South East Queensland Floods 2011

Creeks, streambanks and paddocks

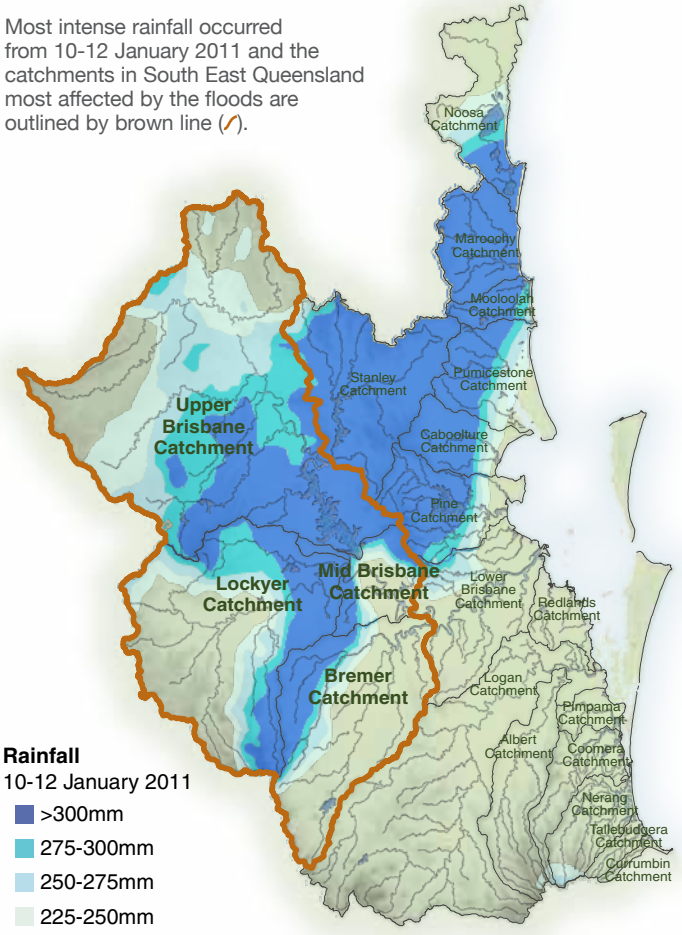
Newsletter #2, March 2011

Over the recent summer we have experienced the strongest La Niña weather pattern in 35 years. This weather has resulted in saturated soils, swollen creeks and rivers, reduced streambank stability as well as dams and weirs reaching full capacity. Intense rainfall between 10-12 January 2011 caused flash and river flooding throughout the region. This newsletter focuses on the flood impacts on creeks, streambanks and paddocks.

The floods caused significant impacts to waterways and the adjacent floodplains. The greatest impacts occurred in the Lockyer, Mid and Upper Brisbane and Bremer catchments with devastating loss of life and significant environmental damage. Across the catchments, there has been widespread loss of topsoil, streambank erosion, gully expansion, landslips, sediment redistribution, channel redirection and vegetation removal.

Over the past 100 years, catchment hydrology has changed. Alterations in catchment vegetation have affected the relationship between rainfall and run-off. Stream channels have become incised and more of the energy associated with flood events is confined in the channel itself. Thus, streams respond more rapidly and intensely to rainfall events.

Most intense rainfall occurred from 10-12 January 2011 and the catchments in South East Queensland most affected by the floods are outlined by brown line (/).



Phil Box

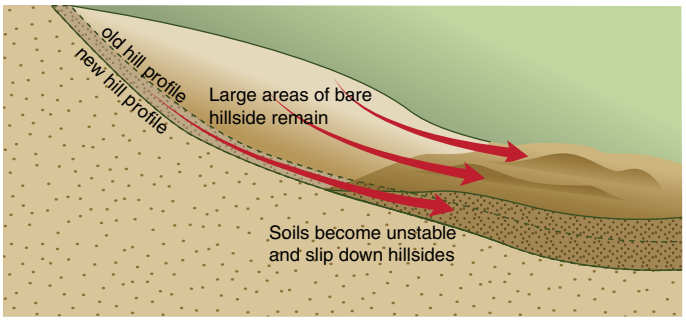
Floodwaters eroded the supports of this rail bridge in the Lockyer Valley

Phil Box

Significant streambank erosion and streambank retention aided by tree roots

Hillslope and gully erosion

When rainfall exceeds the catchments ability to soak it up, then surface water runoff occurs down the slope towards drainage lines and creeks on the valley floor. This runoff can cause erosion when vegetation cover is insufficient to protect the soil surface. Removal of the woody vegetation cover can also lead to mass failure of the hillslopes. When trees are removed, particularly in steep terrain, the lack of root reinforcement can lead to landslips when the soils become saturated. Gully erosion can also occur due to increased surface runoff when water enters the soil profile and erodes through the soil layers to form gully structures. Lack of vegetation and ground cover increases erosion.



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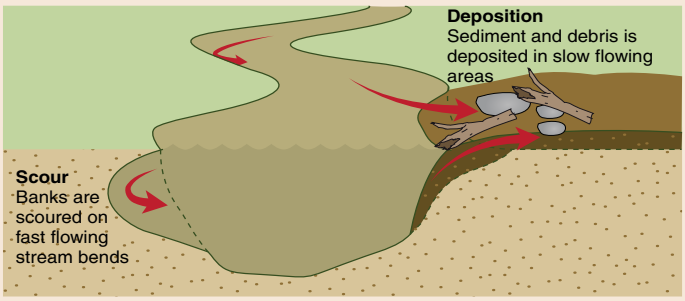
Before (top) and after (bottom) aerial photographs of landslips in the upper Lockyer catchment south-west of Blanchview.

Scour/deposition

Streambank scour is the direct removal of streambank materials by the physical action of flowing water. These erosion processes occurred mainly in the upper tributaries and smaller streams, due to high flood flow velocities. As the flow increases, the erosion power of the water also increases. Extensive areas of scouring to bedrock has occurred in Murphy's Creek, Lockyer Creek and the Brisbane River. The power of the water was so great that massive boulders and large trees have been dislodged, uprooted and carried a considerable distance. When water velocities reduce, sediment and debris are deposited downstream in the river. During the recent flooding this resulted in deposition of large amounts of mud, sand, gravel and boulders where the flow of water slowed due to a reduction in the slope of the channel and widening of the creek in downstream reaches.



Scour. Mt Sylvia Rd, at Blackfellow Creek has been severly scoured.

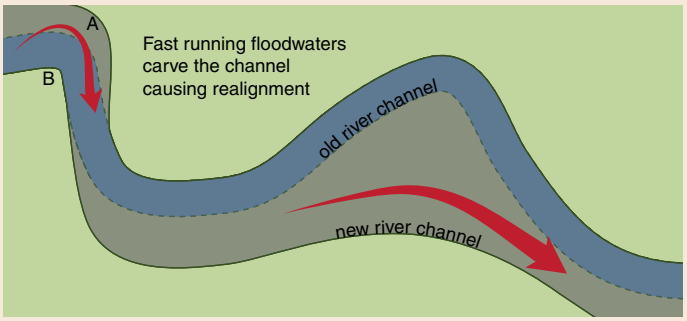
Kaye Hahn

Phil Box

Deposition. This boulder at the junction of Fifteen Mile Creek and Paradise Creek (see map, back page) was moved about 100m by the force of the floodwaters.

River realignment

As streams flow through valleys they create meanders (large loops). When flood events occur, the water cuts and erodes the outside of the curve (A) and deposits sediment on the inside of the curve (B). This occurs because the water moves more rapidly on the outside of the curve and more slowly on the inside. When the volume of the water increases rapidly and flow is swift, meanders can be cut off and new channels formed. During floods and flash flooding, as occurred in the Lockyer catchment, channels can be widened, deepened and realigned.



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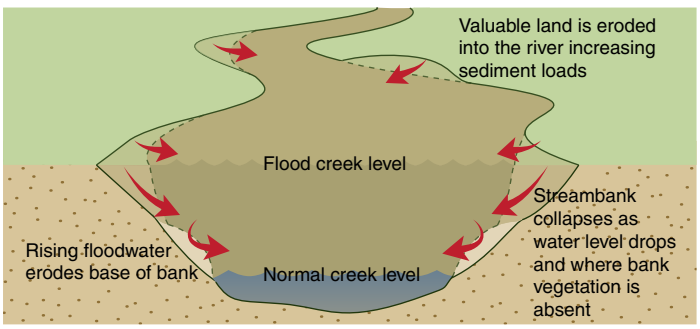
Before (top) and after (bottom) aerial photographs of river widening downstream of Willows Bridge, Lockyer Siding.

Streambank collapse

Streambank collapse has occurred along many kilometres of the waterways, as evidenced by bare and near-vertical streambanks, and areas of slumping. The collapse and slumping is a direct result of the physical action of flood waters scouring out the base of the streambanks, with large sections becoming unstable and toppling into the stream.

Inundated streambank soils are also subject to slumping following the rapid drop in water levels after the flood has passed.

The lack of streambank vegetation in some areas also contributed to slumping. On stable banks as deep rooted trees lower the water content of soil and increase the soil cohesiveness through the root network.



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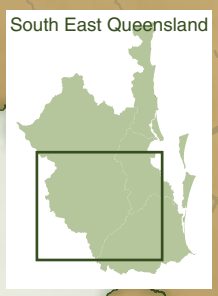
Streambank erosion in the Brisbane River upstream of Moggill (top) and streambank collapse in Lockyer Creek at Lockyer Siding (bottom).

Catchment damage influenced by type of flood



Flash flooding

(water coming 'down')

- Intense rainfall (e.g. 200mm in one hour in Lockyer Creek catchment)
- Rapid rise of water levels (e.g. 8.5m rise in one hour at Helidon)
- High energy and destructive forces
- Concentrated in upper reaches of Lockyer Creek and the Brisbane River
- Impacts include lives lost, livestock lost, crops and paddocks destroyed, debris accumulation and infrastructure destroyed including houses, roads, bridges, outbuildings, fences and equipment
- Widespread damage to streambanks, vegetation, beds, in-stream plants and animals.

River flooding

(water coming 'up')

- Prolonged rainfall
- Slow rise of water levels (hours/days)
- Energy focussed in channels, with low to moderate energy on floodplains
- Widespread flooding in the floodplain of Bremer, Lockyer and Brisbane Rivers
- Impacts include widespread house and building damage, debris accumulation as well as stream bank and gully erosion.

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For more information about Healthy Country please visit the website: www.healthycountry.org
Front banner: Debris washed up along Lockyer Creek, Griffith University
Back banner: Erosion in Lockyer Creek, Griffith University