Fan radius—

• river profile is critical to fan radius, especially—
  – profile slope
  – profile altitude (incision/aggradation regime)
Fig. 17.6. The extent of Palaeolake Tauca, dated to the Late glacial interval ca. 13,000–11,000 yr BP, as interpreted by Servant and Fontes (1978).
Global Geomorphic Survey of Large Modern Non-coastal Fans (“inland deltas”)

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Rationales for examining large terrestrial fans—

Large modern fans—
- have not been studied systematically
- several claimed to be possibly the “largest” or “one of the largest” on the planet
  - all exclude the largest identified in this study
  - one radius arbitrarily assigned as >100 km
- are seen as merely as large end-members of the alluvial fan continuum
- are analogs for features in the rock record

Data sources—
- handheld photographs from Shuttle, Mir and International Space Station taken over most parts of the Earth 55°N - 55°S
- 1: 1,000,000 ONC charts

Himalayas, Tibetan Plateau, Gangetic plain—Kosi and Tista large fans
Characteristics—

• Kosi River avulsions—
  – cover entire surface of fan
  – average rate ~19 yr between switching events
  – slowest rate encountered is > 30,000 yr between switching events
Fan size—

- even small rivers can generate fans as large as coastal deltas of major rivers
Fan radius—

- Foreland basin *overfilling* produces large fan radii.
Foreland basin—nested pattern of large fans

—contiguous large fans cover an area of >750,000 in the Andean foreland
Fan radius—

- *river profile* is critical to fan radius, especially—
  - profile slope
  - profile altitude (incision/aggradation regime)
Basin paleogeography—interpreted from detailed mining data (Westphalian A & B British Isles)

- divergent drainage
- on a scale of hundreds of km

from Rippon 1996
Fish speciation and River switching on large fans—
Green parent population speciates into—
  • red
  • black
  • yellow
daughter species that reenter the regional drainage

Lakes and river switching
- Green parent population speciates, after river switch, into Reds
- After a second switch, the original river has Green AND Red populations

In hospitable trunk river and river switching
Neighboring basins and river switching

Greens’ river is suddenly invaded by Reds from the neighboring basin.
Large fans ("inland deltas") are—
- Far larger than expected
- Widespread—unexpectedly so
- Cover enormous areas of some continents

Conclusions—

Andes Mts
Chaco plains—
N Argentina
W Paraguay
Large fans ("inland deltas") are—
- Far larger than expected
- Widespread—unexpectedly so
- Cover enormous areas of some continents

Conclusions—
Large fans may be the—
- dominant
- mesoscale
- depositional landform on continents

Andes Mts
Chaco plains—
N Argentina
W Paraguay
Conclusions—

Thus, large fans are also models for —

- Paleogeographies, crucial to various disciplines, including historical geology and modeling hydrocarbon environments
- Speciation of aquatic organisms