian Soil Society Inc –ASSSI), and Neil McKenzie (a geomorphologist from CSIRO Division of Soils in Canberra (one of my former colleagues)).

Everyone was asked to state their interests and affiliations then Geoff Noonan gave a short address indicating that he was going to leave the running to Jill Gallagher and Steve Beamon. These two then spoke about their hopes for an outcome from the workshop. Cornish (SF NSW) gave a paper that effectively stated that the only factors in the USLE that were of any importance were the rainfall erosivity factor (R) and the cover factor. The latter was shown to be completely recovered after 12 months. The R factor varied over a wide range depending on the annual distribution of rainfall. However, once this had been established, forestry operations could be tailored to the seasons with little risk of soil erosion. The K factor was written off as inconsequential.

A statement was made by DLWC that did not in my opinion address much that was novel. Their stand appears strongly aligned with SF NSW.

The rest of the time was taken up by discussion, and although four issues were listed on the agenda, viz. (1) soil sampling strategies and the use of existing information, (2) soil testing procedures, (3) information management and (4) training, the discussion ranged over every conceivable topic more or less at random, and no firm conclusions were reached. However, let us take the four topics in turn.

### *Soil sampling strategies and the use of existing information*

Mitch Tulau sent me a proposal he had had some input into before the meeting. This recommended the collection of profile samples in considerable detail and specific chemical analyses required and suggested the archiving of these samples for at least 12 months but he did not attend the workshop and there was very little evidence from the DLWC contingent of support for such a scheme. Some sampling was suggested but the cost of chemical analysis was always stressed and the effort needed for a comprehensive sampling procedure was considered unwarranted.

The EPA was adamant that a procedure was necessary which would stand up in court should a challenge be made to the granting of a license. To my amazement the general consensus was the word of an accredited soil scientist would be enough to stand cross-examination. All manner of excuses were brought forward to support the general contention that the definition of landscape units in the forestry environment was too complicated and hence too expensive to be properly addressed.

There was much discussion concerning the level of mapping. The DLWC are mapping the whole of the eastern NSW at 1:100,000 and this was thought a good basis for the preparation of harvest plans. However, there was a lot of talk about the

most sensitive areas and it was suggested that these could be picked out from an aerial photo by an experienced soil scientist. I would agree to go along with this provided the nature of the sensitivity was quantified, i.e. the proper lab tests were made.

It was pointed out by Neil McKenzie that geological maps were very unreliable when applied to soils, e.g. an area mapped as Ordovician meta-sediments merely refers to rocks of Ordovician age and the area may contain rocks of every conceivable rock type provided that in general there is evidence of mild metamorphism (which is almost *de rigueur* for Ordovician rocks). Yet the field experts went on to agree that Charlie Bell, with the help of a geological map of the Bega area, could go out in the field and accurately assess the erodibility of the soils over a much wider area.

The senior DLWC delegate elaborated a scheme where natural exposures were to be used as the sampling sites, partly in response to McGarity's request that pits be dug for soil inspection in all landscape units. I pointed out that, while natural exposures might be useful for an assessment of soil morphology they would not be suitable to provide samples for analysis, especially with respect to sodium content or dispersibility tests. Pam Hazelton was in complete agreement but the DLWC officer appeared not to be able to even to see the point.

#### *Soil Testing Procedures*

Before the workshop I saw a paper by Lacey that compared Emmerson Aggregate Tests (EAT) with dispersion percentage. This paper showed that the EAT grouped soils into two dispersibility classes, viz. Highly dispersible and moderately dispersible and did not provide a continuous measure of dispersibility. My attitude to this would be that the EAT is inadequate to provide anything but a very rough guide to the soil's behaviour. However, this material was never presented but the value of the EAT was discussed at length, and many of the field workers swore by it. I would prefer a laboratory test but Pam Hazelton put a dampener on this by suggesting that there were several tests offered and they all gave different results. When I suggested (privately) that exchangeable sodium, and cation exchange capacity, would allow calculation of the exchangeable sodium percentage and that was both a very stable test, and directly related to dispersibility, she complained it would have to be supported by several other tests. The DLWC spokesman for chemistry claimed that two thirds of soils were dispersible, so why add to the confusion by testing at all.

As a result the feeling of the majority, most of whom were field men, was that the EAT was adequate and they could get as good an appreciation from field observations as could be obtained by any soil test in the lab. (As a codicil to this – I know Emmerson very well and he always backed up his tests with laboratory examination, however, he did always have the facilities at his disposal.)

#### *Information management and record keeping*

The EPA would like to have good transparent records of all license applications, i.e. material that can be made available to any interested party. I am tempted to say this aim is absolutely crucial but at least it is very noble and deserves support. No one objected to this but I feel they have compromised the situation if the opinion of an

accredited soil scientist is all the evidence that can be presented to the public or legal offices.

### *Training*

Much emphasis is apparently being placed on the new accreditation scheme for soil scientists. Field workers throughout NSW, many of whom have little formal training believe they will be able to call themselves soil scientists with as much aplomb as a doctor or lawyer. While many of these officers, especially those who have worked in the area for years, have a very sound practical knowledge, unless their opinions can be backed up by laboratory data, they should be treated with extreme caution.

### *My comments*

I hope the final decisions are made at a much higher level and by a less biased group. Field staff are not able to make proper use of lab data yet they should not be accredited unless they can. Today it is possible to turn out hundreds of analyses per day yet the excuse of cost is raised every time lab work is mentioned. This is partly due to the exaggerated cost asked for some analyses by some labs and partly to the declining standard of university education. There is a need for better liaison between lab and field. Many field workers are, perhaps, embarrassed by the apparent erudition of 'chemists' but this is inexcusable and both parties are at fault.

Unrealistic field requirements, such as inspection pits and multiple sampling from every catenary sequence is counter productive but soil chemists should get their act together also. It would be possible to specify a group of standard tests relating to soil dispersibility that could be carried out but arguing about which test to use, and always wanting more, may be satisfactory for research purposes but is not what is wanted for land assessment. There is a manual of chemical procedures for use with Australian soils (Rayment and Higginson 1992). Unfortunately this does not deal with dispersibility. However the American Society of Agronomy monographs do this and it should be possible to select a suitable technique.

The K factor should be defined to include dispersibility (as indeed it was initially). Conservation engineers believe they can allow for the properties of soils in the construction of earth banks etc. simply as a property of texture (i.e. particle size attributes), and this is true to an extent but I would like to know how many dams and cross-banks have failed due to this type of thinking. You can see them all over the country. The determination of particle size attributes is time consuming and therefore expensive to do. Yet the determination of certain field workers to use field textures as the basis for an estimate of the K factors as with the determination of sodium and exchange capacity is very simple – one man could do 100 determinations in a day – why then do these people eschew this kind of data.

There are ways to handle variability and there are experts in the field locally. (There is one at the University of Sydney- Alex McBratney. However, he was involved in a survey of the cotton lands near Narrabri where he took a core to 1 metre with a proline auger every 200m over the area of a 1:100,000 mapping sheet. The job cost \$50,000, not including capital costs, and caused the closure of the Brisbane CSIRO lab. This sort of overkill needs to be avoided, of course, and I agree that boffins

should not be welcome). However, if several soil profiles were taken in connection with any given license application then both the mean values and the variability can be estimated and if the soils turn out to be very variable, i.e. there are large standard deviations then a strategy should be decided upon to deal with this. ( A large variation in, e.g. dispersibility, might indicate the presence of a small area of soils very susceptible to erosion. These should then be mapped out and treated accordingly.)

A great point was made of differing geologies but I suggest that in certain areas this might not be reflected in the variability of soil properties. In the Murrah/Mumbulla area where I have analysed soils these seem to have uniformly moderately sodic (i.e. contain a lot of Sodium) subsoils. This salt may not be inherited from the geology but as the sea is close by could be atmospheric accession. I am not aware that this has been measured in NSW but it certainly has been done extensively in Victoria and WA. The result will be that all the subsoils will be sodic irrespective of geology.

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