

It was decided that three categories of landslide were recognizable and interpretable at the scale of the 1990 photography. These were categorised as: 'old', 'transitional', and 'young'. They are defined as follows.

Old Generally large landscape features produced by repeated, multiple landsliding over a long period. In their most characteristic form, they appear as large crescentic amphitheatres. Less often, they appear as large deep-seated, or small, 'single' landslides. They occupy areas completely vegetated in a manner similar in type/density to the immediate surrounding country - usually tree/forest cover in upland areas away from the coast. 'Old' landslides can be considered as 'relict' or 'mature' features which have been inactive (dormant) for many years. The age of these landscape-landslide features probably varies widely from perhaps 30 to hundreds/thousands of years. More recent slides and flows may, however, occur within the bounding areas of the larger old landslides (or 'landslide zones'). Where such younger slides occur, they are separately shown. Examples of 'old' landslides are shown in Figure 3.2.

Transitional Landslides, or landslides zones, of relatively recent origin but old enough to show significant revegetation in both the backscarp and run-out/accumulation zones. Vegetation generally consists of grasses/ferns/low scrub in contrast to the unbroken tree/forest cover in surrounding areas. They tend to be of intermediate size between old and young but show considerable variability. The backscarp of these slides is generally devoid of trees but the run-out/accumulation zones (where recognized) may show younger trees (plus older intact trees in some cases). Age is uncertain and variable, from perhaps 10 to 30 years or more. The activity state of these slides is difficult to determine. The backscarps are not as degraded as old landslides and may be more prone to further retrogressive sliding movements or to smaller 'spalls' as active degradation proceeds leading to increased instability. The transitional category covers a range of landslides and is the most vague and difficult to define. Examples of 'transitional' landslides are shown in Figures 3.1 to 3.3.

Young Generally small, individual slides showing a clear unvegetated backscarp, run-out track and accumulation zone. They appear as bright 'scars' on aerial photographs. They may occur in isolation, in groups (sometimes coalesced) or within the bounds of transitional or (more rarely) old landslides zones. Many young landslides show narrow run-outs originating in drainage headwaters and confined to (or forming) the drainage channel. All are very recent in age, generally less than 10 (in some cases possibly 15) years old. They may show signs of revegetation but retain a relatively fresh appearance due to minor spalling from, or sheetwash on, the backscarp. The accumulation zone or run-out track of these slides may have a thin partial vegetation cover of grasses/ferns/low scrub. Examples of 'young' landslides are shown in Figures 3.1 to 3.3.

Despite the apparent precision of the above descriptions/definitions, it is difficult to devise a scheme that in practice can be systematically and consistently applied *by different interpreters*. Whereas most geologists have no difficulty in recognizing and agreeing on the

young category of landslides and certain obvious and major old landscape features, the less well-defined older landslides and the entire transitional category are subject to considerable variability in interpretation. This subjectivity is probably the single most serious problem to be overcome in the rapid approach to hazard mapping. It requires the setting up of a systematic 'quality assurance' procedure that can be consistently followed over a period of time by different geologists in areas with different landslide histories. This problem was recognized during the present study but at too late a stage to implement such a formal procedure. Future work must address this as a priority issue.

3.3.3 Lineaments

The term 'lineament' is used by geologists to refer to any straight or slightly curved feature, or alignment of discontinuous features, apparent on a photograph, image or map. Lineaments are particularly well-expressed on satellite images due to the oblique constant illumination, the suppression of spatial detail and the synoptic coverage, but smaller fractures traces, often representing individual faults, are also evident on aerial photographs. The size of lineaments tends to relate to the scale of the photography or imagery used. Lineaments correspond to various types of geological features including fractures (faults and joints), bedding, dykes/veins and lithological boundaries, as well as to spurious man-made features (roads, boundaries etc). In relation to landslides, fracture-related lineaments may be of significance in controlling the location or form of landslides. This is not proved but the indications from south east Viti Levu are that the distribution of landslides in some areas is structurally controlled.

In the present study, a start was made interpret lineaments, and it was clear in some instances that there was a spatial association with landslide scars. This is not surprising since fracture zones are known to influence the development of landscape through their effect on rock strength and weathering. Unfortunately, time limitations in the pilot study meant that the lineament data was not included in the eventual GIS analysis. However, it is suggested that further work on lineaments - possibly including the airborne radar (SLAR) interpretation - be included in any continuation of the work.