

  
 MINISTÈRE MAROCAIN DE L'EAU, DES FORÊTS, ET DU DÉVELOPPEMENT DURABLE

## INDICATORS OF MONITORING AND FOLLOWING OF FOREST HEALTH IN MOROCCO



ASSAUF.  
 AADEL T.  
 JANAH T.

Technical Meeting on Forest Degradation  
 Rome, Italy, September 8-10 2008

## FOREST MOROCCAN: rich and diverse heritage

**Introduction**

**Methodologies**

**Results & Discussion**

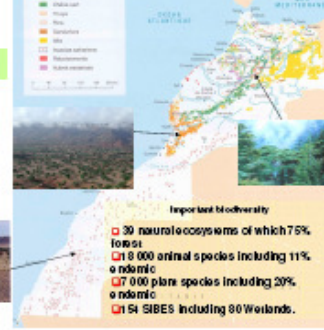
**Conclusion & Recommendations**

**Woodland 9 million hectares**

- Natural forests 5.8 million ha
- Reforestation 50,000 ha
- Tablecloths d'ifs 3.3 million ha

**Important biodiversity**

- 39 natural ecosystems of which 75% forests
- 9 000 animal species including 11% endemic
- 7 000 plant species including 20% endemic
- 54 SIBES including 80 Wetlands.



Forest Health
➡ Ignorance of the extent of damage

### STRATEGY: 3 complementary monitoring system installed

Project FAO-TCF-MOR-3101: In the Middle Atlas pilot area (2006 to 2008)

1. Systematic network of permanent plots 6x8km

2. "Phytosanitary watch" System

Santé des forêts marocaines

3. Specific networks (in case of major problems)  
Ex: Atlas cedar decline

**Principle : retain the indicators that are simple, rapid and reliable assessment information to forest health,**

### 1. A network of permanent plots systematic mesh of 8 km x 8 km

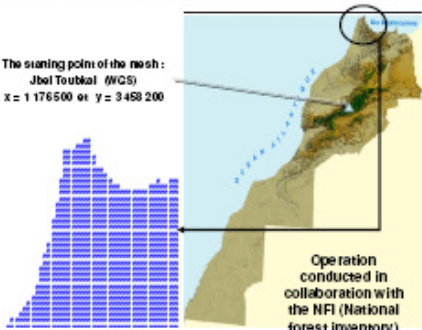
The starting point of the mesh : Jbel Toubkal (WGS)  
x = 1 176500 et y = 3 458 200

**Introduction**

**Methodologies**

**Results & Discussion**

**Conclusion & Recommendations**



Operation conducted in collaboration with the NFI (National forest inventory)

### La placette de suivi

**1. Objective :** Follow objectively the large interannual changes of the vitality of forest stands

**2. Tools:**

- Permanent plot
- Location sheet + Practical Handbook
- Web application input
- Database

**3. Resources people :**

- 2 noxeurs by Province
- 2 artisans by Region

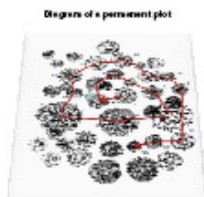


**4. Results:**

- Annual State of the Forest Health
- Maturity of the health development
- Anticipating the phytosanitary infestations

**Methodologies**

- Center determined by Geographic coordinates
- Selection of samples trees (20 stems dominant) in spiral from the center of the plot
- Replacement trees in cases of disappearance

**Degree of a permanent plot**

sample trees      Center plot Location

### Systematic Network 8x8 km

**1. Objective :** Follow objectively the large interannual changes of the vitality of forest stands

**2. Tools:**

- Permanent plot
- Location sheet + Practical Handbook
- Web application input
- Database

**3. Resources people :**

- 2 noxeurs by Province
- 2 artisans by Region

**4. Results:**


- Annual State of the Forest Health
- Maturity of the health development
- Anticipating the phytosanitary infestations

Monitoring : once / year (from June 15 to July 15)

**Criteria of notation**

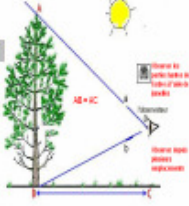
**Mandatory criteria**

- Pruning
- Mortality of the branches
- Defoliation



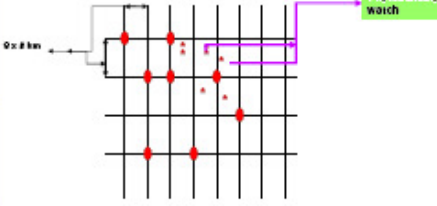
**Other cause of damage or symptoms**

Other causes of damage to biotic and abiotic origin



**2- Phytosanitary watch system**

**Objective:** Detection of damage outside the systematic network permanent plots



**Phytosanitary watch**

**1. Objective**  
The reopening of forest damage instantly to its detection

**2. Tools**

- Watch phytosanitary sheets (Forest)
- Web application input
- Database

**3. Resource people**

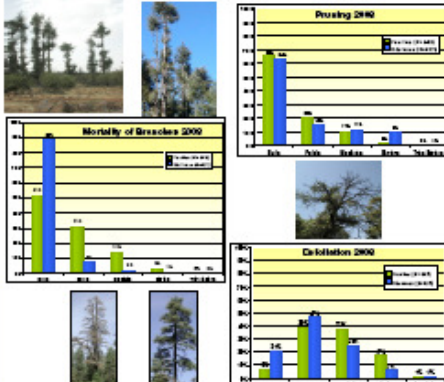
District Manager

- Good ground cover
- Mobile
- Constantly present on the ground
- Appropriate: Animals
- Notions the opportunity to tour

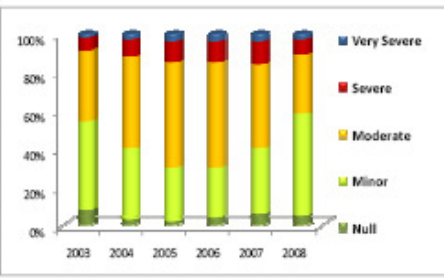
**4. Results**

- Standardized information in real time
- Follow appropriate damage
- Memory Phytosanitary

2005 results of forest health in the middle atlas area (systematic network 0.2 km)



**Evolution of the defoliation level of cedar of the Specific network of tracking of cedar atlas decline from 2003 to 2009 (Middle Atlas cedar area)**



- Pruning is found over a quarter of the trees observed with 3% increase between 2007 and 2008 --- Project of development socio-economic
- The defoliation shows signs of physiological impairment: Atlas Cedar, Green Oak, thuja and Juniper oxycedri --- Re-examine the methods of forest management: Mode of treatment.
- The reports of attack by the pest 'Processionary pine' increased from 4% in 2007 to 5% in 2008 --- Maintain vigilance through phytosanitary watch system.
- More than 30% zeen oak (*Quercus faginea*) have suffered a deterioration --- Solicit a study to install a specific network monitoring.
- Ensure progressively the grafting of other disciplines like the biodiversity, pédology, phytosociology...

**IUFRO**

## Addressing Forest Degradation in the Context of Joint Forest Management in Udaipur, India

Presented by:  
**Michael Kraline**  
International Union of Forest Research Organizations (IUFRO)  
IUFRO's Special Programme for Developing Countries

**Background:**  
Promode Kant, Prati Pal Singh, Ghasia Shrestha and Rajeshwar Singh Jaiswal, 2006. India: Bringing a third of the land under forest cover. In: Con Koo Lee (Editor), 2006. Keep Asia Green, Volume II "South Asia". IUFRO World Series Volume 20-8.

**F23, Foundation for Ecological Security, India: Project Location Site: Udaipur, Rajasthan:**  
<http://www.fes.org/india/forest/forest23.html>

International Union of Forest Research Organizations  
IUFRO's Special Programme for Developing Countries  
IUFRO's Special Programme for Developing Countries  
IUFRO's Special Programme for Developing Countries

**IUFRO**

## Recent IUFRO-led Scientific Publication Initiatives on Rehabilitation of Degraded Forests in Africa and Asia

- 1. Rehabilitation of Degraded Lands in Sub-Saharan Africa**  
Lessons Learned from Selected Case Studies  
Presents success and failure of forest rehabilitation in various eco-regions of Africa  
<http://www.iufro.org/india/forest/forest23.html>
- 2. "Keep Asia Green"**  
Analyses past and ongoing forest rehabilitation and restoration efforts in the Asia Pacific region.  
<http://www.iufro.org/india/forest/forest23.html>

**State of Knowledge – Information Gaps – Research Needs – Policy Recommendations**

International Union of Forest Research Organizations  
IUFRO's Special Programme for Developing Countries  
IUFRO's Special Programme for Developing Countries  
IUFRO's Special Programme for Developing Countries

**IUFRO**

## Addressing Forest Degradation in the Context of Joint Forest Management in Udaipur, India

**Community Development Project**  
<http://www.fes.org/india/forest/forest23.html>

**FES**  
FORUM FOR ECOLOGICAL SECURITY


Tropical dry forests and grasslands (semi-arid eco-zone) in Udaipur District of the north-western state of Rajasthan, India.

Three villages (1500 inhabitants in 250 tribal households)

Foot-hills and valleys of the Arwal Hill Range

• Forest land	201 ha
• Pasture	167 ha
• Un-irrigated agric. Land	15 ha


Typical situation in many dryland areas in economically disadvantaged countries



International Union of Forest Research Organizations  
IUFRO's Special Programme for Developing Countries  
IUFRO's Special Programme for Developing Countries  
IUFRO's Special Programme for Developing Countries

**IUFRO**

## Status of Forest Degradation



**FES**  
FORUM FOR ECOLOGICAL SECURITY

International Union of Forest Research Organizations  
IUFRO's Special Programme for Developing Countries  
IUFRO's Special Programme for Developing Countries  
IUFRO's Special Programme for Developing Countries

**IUFRO**

## Assessment of Forest Degradation

- Step 1: Socio-economic situation**
  - Growing population with insufficient income
  - Subsistence through government programs and migration
- Step 2: Reduction/loss of vital goods and services**
  - Insufficient water for human consumption and irrigation
  - Low productivity of agriculture crops and livestock
  - 20% drop of income from forests (fuelwood, grass)
- Step 3: Status of forest degradation**
  - Low stocking density and loss of tree species
  - Degradation of pasture land (i.e. low grass production, loss of grass cover)

**FES**  
FORUM FOR ECOLOGICAL SECURITY

International Union of Forest Research Organizations  
IUFRO's Special Programme for Developing Countries  
IUFRO's Special Programme for Developing Countries  
IUFRO's Special Programme for Developing Countries

**IUFRO**

## Forest Rehabilitation Projects

Project on natural resource management and dairying

- 40% of total fodder intake of animals from forest lands;
- Bring common land under active village governance;
- Provide legal rights on the usufructs from common lands.



Poverty alleviation through social mobilisation around natural resource's management

- Reduce migration to cities for unskilled labour;
- Creation of local employment opportunities.



Development of models of local self-governance at village and inter village level for natural resources management.

Strengthen decentralisation of governance over natural resources; Continue protection of forests and common lands through village institutions.



**FES**  
FORUM FOR ECOLOGICAL SECURITY

International Union of Forest Research Organizations  
IUFRO's Special Programme for Developing Countries  
IUFRO's Special Programme for Developing Countries  
IUFRO's Special Programme for Developing Countries

IUFRO

## Results of Forest Rehabilitation Efforts




FES

International Union of Forest Research Organizations  
 International Centre for Integrated Mountain Development  
 International Institute for Environment and Development  
 International Institute for Water and Environmental Research  
 International Institute for Applied Systems Analysis  
 International Institute for Geo-Information Science and Earth Observation  
 International Institute for Remote Sensing Education and Training  
 International Institute for Sustainable Development  
 International Institute for Technology Assessment  
 International Institute for Urban and Regional Research  
 International Institute for Zoonotic Disease Research and Control  
 International Institute for Water and Environmental Research  
 International Institute for Water and Environmental Research

IUFRO

## Results of Forest Rehabilitation Efforts



FES

International Union of Forest Research Organizations  
 International Centre for Integrated Mountain Development  
 International Institute for Environment and Development  
 International Institute for Water and Environmental Research  
 International Institute for Applied Systems Analysis  
 International Institute for Geo-Information Science and Earth Observation  
 International Institute for Remote Sensing Education and Training  
 International Institute for Sustainable Development  
 International Institute for Technology Assessment  
 International Institute for Urban and Regional Research  
 International Institute for Zoonotic Disease Research and Control  
 International Institute for Water and Environmental Research  
 International Institute for Water and Environmental Research

IUFRO

## Conclusions „Assessment of Forest Degradation“

- Defining forest degradation through a indirect three-tiered approach at the local level
  - Socio-economic situation
  - Reduction of goods and services from forests
  - Status of forest degradation (visual field inspection)

Many rehabilitation projects are based on this type of indirect assessment

Provides the basic motivation for implementing a forest rehabilitation project

FES

International Union of Forest Research Organizations  
 International Centre for Integrated Mountain Development  
 International Institute for Environment and Development  
 International Institute for Water and Environmental Research  
 International Institute for Applied Systems Analysis  
 International Institute for Geo-Information Science and Earth Observation  
 International Institute for Remote Sensing Education and Training  
 International Institute for Sustainable Development  
 International Institute for Technology Assessment  
 International Institute for Urban and Regional Research  
 International Institute for Zoonotic Disease Research and Control  
 International Institute for Water and Environmental Research  
 International Institute for Water and Environmental Research

IUFRO

## Conclusions „Forest Rehabilitation“

- Rehabilitation targets include
  - Increased ground vegetation cover – improved grass production – reduced soil erosion (controlled grazing, check dams etc.)
  - Increased tree biomass – improved fire wood production (forest protection; planting of hedgerows etc.)

Quantifying progress towards achieving the rehabilitation targets requires monitoring of indicators (biological, structural etc.); data on „before – after scenarios“ (on project-by project basis)

Rehabilitation measures lead to higher forest biomass levels, in order to achieve improved productivity. This may or may not be in line with other goals (e.g. carbon, biodiversity etc.)

FES

International Union of Forest Research Organizations  
 International Centre for Integrated Mountain Development  
 International Institute for Environment and Development  
 International Institute for Water and Environmental Research  
 International Institute for Applied Systems Analysis  
 International Institute for Geo-Information Science and Earth Observation  
 International Institute for Remote Sensing Education and Training  
 International Institute for Sustainable Development  
 International Institute for Technology Assessment  
 International Institute for Urban and Regional Research  
 International Institute for Zoonotic Disease Research and Control  
 International Institute for Water and Environmental Research  
 International Institute for Water and Environmental Research

IUFRO

## Conclusions „Investment Strategy“

- Investments into forest rehabilitation
  - Field work (planting; fencing; check dam construction; etc.)
  - Changes in the management of forests through
    - Adequate policies and regulations;
    - Local institutions;
    - Capacities (including training of forestry staff); and
    - Employment/markets etc.

Large portions of investments are needed to bring about a social transition to SFM. Otherwise rehabilitation results (e.g. improved production; reduced emissions) are only short-lived.

FES

International Union of Forest Research Organizations  
 International Centre for Integrated Mountain Development  
 International Institute for Environment and Development  
 International Institute for Water and Environmental Research  
 International Institute for Applied Systems Analysis  
 International Institute for Geo-Information Science and Earth Observation  
 International Institute for Remote Sensing Education and Training  
 International Institute for Sustainable Development  
 International Institute for Technology Assessment  
 International Institute for Urban and Regional Research  
 International Institute for Zoonotic Disease Research and Control  
 International Institute for Water and Environmental Research  
 International Institute for Water and Environmental Research

IUFRO



Thank you for your attention

FES

International Union of Forest Research Organizations  
 International Centre for Integrated Mountain Development  
 International Institute for Environment and Development  
 International Institute for Water and Environmental Research  
 International Institute for Applied Systems Analysis  
 International Institute for Geo-Information Science and Earth Observation  
 International Institute for Remote Sensing Education and Training  
 International Institute for Sustainable Development  
 International Institute for Technology Assessment  
 International Institute for Urban and Regional Research  
 International Institute for Zoonotic Disease Research and Control  
 International Institute for Water and Environmental Research  
 International Institute for Water and Environmental Research