

Agroforestry in the semi-arid and sub-humid tropics



Plantation crops in Malaysia



Beans, banana and grevillea
in Burundi

Agroforestry – a definition

- ▶ Land use systems in which trees or shrubs are grown in mixtures with crops or pasture species and/or livestock in a spatial arrangement, a rotation, or a combination of both

Rationale for agroforestry



- Increase productivity through better use of resources e.g. light, water, nutrients
- Mimic ecosystem functions e.g. soil conservation, carbon sequestration
- Generate income with high value produce from trees

Objectives of agroforestry

To provide:

- timber for housing and furniture
- firewood and charcoal
- fodder for livestock
- livestock enclosures
- green manure
- food for local consumption or sale e.g. macademia nuts, mangoes, nectarines, apples
- decorative and medicinal products e.g. *Prunus africana* can be used to treat prostate cancer
- erosion control
- ecosanitation

Introduction of high value trees



Calliandra



Apples



Apple mangoes

Apples are replacing maize, banana and coffee in Batu in Java



Banana/maize/coffee system



Permanent apple cultivation
with year round production

Apple production in Java



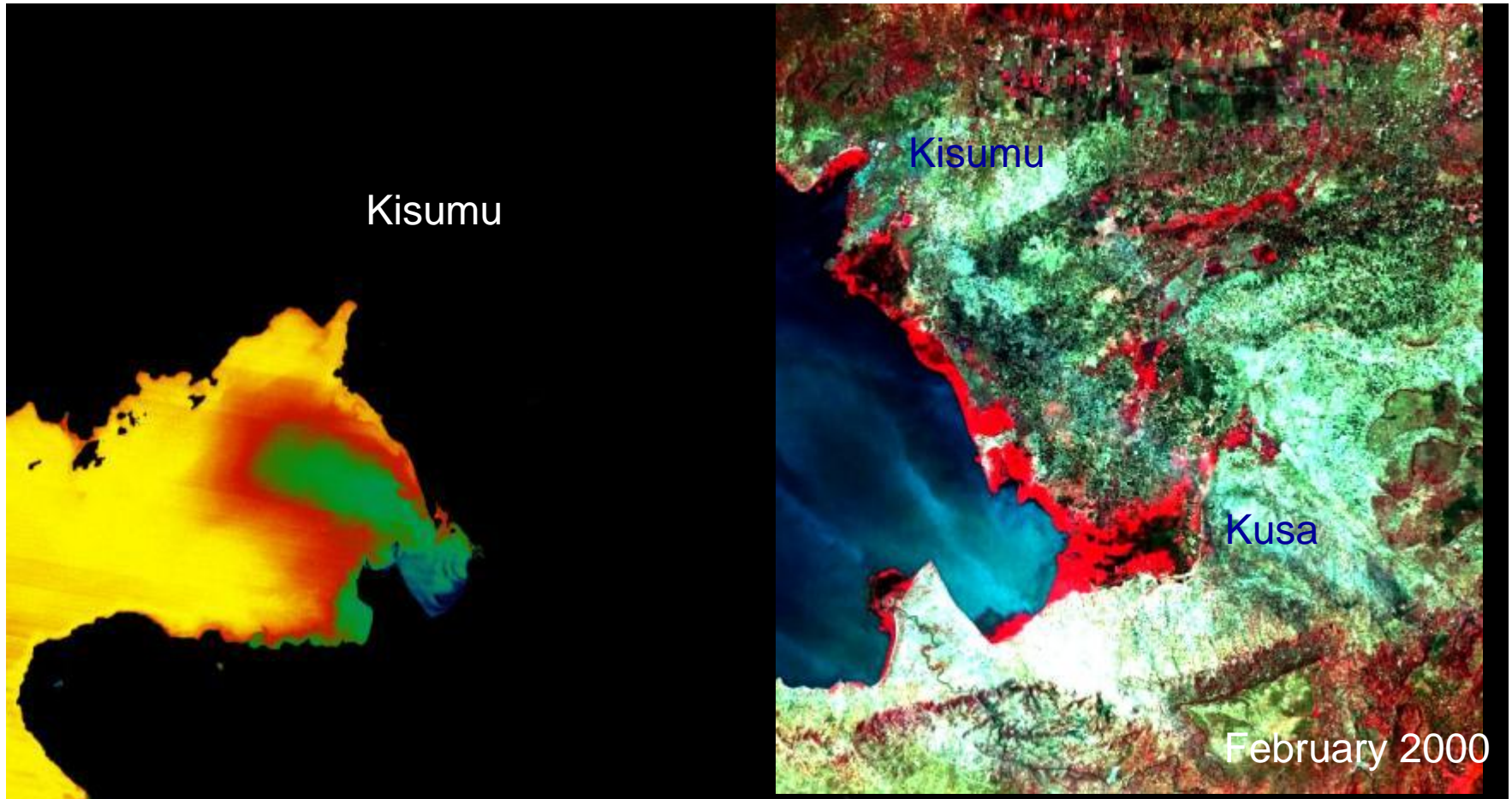
- Simple management by defoliation for year-round production
- Suitable environments are at much lower altitudes than Africa
- Chilling is unnecessary
- Plentiful local supply of 'wild apple' rootstock, exported to other Asian countries

Grading apples in Batu

Water-borne erosion



Erosion and eutrophication of Lake Victoria



Satellite image processed to highlight River Nyando sediment plume in Winam Gulf, SW Kenya

Kyantobi Watershed, SW Uganda



**Run off and erosion
caused by El Nino**



Kusa Community Development Committee, SW Kenya



Kyantobi Watershed – tree nursery



Kyantobi Watershed

Planting hedges



**Contour-planted trees
stabilise hillslopes**



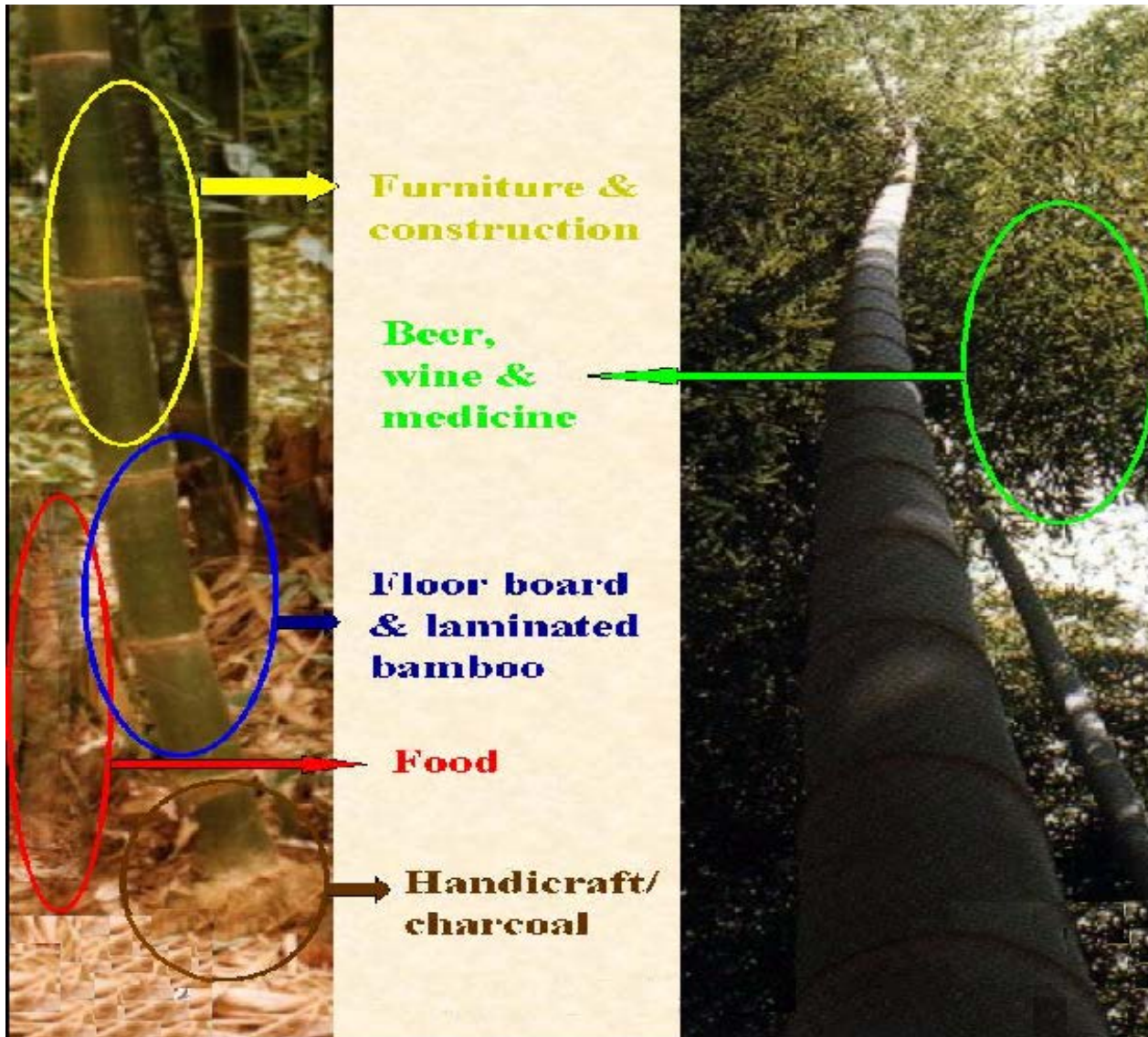
Stall-fed livestock in Kusa, SE Kenya



Kyantobi Watershed – fish farming



Complete Utilisation of Bamboo



Bamboo as food

- Bamboo Leaves
- Fermentation
- Bamboo Beer - China



Bamboo as Food

Processed

- Traditional Food
- Bamboo Shoots
- Bamboo Beer



- Roots
- Shoots
- Leaves
- Buds



Bamboo shoot processing in Anji, China

- Mainly for export to Shanghai and Japan - 120 factories in Anji alone
- Most lucrative bamboo product - provides income of US \$2000 per farmer p.a.
- Market worth US \$300 million p.a.



Construction: strong and durable



Construction: beautiful & renewable



Bamboo handicrafts and furniture

- Handicrafts and furniture for tourist trade



Bamboo handicrafts in Malaysia

Bamboo mats and blinds

- Major source of income at village level
- 70% of women employed, many as managers of cottage industry
- Great for export and small-scale industry
- Over 40000 farmers involved in processing in Lin'an alone



Potential uses of bamboo as a substitute for wood



Poles



Furniture



Floor boards

Shortage of poles and timber in Kenya: mostly imported from Congo & Tanzania

New uses for bamboo



Bamboo fabric



Composites

Wenzhao Charcoal Company, Suichang, China

- Produces over 100 charcoal products, mostly for health/medicine
- Mainly exported to Japan, Korea, USA and Europe
- Output worth US \$12 million p.a.



Global Facts

- ◆ **1,300 species of bamboo**
- ◆ **Estimated annual crop of bamboo: 10 M tonnes**
- ◆ **Global market US \$12 billion**
 - **Chinese share US \$3 billion**
- ◆ **Chinese production increasing rapidly:**
 - **Bamboo timber**
 - **1980s** **304 million culms**
 - **1996** **1 billion culms**
 - **Bamboo shoots**
 - **1980s** **390,000 tonnes**
 - **1996** **1.8 million tonnes**

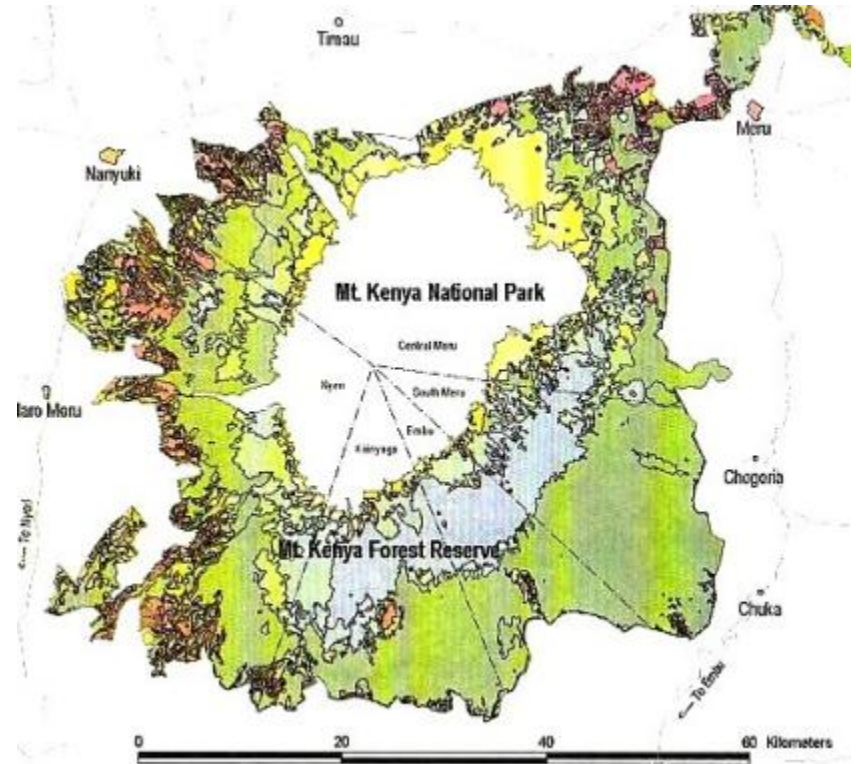
Bamboo in India

- ◆ **India has 45 % of world's bamboo forests**
 - **India: 4.5 m tonnes of bamboo on 8.96 M ha**
 - **China: 11.6 M tonnes of bamboo on 3.79 M ha**
- ◆ **Replacing 25 % of plywood produced in India by bamboo mat board could save 8000 ha of natural forest**
 - **66 million manpower-days' work would be created**
- ◆ **Wooden furniture industry estimated to be worth \$1.7 billion p.a.**
 - **Annual growth rate of 15 %**

Native bamboo in Kenya

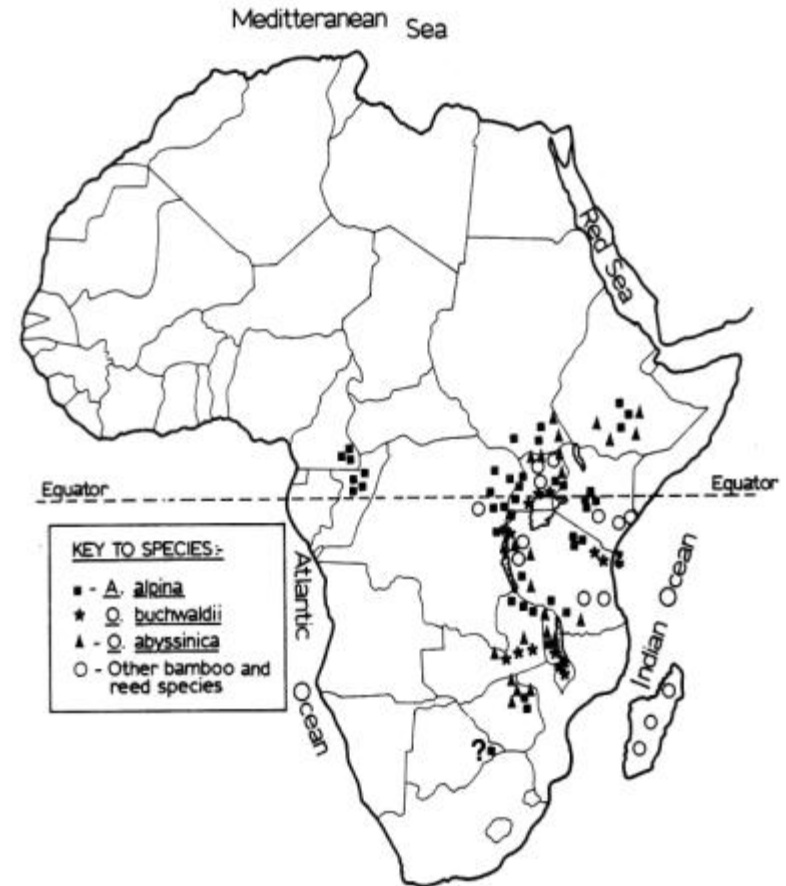


Arundinaria alpina in Aberdares, 1927.
Excellent hydrological properties, soil stabilisation



Distribution *A. alpina* (in blue) on
Mount Kenya, 2001

Types of bamboo and their distribution in Africa



- Despite their value in terms of environmental functions, income generation and multiple uses, bamboos are not valued in Africa
- Many are reed species with similar traits to papyrus found in wetlands and river banks

Production potential of native and exotic species in Kenya



Dendroclamus giganteus (Asia) at Thika, Kenya, 1000-2000 masl



Arundinaria alpina (native) on Mount Kenya, 2000-3500 msal

Bamboos in Kakamega, Kenya



Dendrocalamus strictus



Bambusa vulgaris



Phyllostachy pubescens

Bamboo for riverine and wetland protection



10 year old giant bamboo and eucalyptus, Thika, Kenya



Bamboo for protection of river banks

Bamboo furniture training, 20-30 September 2004



Mountain gorilla in Bwindi Forest, Uganda



Friend of the mountain gorilla



Friends of the mountain gorilla



Friends of the mountain gorilla

