FIELD GUIDE TO ASSESSING THE GEOMORPHOLOGICAL INDEX

INTRODUCTION

This field guide is designed to be used in association with the data collection forms given in Appendix A and B. Concise descriptions or instructions are given relating to each of the sections of the data forms. Selected illustrations are provided where relevant. A CD is in preparation which will include a much wider range of examples. This CD will be updated periodically as more illustrative material becomes available.

DEFINITIONS

Study Area

The delineation of the study area may vary depending on the type of assessment, the size of the system and the general accessibility. The study area should include sites selected for other specialist studies such as SASS, but it must also be representative of the geomorphology of the channel reach and will probably extend beyond the limits of the SASS site. The extent of the site for assessment of the geomorphology must include the hydraulic control (riffle, rapid etc.) and the upstream and downstream morphological features (usually pools). For a biomonitoring study the geomorphologist must delimit the boundaries of the study area at the time of site rating and provide clear descriptions so that all later assessments can be applied to the same area. Specific sites should be demarcated within the study area for the assessment of bed material size and bed condition. A careful note should be made of the location and dimension of these sites.

Bankfull

The bankfull level is commonly used to define channel dimensions. Bankfull refers to the discharge that is just sufficient to fill the active channel to the top of the banks without overtopping. In a simple channel with a clearly defined flood plain the definition of bankfull is relatively simple, but in compound channels, with an active channel situated within a larger macro-channel, or an incised channel, bankfull is more difficult to define.

The bankfull level can be defined in terms of one or more of the following criteria:

- a sharp break in bank slope;
- the lower limit of permanent vegetation, not including aquatic vegetation such as reeds;
- the lower limit of overbank sediment deposits such as sands.

DESK TOP REACH ANALYSIS

All sites are located within channel reaches, a length of channel characterised by a particular channel pattern and morphology, resulting from a uniform set of local constraints on channel form.. The boundary of reaches can be identified on a 1: 50 000 map using channel pattern, sinuosity and width indicators. In the field reaches are further classified in terms of channel type and channel morphology.

Channel pattern refers to the degree of channel division and channel sinuosity as depicted on a 1: 50 000 map.

Channel division. Channels can be either single thread or multi-thread. On the map multi-thread channels may be distinguished as clear islands in a widened channel or as two or more blue lines on the map.

Channel sinuosity is a measured as the ratio of channel length to valley floor length for the designated reach.

Channel width is taken from the map; it refers to whether the channel is depicted on the map as a single blue line or as a wider shaded area.

Channel gradient is estimated as the vertical height difference for the reach divided by channel length over the reach.

The **geology** of the reach can be described in terms of the rock types (lithology) underlying the river. The presence of dykes or faults should also be noted. This information can be obtained from the largest scale geological map available, preferably 1: 250 000. If no maps are available, reference should be made to the WR90 data base.

Valley form

Valley form describes the shape of the valley cross profile. The most common valley forms found in South Africa are the V1, V2, V3, V4, V6, V8 and V10 valley types. These are illustrated and described below.

V1 and V2 valley types both have an entrenched form which means that the river course occupies the full valley floor, with little opportunity for sediment storage. V1 valley types have steep valley side slopes (greater than 200) adjacent to the channel. Such slopes are prone to mass movements such as land slides and rock falls which contribute coarse debris directly to the channel. V2 valley types have moderately steep lower valley side slopes, often formed in colluvium; transport of hillslope material is dependent on fluvial processes such as slope wash so that the potential for transporting coarse material is reduced. Where colluvial slopes are dissected by dongas, however, input of coarse sediments is likely to be high.

The V3 valley type is essentially depositional in nature in that the valley floor is occupied by alluvial fans and debris cones.

The V4 valley type has steep valley side walls, but has a significant valley floor wherein sediment storage may take place in the form of well developed lateral bars or a narrow flood plain. This valley form is typical of gorges in rejuventated areas as well as foothill zones where the valley floor begins to widen out.

The V6 valley type is a fault bounded valley which characteristically is confined on one side, but the channel is free to migrate on the other side. Colluvial hillslopes dominate, giving rise to a low sediment supply (Rosgen, 1996).

The V8 and V10 valley types represent true unconfined alluvial systems with a well developed flood plain within which the river is free to meander. The existence of river terraces (former flood plains) distinguishes the V8 type from the V10 type. In both valley types the channel may be incised into the modern flood plain so that overbank flooding occurs infrequently. In such cases it may be difficult to distinguish between infrequently inundated flood plains and river terraces.

Valley floor gradient

The valley floor gradient is calculated as the height difference over the reach divided by the valley length over the reach.

Zone class

Valley form and valley floor gradient are used to classify reaches according to river zone. The zone classification is given in Table 2. Ten river zones are recognised. The first seven zones, labelled S, A to F, are those associated with a "normal" river profile. The remaining three zones (BCr, DEr and Fr) are associated with steepened rejuvenated profiles. BCr indicates rejuvenated reaches with gradients equivalent to the B and C classes, DEr to D and E classes.

SUMMARY TABLE

The summary table provides a compilation of the key features of the study area. The relevant data from the desk top study and the field survey (see below) are transferred to this sheet.