# Trends in forest management with special focus on harvesting and wood supply

Prof. Dr. Dr. h.c. Gero BECKER, Benjamin ENGLER

University of Freiburg
Institute of Forest Utilization and Work Science

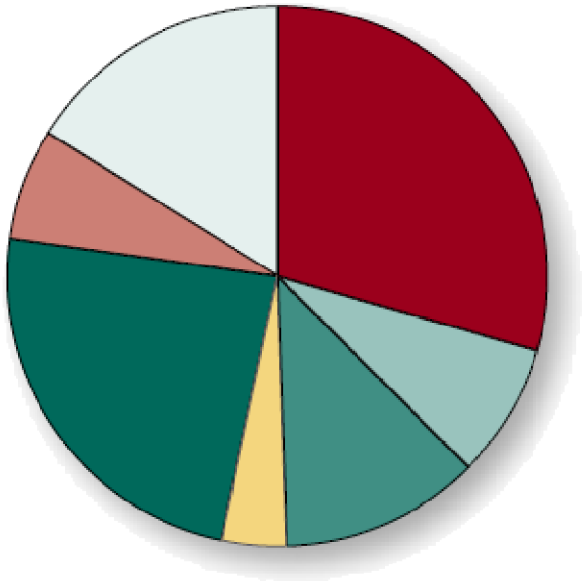
International Conference on Multipurpose Forest Ecosystem Management
in a Changing Environment | November 23 – 25, 2011



UNI FREIBURG

# Forest management worldwide

- Worldwide, forest cover **31 %** of total land area
- The world's forest area is over **4 billion hectare**
- Forest management types
  - Production forests: 30 %
  - Multiple use forests: 24 %
  - Protection and conservation forests: 20 %



| | (%) |
|---|---|
| Production | 30 |
| Protection of soil and water | 8 |
| Conservation of biodiversity | 12 |
| Social services | 4 |
| Multiple use | 24 |
| Other | 7 |
| Unknown | 16 |

*source: FAO, 2010*

# Actual forest situation in China

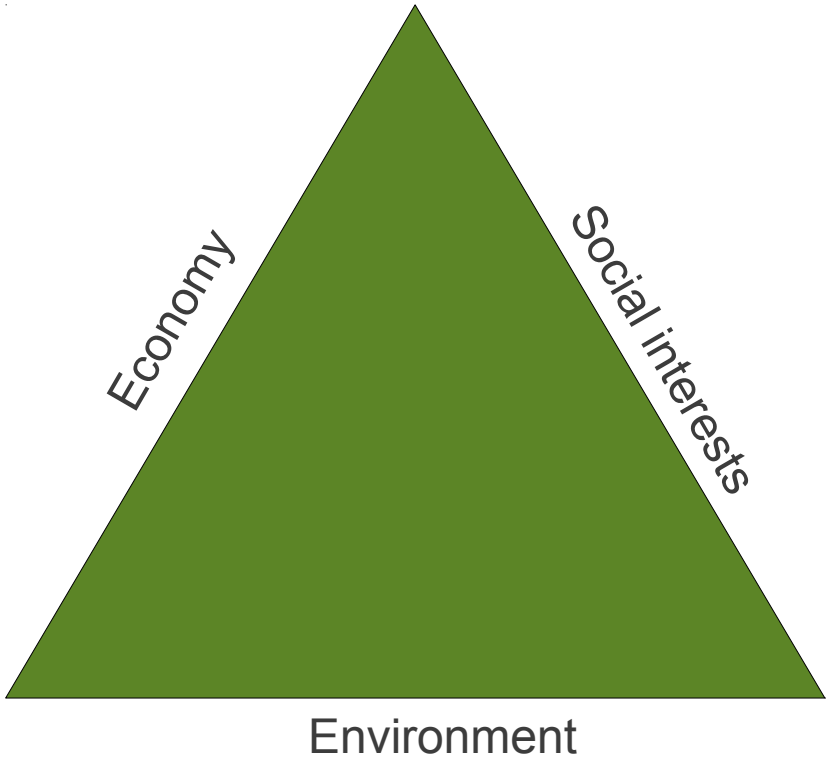
- China's forest area has increased by 7 % since 1995
- Today, forest area covers 22 % of total land area
  - In **total 206 Mio ha** forest land, of which
    - 91 Mio ha are **protected forests**
    - 65 Mio ha are **timber forests**




*source: FAO, 2010*

# Expectations towards forestry: Competing demands of society

- **Protection:**
  - Watershed
  - Soil erosion
  - Biodiversity & ecology
  - Carbon sequestration
- **Production:**
  - Standard industrial and high value timber
  - Pulp & paper
  - Bioenergy
  - Traditional products and households
- **Human needs: Social & recreation**
  - Livelyhood, perspective/ income for local people
  - Recreation for urban and rural people
  - Education & tourism



# Two basic concepts of forest management

- **Segregation**
  - Plantations for production, taking into account protection aspects
  - Protected forests for ecology, biodiversity and recreation

- **Multipurpose forest management**
  - Combining several functions at one site

# Characteristics of both concepts

**Segregation: plantation management**

- Even age
- Short rotation
- One species
- Mass-production
- One target product
- High yield (volume)

**Multipurpose forest management**

- Mixed ages
- Longterm rotation
- Various species
- Horizontal and vertical structure
- High quality timber production
- Several target products
- Possibly high yield (value)

- Clear cutting/ planting
- Simple standard working processes

- Selective cuttings/ natural regeneration
- Complex working processes adapted to site/ stand conditions

# Work processes of plantation management (traditional)

**Typical harvesting work processes**

- Motor-manual serial felling
- Manual de-branching
- Manual measuring of the logs
- Motor-manual cross-cutting
- Manual hauling and loading

# Work processes of plantation management (traditional)

**Advantages and Limitations of manual harvesting systems**

- Safety risks
- Physically hard work
- Log volume restricted
- Low productivity
- Weather dependent

+ Job opportunities (seasonal) for unskilled rural labor
+ flexible organization
+ Low investment

# Trends in plantation management

## Mechanized harvesting work processes

- Mechanized or motor-manual felling
- Mechanized or motor-manual de-branching
- Integrated measuring of the logs and cross-cutting
- Mechanized hauling with forwarder

# Trends in plantation management

**Advantages and Limitations of mechanized harvesting systems**

+ Low safety risk
+ Mental instead of physical strain
+ High productivity
+ (Less) weather dependent
+ No limitations in tree size

- Very steep terrain/ soft soils difficult
- High investment and cost of operation
- Ecological “footprint”
- Less job opportunities (but qualified)
- Organizational requirements

# Harvesting in multipurpose forest management (MPF)

## Selective cutting preconditions

- Uneven age stands
  – high risk of damaging remaining trees and regeneration
- Trees of bigger dimensions
  – higher productivity, but difficult for manual work
- Low harvested volume per area
  – higher harvesting costs
- Different tree species and log sizes
  – several products within one stand/ one tree
- Small harvesting units

# Risks: Damages on strip road

*source: KWF, 2010*

# Risks: Tree damages

# Risks: Damages on remaining trees

*source: forst-rast.de*

# Harvesting in multipurpose forest management (MPF)

**Basic requirements for selective cutting systems**

- Dense network of forest roads and skidding lines
- Careful operational planning and supervision
- Well educated/ trained forest workers
- Adapted technology and harvesting systems to enhance feasibility and increase productivity
- Flexible response to weather conditions
- Respecting protection areas and ecological sensitive spots

# Trends in MPF: Well educated forest workers

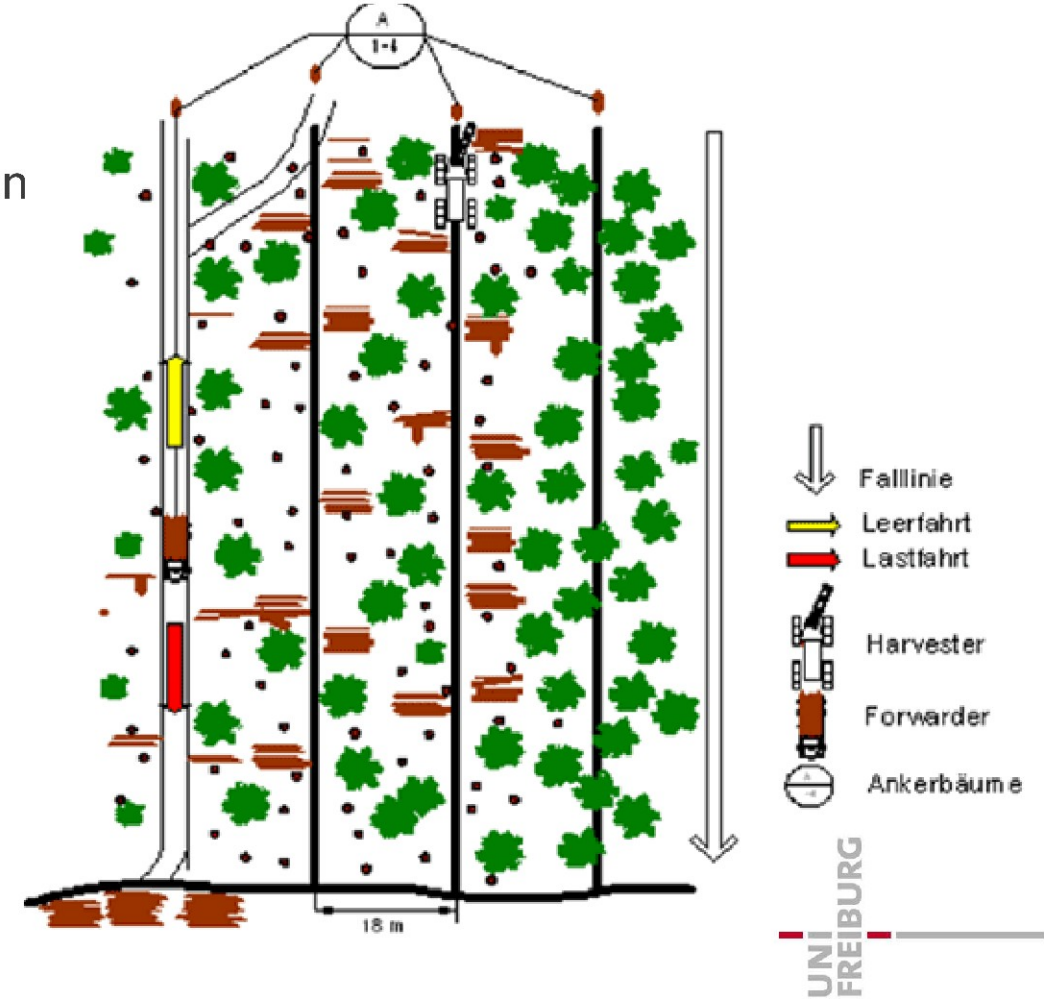
**Motor-manual work**

- Knowledge on tree felling (direction)
- Knowledge on harvesting system and machinery
- Assorting different products
- Work safety: processes and equipment
- Self responsibility in the framework of a clear task description
- Post harvest evaluation
- Incentives for excellent work

# Trends in MPF: Forest road network

- Basic forest road network for good access and log transport by truck, combined with
  - Skidding road/ strip road for forest machines in flat/ hilly terrain
  - Cable yarding in steep terrain

- Machine driving outside roads is forbidden



# Trends in MPF: Harvester & Forwarder combination

**Harvester & Forwarder in selective cutting**

- High productivity
- High investment and operational costs
- Requires basic road network
- Sensitive to steep terrain and soft soils

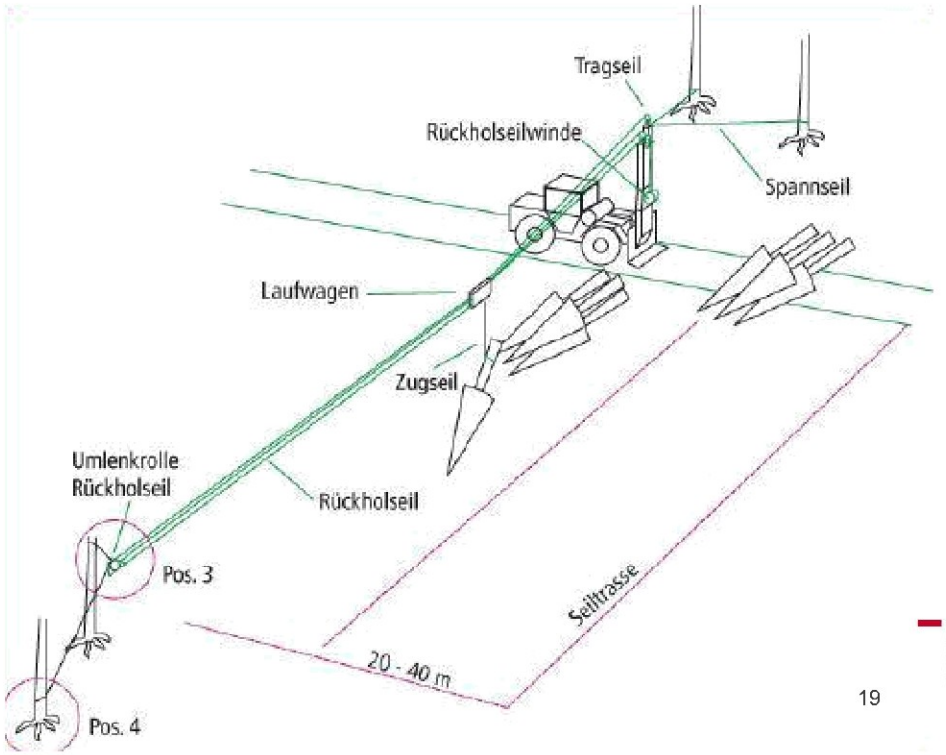
*source: Valmet, 2009; Ponsse, 2010*

# Trends in MPF: Cable yarding


*source: Ritter, 2011*

## Cable yarding

- Hauling of trees over long distances
- Requires basic road network
- Mainly in steep terrain or on soft soils
- In combination with motor-manual work
- High hauling productivity



# Conclusions

**Well organized harvesting operations in multipurpose forests (MPF)**

- ✔ allow flexibility in production targets and products
- ✔ reduce risks
- ✔ are safe for workers and visitors,
- ✔ productive and cost effective,
- ✔ environmentally friendly and
- ✔ **accepted by the public**

FSC PEFC™

UNI FREIBURG

Prof. Dr. Dr. h.c. Gero BECKER
University of Freiburg
Institute of Forest Utilization and Work Science

phone +49 761 203 37 64
e-mail institute@fobawi.uni-freiburg.de

# Conclusions on multifunctional forestry

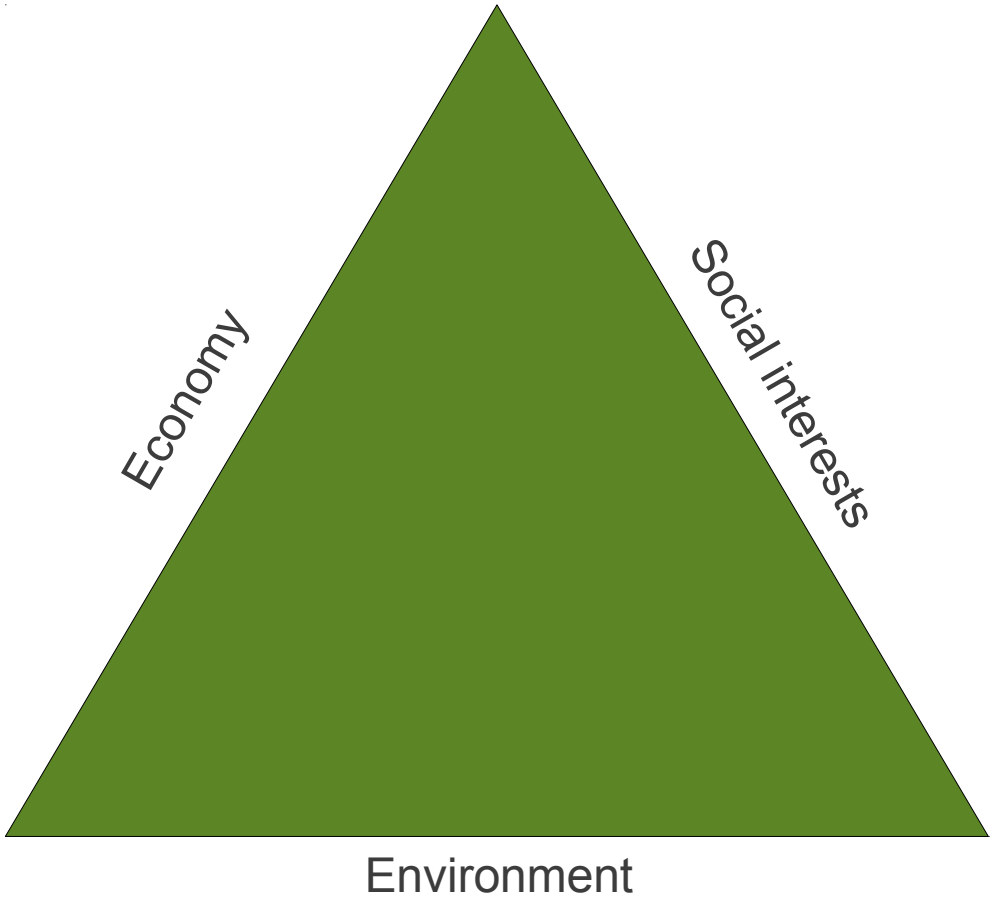
**Standardize harvesting work processes, adapted to site conditions**

- Mechanize or motor-manual felling
- Mechanize or motor-manual cutting off branches
- Integrated measuring of the logs and cross-cutting
- Mechanized hauling

- Increased working safety
- Highly precise harvesting

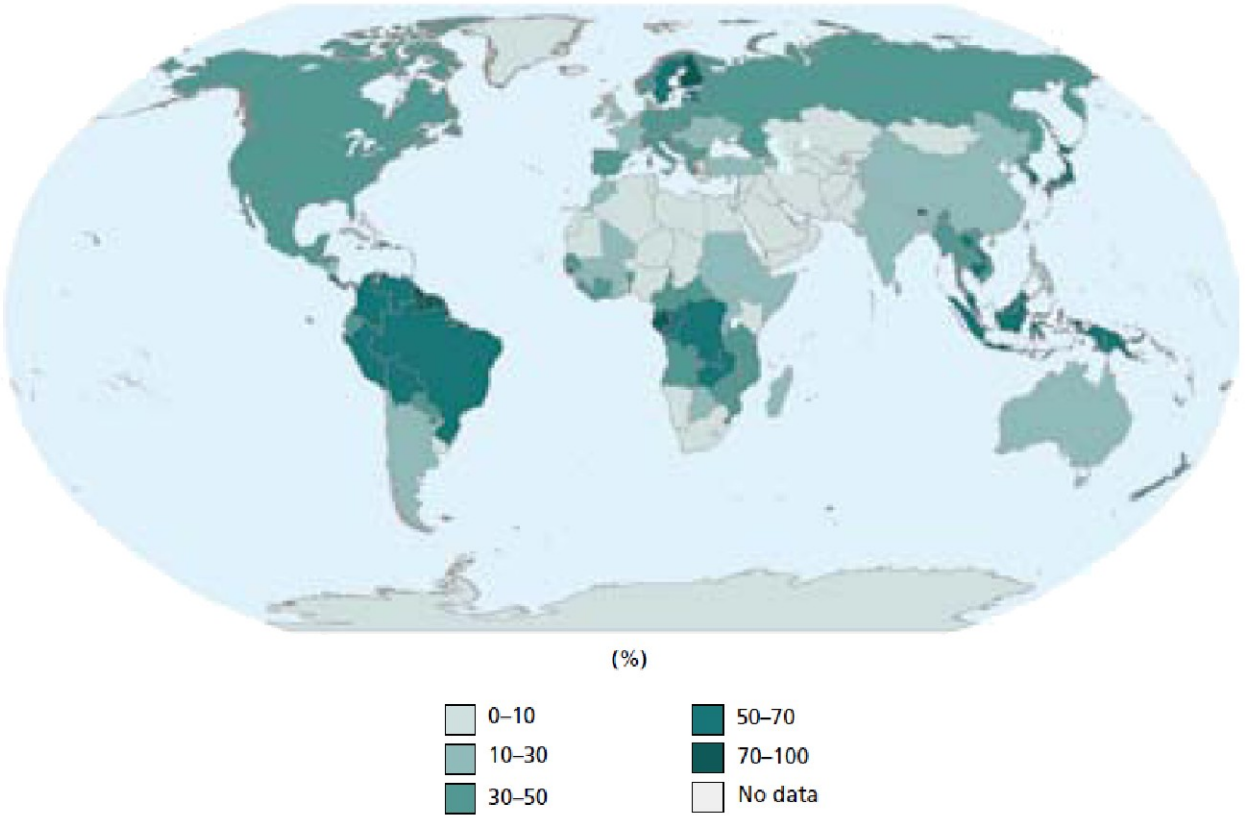
- Provides year-long jobs, high income for (few) local people

# Trends towards multipurpose forestry




- Equal distribution between economical, social and environmental interests
- Focus on one interest, might reduce others importance
- Its difficult, but possible to keep all interests balanced

# Forest area as a percentage of the total land area per country, 2010




*source: FAO, 2010*