

Mountain Residents Should Know Signs Of Landslides

The crisis in Santa Cruz County may not be over.

Severe damage already caused by recent storms and flooding when coupled with the rains expected throughout the county in January and February, make it necessary for residents to be knowledgeable of methods and techniques that may help to avoid further damage to property as well as to protect human health and safety, according to Chris Hirsch of the county Planning Department.

This applies especially to persons living in the hardest-hit areas, such as the Santa Cruz mountains where landslides pose a threat.

The following information provides a practical framework for citizens to deal effectively and wisely with existing and potential landslide situations:

Natural Causes

Landslides are normal geological events in the Santa Cruz mountains. This is due to a variety of local conditions including:

- Steep, irregular slopes
- Soil and rock types
- High seasonal rainfall.

Landslides, like many other geological events, become hazards when they interfere with the activities of man or more accurately, when man interferes with ongoing natural processes. The "hazard" is often man's creation when our actions and structures are imposed on the natural condition without a full understanding of the impact

In nature, landslides are usually activated by:

• Earthquakes, although not the immediate concern in this county's recent crisis, it should be noted that the earthquake of 1906 activated many landslides in the Santa Cruz mountains. Today, should such an event reoccur, the loss of lives and property would be considerable.

• Undercutting of slopes by steam action. Log jams and other obstacles can divert the normal flow of water onto a stream bank not used to handling the force. It can also occur at stream bends where the outside bank is subject to the full force of water. This situation is often amplified during floods.

• Water-accumulation is a major cause of landslide activity in general and the prime factor in the recent crisis. Water destabilizes slopes by increasing the weight of the surface soil, causing clay particles in the soil to expand and lubricating bedrock or subsurface clay layers running parallel to the slope to forming a 'slip

plane' on which surface soil may slide.

Types of Slides

A landslide is defined as the downward and outward movement of soil and rock. This movement of material can take a variety of forms or types of landslides whose characteristics vary from type to type. In all landslides though, the forces of friction and gravity are at play. Types of landslides occurring in the Santa Cruz mountains include:

• Soil Creep — any mass of rock or soil on a slope, no matter how gentle the slope, is under the constant pull of gravity. The resulting tendency of the soil to move slowly toward level ground often results in soil creep. Although this movement is gradual, it can result in great damage to structures and foundations.

• Flows (debris and mud) — When soil is not well anchored by vegetation and/or during heavy rains, surface soil may become so water-saturated that soil particles become suspended and the total mass may flow as a heavy fluid, as in mud flows. This process is called 'liquefaction'. The mass generally moves more quickly than a person can run and easily takes large trees and structures with it.

• Rockfalls — These usually involve only solid bedrock material and most commonly occur on steep slopes. The event is sudden and rapid and is more likely to occur on oversteepened or de-vegetated slopes.

• Slides — These involve slippage and movement on a distinct surface of failure and include such types as block slides (where slope material has naturally occurring areas of weakness along bedding planes or clay layers) and rotational slides (movement involves the turning or rotation of the slide mass around a particular point.)

• Complex — Landslides incorporating two or more kinds of movement.

Cultural Causes

As mentioned previously, human activity can contribute to landslide activation. This occurs through many building and construction practices:

• Cut slopes — this activity can lead to the removal of soil and rock material in middle or base slopes. This material is usually extremely necessary for slope stability and support and is often removed for road construction and building pads.

• Septic system installation — not only do septic systems add weight to slopes but they also lead to excess water in soil material and resulting soil saturation.

• Weight of structures — homes and other residential or commercial structures as well as such items as swimming pools add excess weight to slopes and interfere with slope stability.

• Drainage systems — when these systems are installed without concern for slope soil and geology, systems may not operate effectively and lead to build up of water, causing saturated soil material and excess weight.

• Vegetation clearing — can reduce the soil cover that would normally remove water for its own use as well as disturb already sensitive slopes. Tree roots often assist in anchoring soil to stable underlying rock.

Indicators

The purchase of real estate is usually one of the largest financial investments an individual or family will ever make. Recognition and prevention are key words in avoiding property loss to a landslide disaster. As witnessed in the recent storm, much more may be at stake than losing a home. Thus, know the soil and geology of the area that you choose to build or live on. The following are factors which may indicate landslide activity in an area:

• Scarps — bowl or spoon-shaped depressions (scars) near the top of slopes or ridges;

• Hummocky ground — irregular topography at the lower portion of a slide. This can be compared to a rug not pulled flat;

• Tilted telephone poles, trees or fence posts;

• Flat terraces on slopes that may be the upper portions of blocks of rock and solid that have moved, rotated or tilted upward. People often find these areas convenient to build upon;

• Springs or seepage on slopes that may indicate a clog of groundwater flow;

• Water-loving plants (ferns, reeds, etc.) in unsuitable environments;

• Cracking or breaking off of land on slopes;

• Streams with irregular drainage patterns;

• Trees with oddly-curved trunks indicating a series of ground move-

ments. Some shallow-rooted trees like redwoods will 'ride' with a slide, readjust when movement stops, ride, readjust. This results in odd curves.

• Landslide deposits — the force of slides can move large amounts of debris that consists of a variety of material from fine clays to large boulders and both organic and man-made materials.

People can use these indicators as well as a variety of other tools and resources when determining the landslide hazard of an area. Also landslide hazard maps and other geological maps can be obtained through the Environmental Section of the County Planning Department and the Santa Cruz County Resource Conservation District. These indicators and tools are extremely helpful but should not take the place of on-site investigation by a registered geologist. Lists of these persons can be obtained through the County Planning Department.

Avoidance of living in potential landslide areas is the best means of protection. But, in desirable area, such as Santa Cruz County, where population pressures and building demands are tremendous, the development of lands of marginal stability is already a reality. Residents of such areas should be aware of the above factors as well as the following "clues" indicating initial effects of landsliding to structures already built:

• Doors and windows stick or jam for the first time;

• Fresh cracks appear in plaster, brick work and foundations;

• Outside walls, stairs, or walks pull away from buildings;

• Slowly developing and widening cracks in the ground or paved areas;

• Breakage of underground utility lines;

• Swimming pool leaks;

• Muddy water from wells indicating breaks or leaks in pipes.

If there is a possibility that any of these indicators exist, individuals should contact a professional for advice. Whether indicators have been detected or not, people living in poten-

tial landslide areas in the Santa Cruz mountains should consider evacuation of their homes during times of heavy rainfall, especially when soil is already water-saturated due to previous storms.

Preventative Practices

Do Not

• Disturb soil and vegetation. Trees and groundcovers stabilize slopes.

• Build on, at the top, or below steep slopes or in the course of swales or drainage ways that may carry mud flows.

• Add additional weight to slopes in the way of structures, swimming pools, etc.

• Excavate at the base of slopes. This may remove the lower supporting material that is keeping the slope intact.

Do

• Remove large rocks that may start rolling in storms or water flows. Check adjacent slopes as well as your own for the indicators already mentioned in order to note signs of early slippage.

• Consider retaining structures for small areas that may be unstable. All retaining structures must include drainage provisions so that excess weight of blocked water is not added to the slope. Check with the environmental section of the planning department for specifications.

• Keep water off slopes since it is the culprit in most landslide situations whether it is in the form of irrigation, rain or runoff.

• Plant water-loving ground covers and trees.

• Cover small areas with 4 mil plastic to keep water off slopes. Anchor it in place and overlap the sheets as you would shingles from top to bottom.

• Cover all bare soil. At this time of year, vegetate with barley seed (appropriate for cold season), fertilize, and mulch. On slopes of greater than 30 percent, you will need to anchor the mulch with plastic netting.

• Consider drainage ditches and culverts to intercept and channel flowing water off the slope. Shallow ditches just above the upper edge of

the slope can carry water around the unstable area and down the slope, releasing water onto an area of vegetation or pavement that will break the velocity and concentration of the flow to prevent erosion. If the slope is long or steep, the ditch should be lined in concrete or asphalt. Control subsurface water with interceptor trenches fitted with three-to-four-inch perforated pipe. The trench should be dug deep enough to just intercept groundwater. Non-perforated pipe in trenches at the sides can carry water to safe dispersal sites.

Remember, building of structures may need the advice of a professional. Landslide situations are always unpredictable.

Victims May Get State Tax Help

SACRAMENTO (AP) — Residents of 10 Northern California counties who had property damaged in recent storms may qualify for property tax relief, the Board of Equalization says.

The affected counties are Alameda, Contra Costa, Humboldt, Marin, San Joaquin, San Mateo, Santa Clara, Santa Cruz, Solano and Sonoma.

Board Chairman William Bennett said Friday that boards of supervisors can pass laws permitting assessors to recognize losses in value resulting from calamities.

Where such laws already exist, an assessment for damaged property must be reduced when a claim is filed with the assessor within the time specified. The property will retain its reduced value until it is repaired.

Bennett, whose own residence was damaged in Marin County, urged homeowners to contact their assessors immediately for information about filing claims.

Bennett also announced that taxpayers who were prevented by the storms from making timely payment of sales and use taxes can claim up to 30 days' extension without penalty.

And alcoholic beverage licensees who had large merchandise losses can claim a refund of state excise taxes.

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