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Excerpts from Chapter 7 Fluvial Landforms

I. Piedmont Environments: Fans and Pediments

A. Definitions: Mountain Front Morphologies

1. piedmont- sloping surface along front of mountain
2. pediments- eroded bedrock plain along piedmont region
3. alluvial fans- fan-shaped alluvial deposits fed out onto the piedmont from mountain canyons

B. Alluvial Fans

1. Conditions
   a. found in all climates (arid, humid glacial, humid temperatue, humid tropical)
   b. represent link of transfer process moving debris down water shed

2. Morphology
   a. fan-shaped deposits
   b. apex of cone at point-source canyon
      (1) point source at mtn front (rock)
      (2) or down-fan in case of fan entrenchment
   c. expansion of flow and sediment as exiting canyon

3. Terminology
   a. bajadas-coalesced fans
   b. alluvial aprons- d.o.
   c. alluvial slopes- d.o.

4. Fan Classification
   a. dry fans- those created by ephemeral flow
   b. wet fans-those created by perennial stream flow
   c. debris fans vs. fluvial fans

5. Fan Morphology

   a. longitudinal gradients
      (1) steep at head, < down fan
   b. fan area
      (1) $A_f=cA_d^n$ where Af = fan area, Ad = area of drainage basin
         (a) local influences: climate, source, rock, tectonics, depositional space available
   c. fan nomenclature
      (1) modern washes
      (2) abandoned washes

(3) desert pavements: inactive segments, build-up desert varnish
(4) fan-head trenches- incision at head of fan, to allow deposition to more distal reaches of fan
(a) entrenchment serves to enlarge fans

6. Fan Deposits and Origins

a. Deposits and Depositinal Processes

(1) Debris flows
(2) hyperconcentrated flows
(3) stream flow

(a) all rheologic conditions may occur, and transform during single depositional event.

C. Pediments

1. Defined/Characteristics

a. erosional surfaces abutting or sloping away from Mtn fronts
b. entirely erosional in origin, diverging from regional structure
c. commonly surface cut on same rock as comprising mtn.
d. may or may not have thin sediment veneer
e. common in arid climates

2. Morphology and topography

a. size and shape: <1 sq. km to > 100's sq. km
(1) may be concave or convex up
b. surface topography
(1) inselbergs- residual bedrock knobs
c. piedmont angle-angle between mountain front and pediment
d. slope

3. Processes

a. peidmont association

(1) pediment
(2) mountain area adjacent
(3) related alluvial plain

b. fluvial flow
c. weathering processes

II. Deltas

A. Defined

1. delta- depositional plain formed at mouth of river, into standing body of water
2. fan delta- alluvial fan prograding into standing body of water

    a. deltas and alluvial fans are somewhat similar in morphology and process

B. Classification and Morphology

1. High constructive deltas: fluvial dominated

    a. elongate types
    b. lobate types

2. High destructive deltas: wave worked delta fronts

    a. wave dominated deltas
    b. tide-dominated deltas

3. Morphology
    a. upper delta plain (fluvial process)
    b. lower delta plain (fluvial - tidal transition)
    c. subaqueous delta plain (subaqueous processes)

4. gilbert deltas

    a. foreset: prograding delta front
    b. topset: bounded by water depth, transport
    c. bottomset: prodelta muds

C. Delta Evolution/Dynamics

1. delta front progradation
    a. delta-lobe switching
2. lobe abandonment
    a. crevasse splays