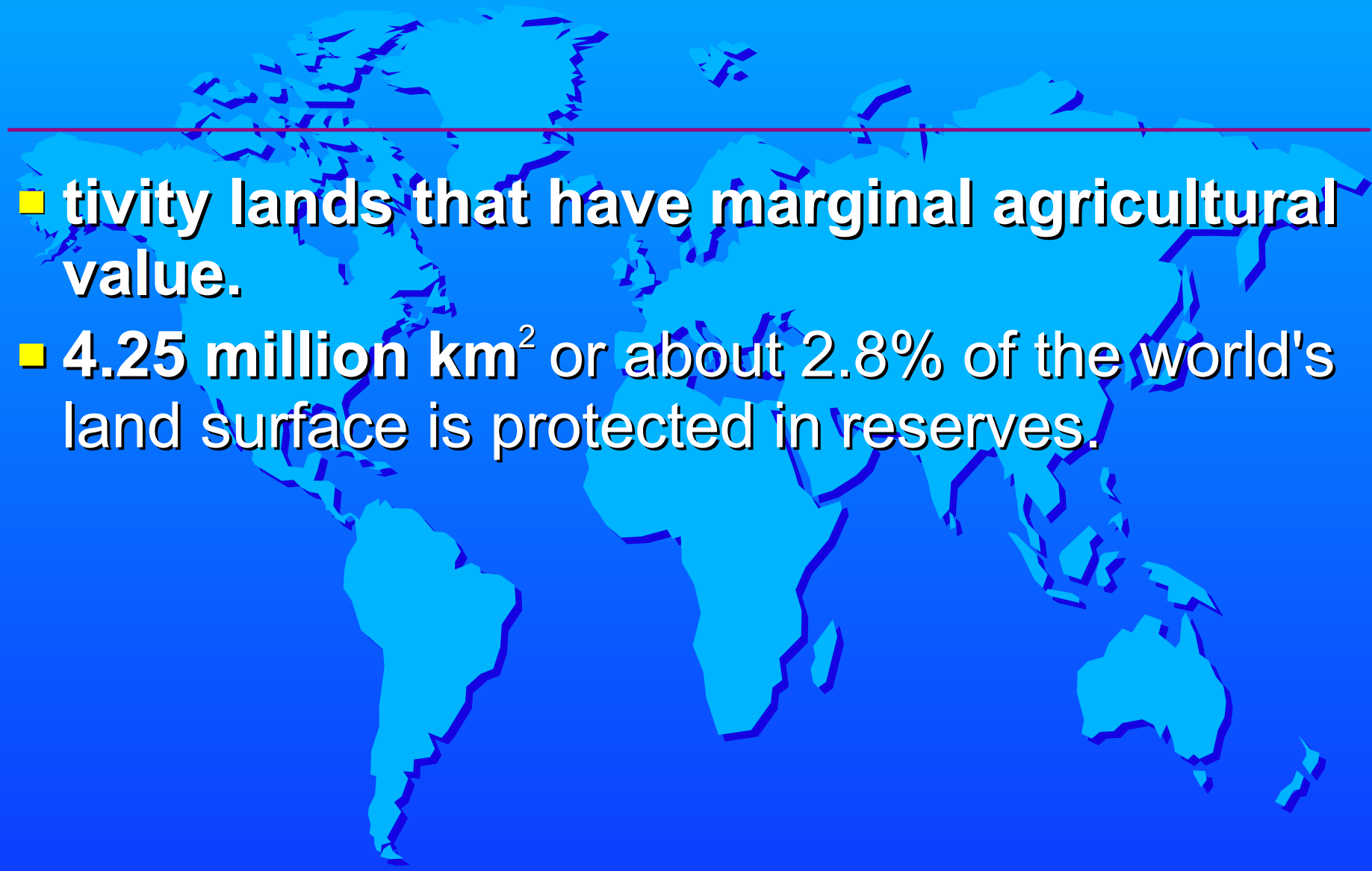
X: Conservation Reserves

History of Reserves

- The first reserves in the U.S. were national parks (i.e., Yellowstone, Yosemite, Glacier, Grand Canyon).
- These parks were largely created because of their unique geologic features and esthetic qualities.
  - Railways/tourism was a big player in the development of the early parks.
  - NPS management grew out of the US Cavalry's techniques (military discipline).
  - Most reserves are remnants of low produc-



- **tivity lands that have marginal agricultural value.**
- **4.25 million km^2** or about 2.8% of the world's land surface is protected in reserves.

Considerations for Conservation Reserves:

- The nonequilibrium paradigm should be the underlying model and motivation for all decisions affecting selection and management of conservation reserves.
  - The concept of the "balance of nature" or equilibrium has been discarded for more robust models.
  - Intermediate disturbance hypothesis: maximum species richness occurs in an ecosystem at an intermediate intensity and frequency of natural disturbance
  - A particular unit of nature is not easily

- conservable in isolation from its surroundings.
- Reserves will not maintain themselves in a stable and balanced configuration over long periods of time.
- Reserves will incur natural disturbances (as well as anthropogenic ones) and are likely to change state as a result.

Goals of Conservation Reserves

- Retain the diversity of biological elements and ecological processes inherent in nature that would otherwise be lost through habitat degradation.
  - preserve large and functioning ecosystems
  - preserve biodiversity
  - protect endangered species
  - preserve species for harvest (extractive reserves; "game management areas)

Goals of Conservation Reserves *(continued)*

- Concerns in Reserve Development
  - Siting of reserves for biological/ecological integrity.
  - Cultural considerations: local peoples, historic peoples, native peoples, etc.
  - Political and economic factors constraining the process of siting.

Six Issues in Reserve Success:

- Reserve Size
  - Minimum viable population size (MVP)
    - Population Viability Analysis (PVA)
  - Extinction rates are negatively correlated with reserve size.
  - Large reserves can support higher population size than smaller reserves.
  - Genetic diversity issues: drift, founder effects, inbreeding.
  - Resistance to disturbances.

- Heterogeneity and Dynamics
  - Minimum dynamic area - the smallest area with a complete, natural disturbance regime.
  - Metapopulation structure/patch dynamics
  - Disturbance regimes/patch heterogeneity

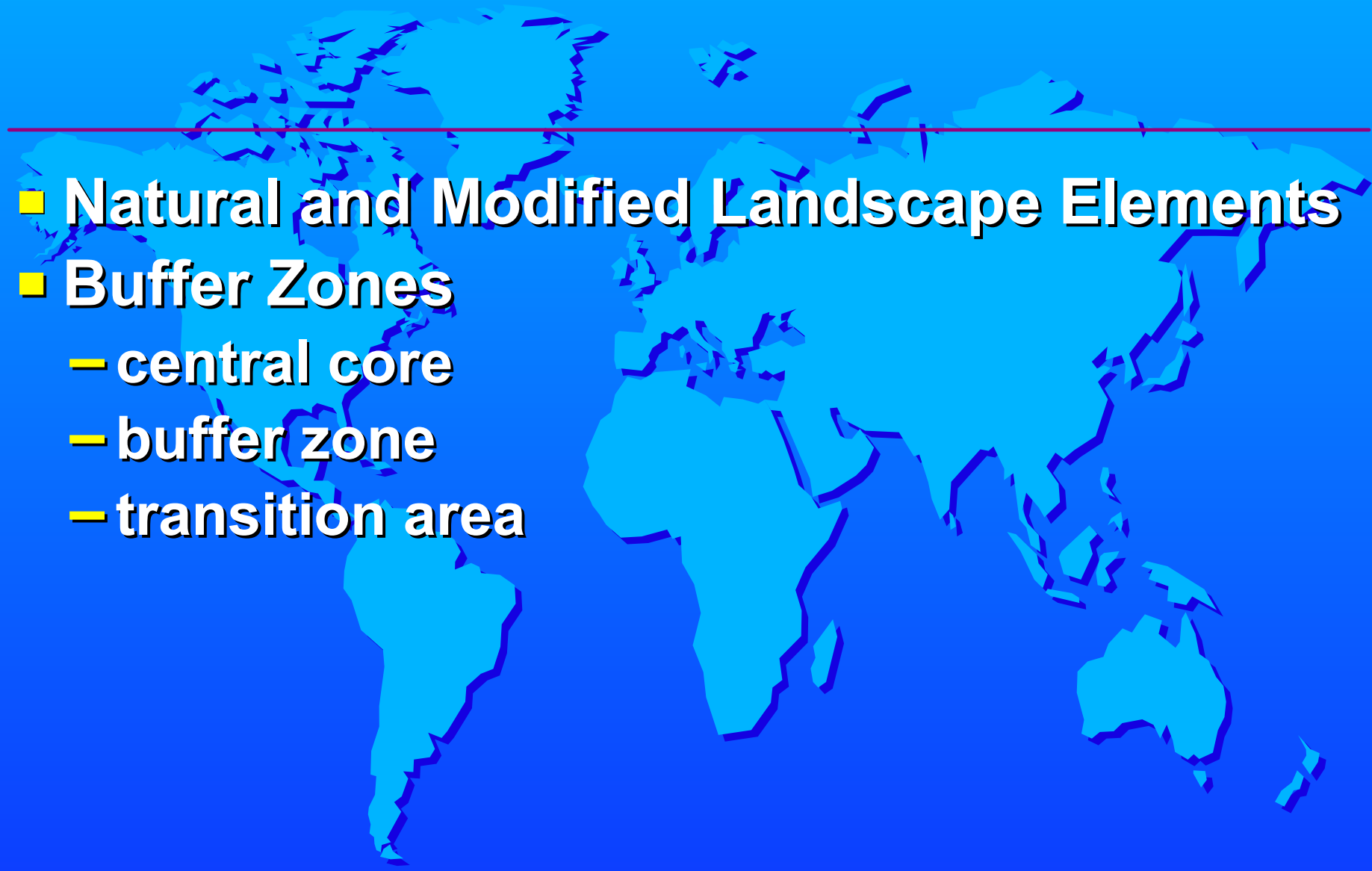
(continued)

- Landscape Context
  - migration and legal boundaries
  - area/perimeter ratio (edge effects)
    - buffer zones
  - regional/global changes (acid rain, climatic change, regional land use).

(continued)

- Connectivity
  - Corridors
    - provide paths for periodic movement
    - immigration, emigration of individuals
    - types of corridors:
      - fencerow scale
      - landscape mosaic scale
      - regional scale
      - line corridors
      - strip corridors
      - "sink corridors"

- regional reserve design:
  - node - an area with unusually high conservation value
  - networks - reserves need to be connected by corridors
  - multiple-use modules (MUMs) - a central core area surrounded by a series of buffer zones of increasingly heavy use by humans farther from the central core.
  - The literature on the effectiveness of corridors is nonexistent.



- Natural and Modified Landscape Elements
- Buffer Zones
  - central core
  - buffer zone
  - transition area