# 66% of Iceland suffers from moderate to severe soil erosion

# Other erosion problems are limited in area

# Root causes

- Iceland at settlement 870 AD.
  - Lowlands - mostly birch forest or woodlands up to 300-600 m a.s.l.
  - Highlands – mostly willow tundra up to about 600-900 m a.s.l.
  - Above that – non-continuous vegetation

# Root causes

- Clearing of woodlands for fields and pasture
  - Livestock grazing prevented regeneration
  - Spot erosion and downslope creep started soon.

# Root causes

- The highland tundra had no grazing tolerance and erosion at the boundary of continuous and non-continuous vegetation started immediatly.

# Root causes

- In a deforested landscape:
  - there is little to capture blowing sand/soil/tephra,
  - little protection of ground vegetation from freeze-thaw cycles,
  - little to anchor soil on hillsides

# Obvious solution

- More forests

# Prevention

- Iceland Forest Service established in 1907
  - Protect the last woodland remnants
  - Afforestation with a variety of goals
    - Wood production
    - Reclamation of degraded and eroded land
    - Amenity, recreation, shelter....
- Soil conservation split from the Forest Service in 1916
  - Control encroaching sand using lyme grass
  - Revegetation of eroded land
  - Improve grazing land

# Forestry today

- Farm afforestation
  - Grants for timber production
  - Mostly on degraded but not eroded land
  - Also on fertile sites
- Land reclamation forests
  - Grants for afforestation specifically of degraded and eroded land
- Hekla forests
  - Project to afforest a 90.000 ha desertified area around the volcano Hekla

# Soil conservation today

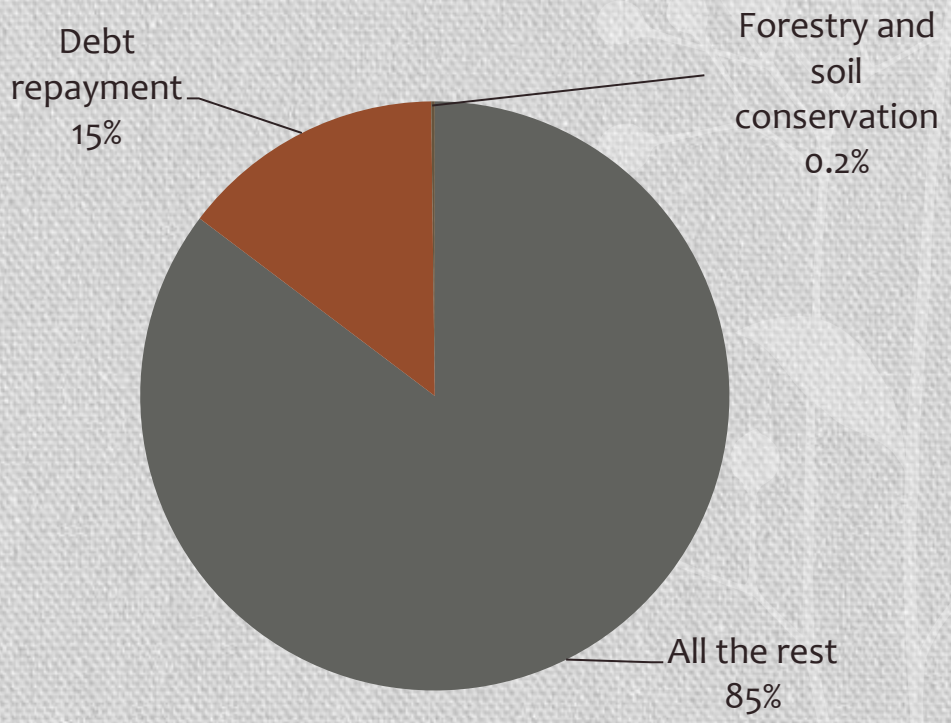
- Seeding lyme grass and fertilizing in sand dune areas is still a priority
- Grants and other support to farmers to stop erosion and improve grazing land
  - Mostly grass + fertilizer
- Revegetation of desertified areas
  - Nootka lupine much used 1990-2010
  - The principals of ecosystem restoration (without exotics) are now championed to a greater extent.

# Status

- We have
  - Over a century of experience and research results
  - Several methods and species that work well and are suitable under various conditions
    - Most require exclusion og livestock
    - Variably expensive, variably quick, variably long lasting,
    - Choice of method depends on conditions and desired results.
      - Stopping erosion in the most efficient way possible (large areas)
      - Stopping encroaching sand (relatively small areas, but a difficult problem)
      - Improving grazing land
      - Ecosystem restoration (often resulting in native woodland)
      - Productive forest
    - Exotic species are often more efficient (cheaper, quicker, more productive, more long lasting) than the natives.

# Cultural obstacles

- We are a small nation in a relatively big land
  - Funding is always a constraint
  - Sustained political will is required




Iceland‘s state budget 2014

# Cultural obstacles

- Tradition of free range sheep grazing

# Cultural obstacles

- People are conservative „change is bad“
- The current fashion in nature conservation „exotics are bad“
- The current status is „sold“ to tourists.

# Result

- Protection of woodlands, afforestation and soil conservation are practiced within fenced patches here and there.
- The locations of these areas do not necessarily reflect the greatest need.
- Soil erosion is ongoing over most of Iceland and Iceland remains almost completely deforested.
- This situation is actively maintained through tradition, agricultural grants and tax breaks to promote tourism.

# Forestry

- We have recently started using big machines in Icelandic forestry.
- There are occasional problems.

# Forestry

- Afforestation most often leads to improvement of soil nutrient status.
  - Because land available for afforestation is degraded to begin with
- Increased afforestation is much more a solution to soil erosion than a problem.

Thank you