Impact of predicted change on the management of a montane forest and its adjacent areas in Rwanda

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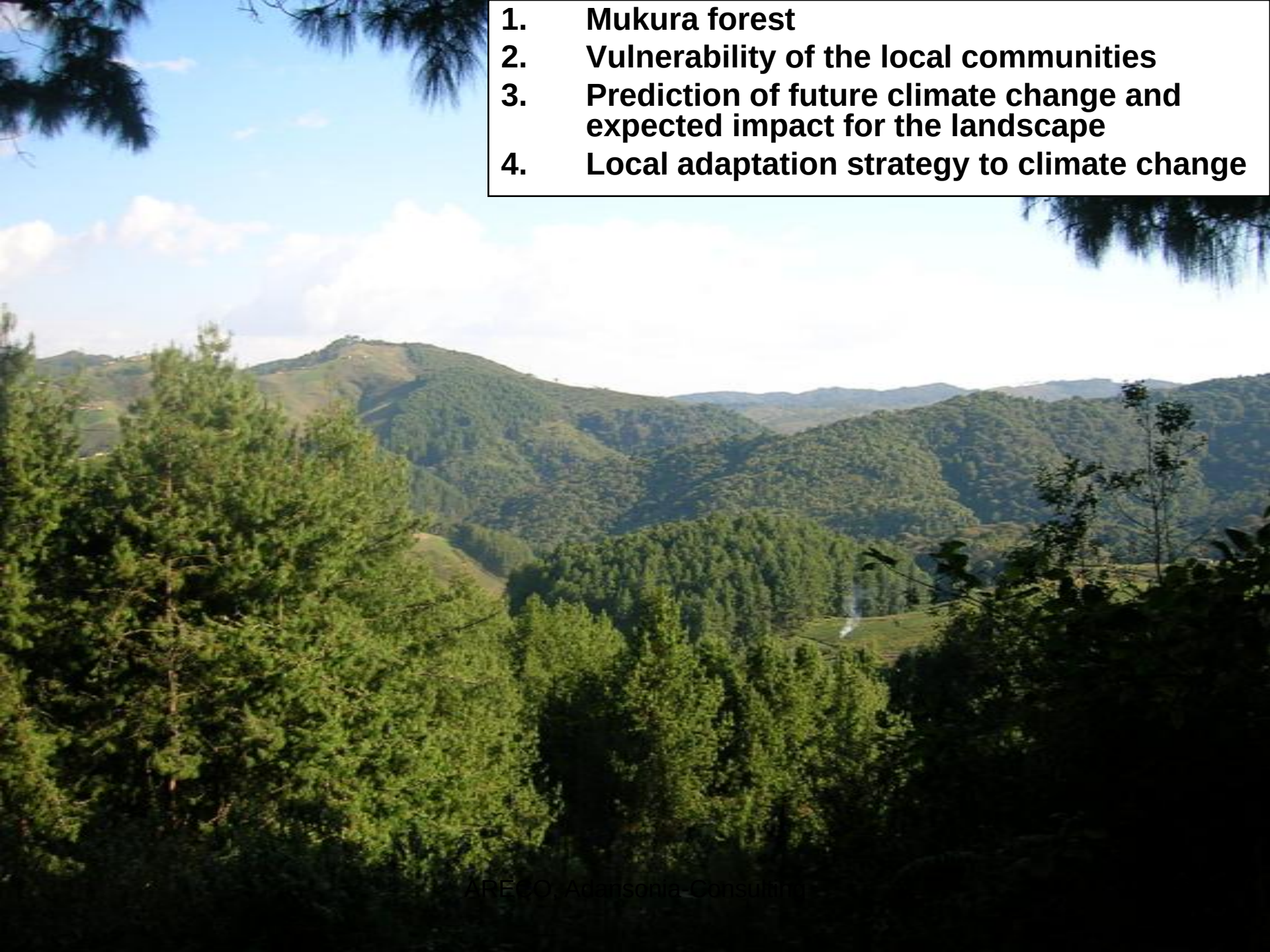
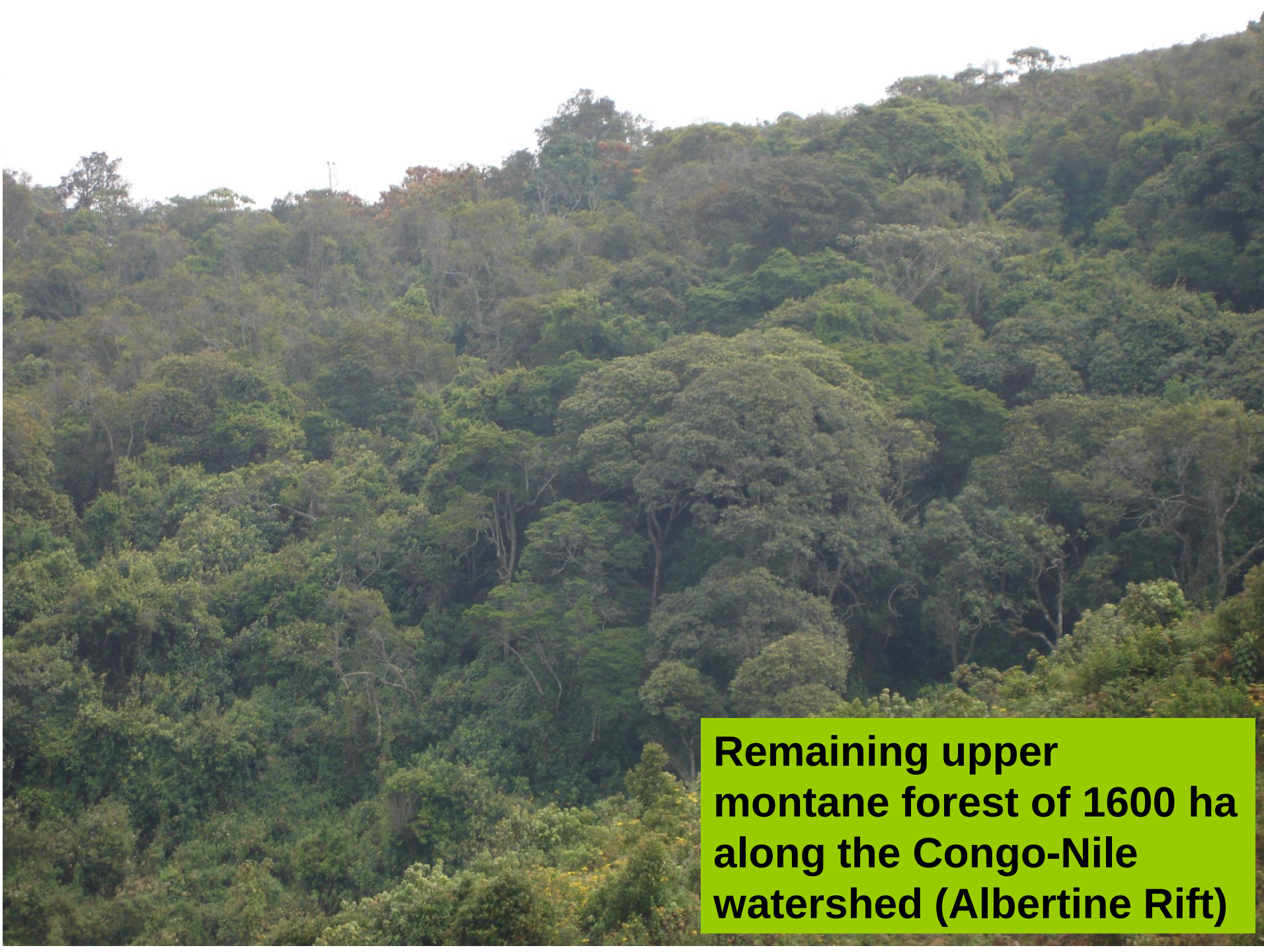
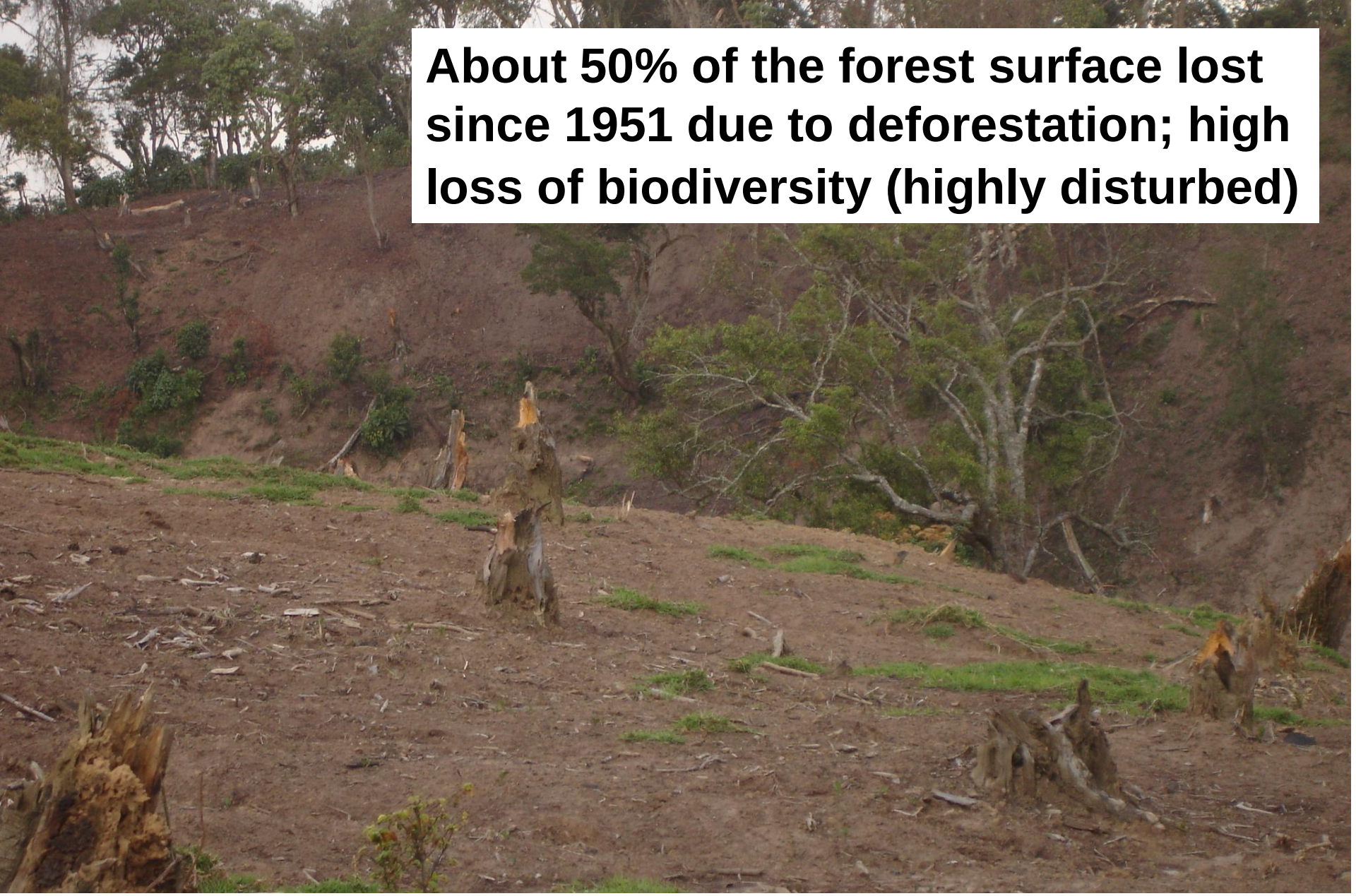
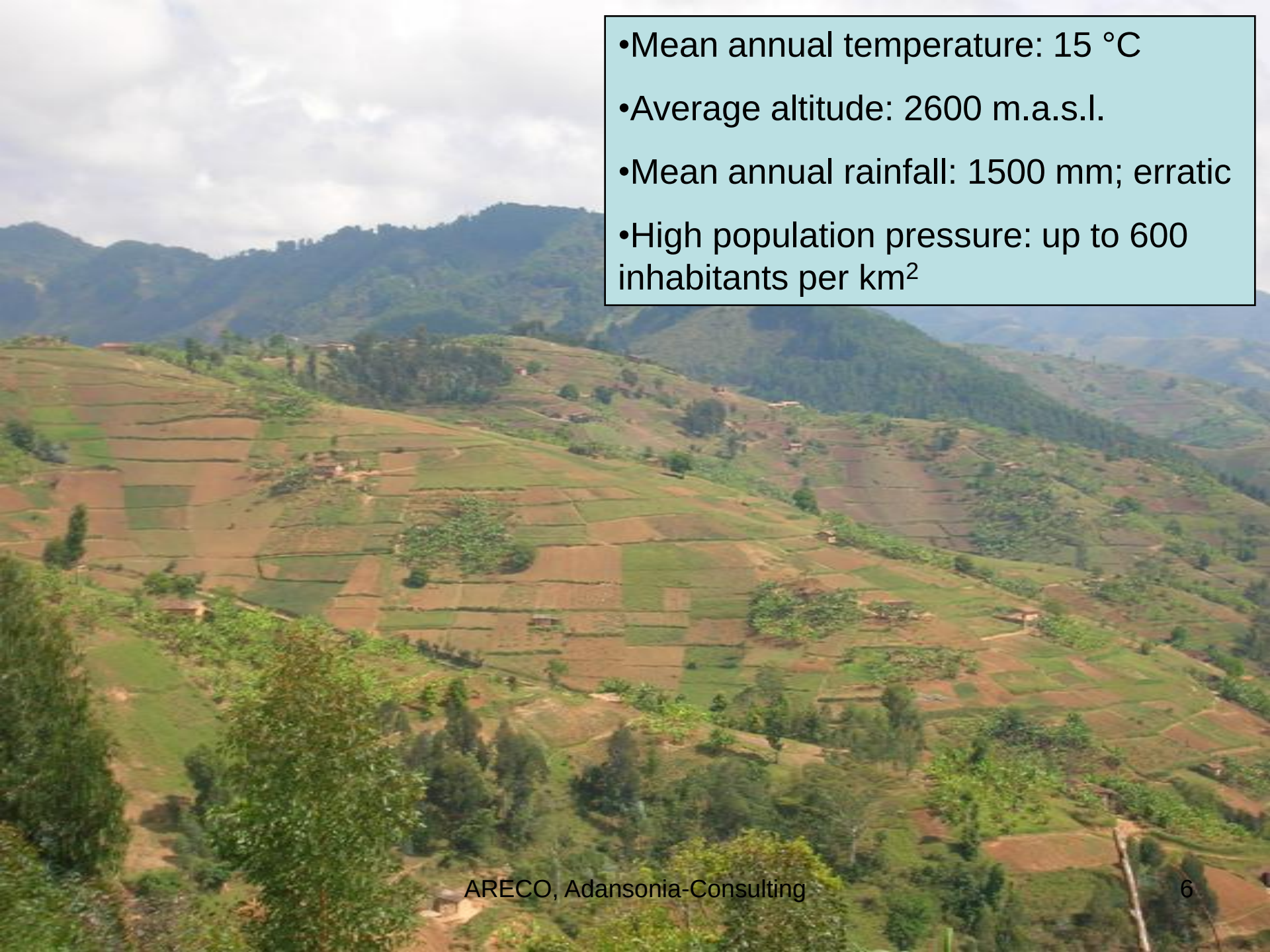


1. **Mukura forest**
2. **Vulnerability of the local communities**
3. **Prediction of future climate change and expected impact for the landscape**
4. **Local adaptation strategy to climate change**

1. Mukura forest


Remaining upper
montane forest of 1600 ha
along the Congo-Nile
watershed (Albertine Rift)


About 50% of the forest surface lost since 1951 due to deforestation; high loss of biodiversity (highly disturbed)



- Mean annual temperature: 15 °C
- Average altitude: 2600 m.a.s.l.
- Mean annual rainfall: 1500 mm; erratic
- High population pressure: up to 600 inhabitants per km^2

2. Vulnerability of the local communities

Current climate variations are increasing the stress on the already overused natural resources by the local communities

Rural communities are highly depending on rain-fed agriculture

and depending on the Mukura forest:

Forest products:

Firewood, forest pastures for cattle, honey, fruits, vegetables, medicinal plants, exploitation of minerals…

Environmental services:

Catchment forest (hydrology, erosion control)…

Very accidented relief and very low tree cover leading to a high risk of sol erosion and thereby land degradation

About 40% of households are headed by women

High level of poverty: monthly income of households 3 US$; high vulnerability of children (20% are not going to school)

3. Prediction of future climate change and expected impact for the landscape

IPCC models (*www.knmi.nl/*):

- **Increase in the intensity of extreme rainfall events of up to 50% in 2100 (rainfall events occurring every 10 yrs).**
- **No consensus between the models on the likely changes in the severity of the dry events.**
- **Increase of temperature.**

In addition:

- **Change of seasonal pattern of rainfall (field observations).**

From 150 hydro-meteorological stations in 1994 only one is functional at present what hinders accurate weather forecast and calibration of accurate regional climate models!

Consequences for the landscape and the vulnerability of the local communities:

Increased probability of hazards (landslides, landslips and flooding causing loss of human and animal lives) and increased soil erosion leading to destruction of infrastructure, crops and high degradation of arable land

Northern Rwanda,
December 2006

Increased food insecurity due to increasing erratic rainfall pattern and land degradation.

Proliferation of mosquitoes and diseases of water-borne origin (malaria, diarrhoea, etc.).

New crops will become adapted to the high elevation of the area.

This degradation trend will be further accelerated by other global change effects (ongoing population growth of 3.1%, aids…).

4. Local adaptation strategy to climate change

Referring to the National Policy and Strategy:

NAPA-Rwanda**:** National Adaptation Programmes of Action to Climate Change, 2006

National Policy for Disaster Management, 2003

The National Decentralisation Policy, 2000

Goal:

Enable individuals and households to follow a strategy to enhance their capability to cope with constraints.

6 priority adaptation options to climate change of NAPA-Rwanda (national level):

- An Integrated Water Resource Management;
- Setting up an information systems to early warning of hydro-agro meteorological system and rapid intervention mechanisms;
- Promotion of non agricultural income generating activities;
- Promotion of intensive agro-pastoral activities;
- Introduction of species resisting to environmental conditions;
- Development of firewood alternative sources of energy.

Recommended mitigation and adaptation measures at the local level in a perspective of sustainable management:

The environmental problems in Rwanda arising from climate change and the variability of climate (and other global changes) necessitates the effective involvement and participation of the local communities since socio-economic aspects are crucial in the analysis and evaluation of the most appropriate mitigation and adaptation measures.

Significant uncertainties with regard to potential impacts of climate change on ecological and social systems require a flexible approach.

A. Reinforce urgently existing (ARECO) and new classic measures of rural development:

1. **Small scale afforestation of marginal lands and agroforestry (fruit trees);**
2. **Promote alternative energy sources such as wind;**
3. **Promote energy efficiency technologies (improved stoves) and practices;**
4. **Promote and support community-based development of mini-hydro electric power plants;**
5. **Soil conservation methods using e.g. terracing, water retention dams, gabbions, anti-erosive ditches (labour intensive work);**
6. **Reinforce health services;**
7. **Improvement of extension services;**
8. **Gender and youth considerations (e.g. in composition of development committees).**

B. Additional measures:

1. **Install a local monitoring system of global change impacts (e.g. observations of river flows, soil movements) in profit of a national early warning and rapid response system.**
2. **Permanent and immediate exchange of information between national and local level regarding the early warning and rapid response system. Ensure information of alert amongst the local communities.**
3. **Diversification of agricultural crops in adaptation to climate change.**
4. **Create alternative income opportunities in order to reduce their dependency on agricultural activities.**
5. **Install permanent vegetation observation plots in Mukura forest in view of monitoring its structure, biodiversity and function.**
6. **Implement the jointly elaborated Forest Management of Mukura.**

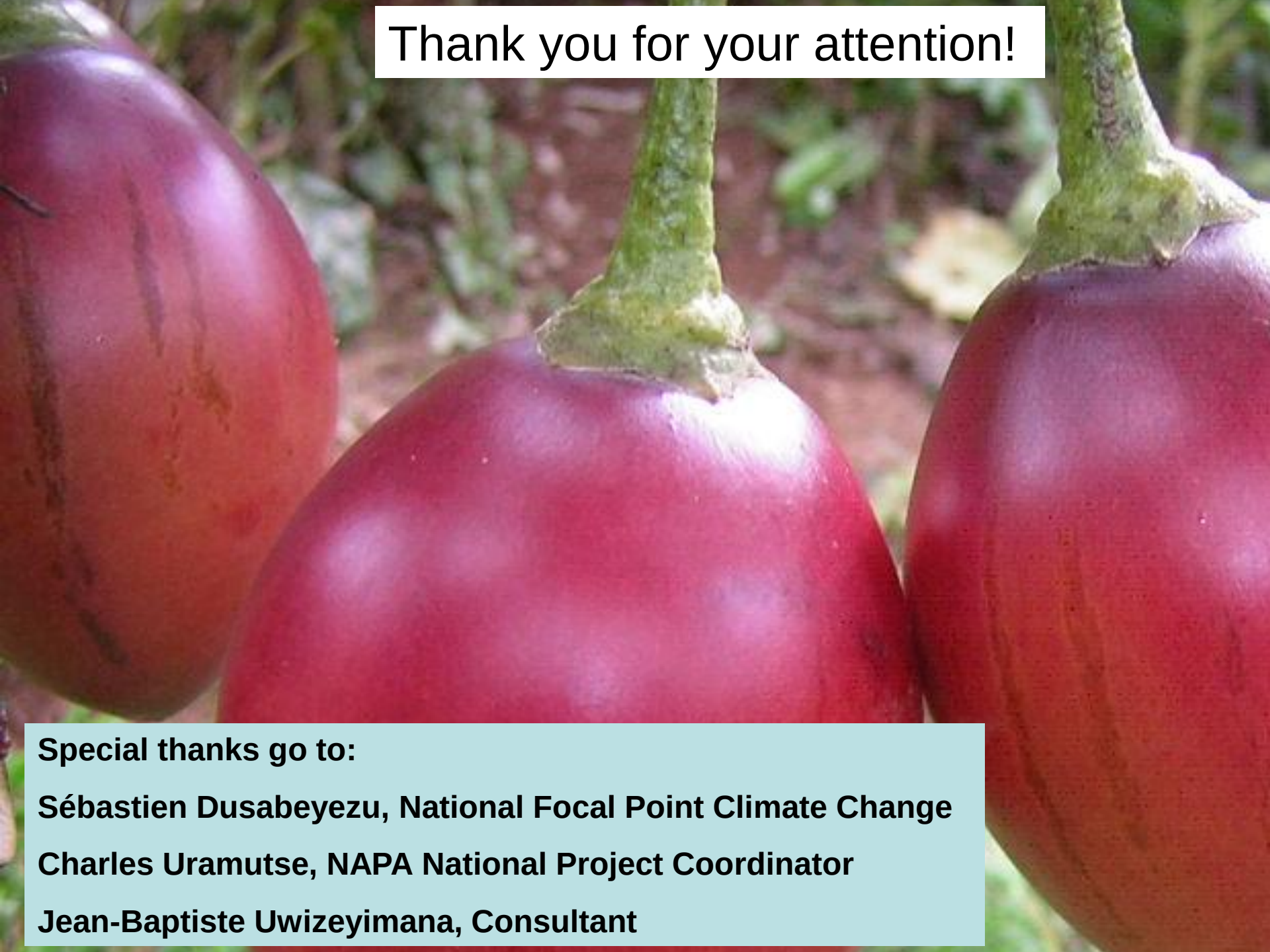
In order to get the perception of the local communities:

Organise a local workshop with all stakeholders to define jointly a local mitigation and adaptation strategy and a action plan to cope with global change.

Recommended mitigation and adaptation measures at the national level:

1. **Rehabilitate hydro-meteorological services for better weather (agricultural season) and hydrological forecasting and early warning and rapid response systems.**
2. **Set-up an early warning and rapid response system with an effective participation of the local level.**

Thank you for your attention!



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