# SLEEK

SYSTEM FOR LAND-BASED
EMISSIONS ESTIMATION IN KENYA

# What is SLEEK?

- A System for Land-Based Emission Estimation in Kenya (SLEEK);
  - It's a GoK program making an attempt to develop a tier 3 MRV system for the land sector
  - Administered by the ME&F with initial funding support from the Government of Australia (2013-2016)
  - It's a complete system:
    - Full Land Integration Tool (FLINT) – The engine
    - Reporting Tool
    - Integrates local data with scientific models and IPCC guidelines
    - Includes administrative processes, reporting processes, analysis and inputs to policy

# Institutional arrangements for SLEEK?

- SLEEK is led by the Ministry of Environment & Forestry (ME&F)
- The program is being delivered by over fifteen government agencies, institutions, and departments and Non-state actors organized into Element Working Groups (EWGs)
- These are:

- Department of Resource Survey & Remote Sensing
- Survey of Kenya
- Kenya Meteorological Service
- Regional Centre For Mapping Resource For Development
- Kenya Agricultural and Livestock Research Organization
- Kenya Forest Service
- Kenya Forest Research Institute
- Jomo Kenyatta University of Agriculture and Technology
- Karatina University
- University of Nairobi
- National Environment Management Agency
- National Museums of Kenya
- Kenya Wildlife Service
- Kenyatta University

# What was the motivation to develop a tier 3 method/model for reporting in the National GHG Inventory?

1. To build a harmonized and sustainable system for data and information – various sources of information provided varying numbers of forest cover, forest cover changes and associated emissions
2. To allow generation of datasets by Kenyan institutions – 1st and 2nd national communications relied on external consultants. There was a need to develop national capacity through skill building and generation of national products using methods that they are familiar with
3. To overcome large uncertainties associated with existing methods of calculating GHGs from the land sector – methods that have been used always have data gaps or make assumptions that imply large omissions or overestimations

..\KENYA NATIONAL INVENTORY REPORT\3.FOLU\FOLU TABLES\Changematrix_2010_2015.xlsx

## Did the country develop its own tier 3 method/model or adapted existing ones?

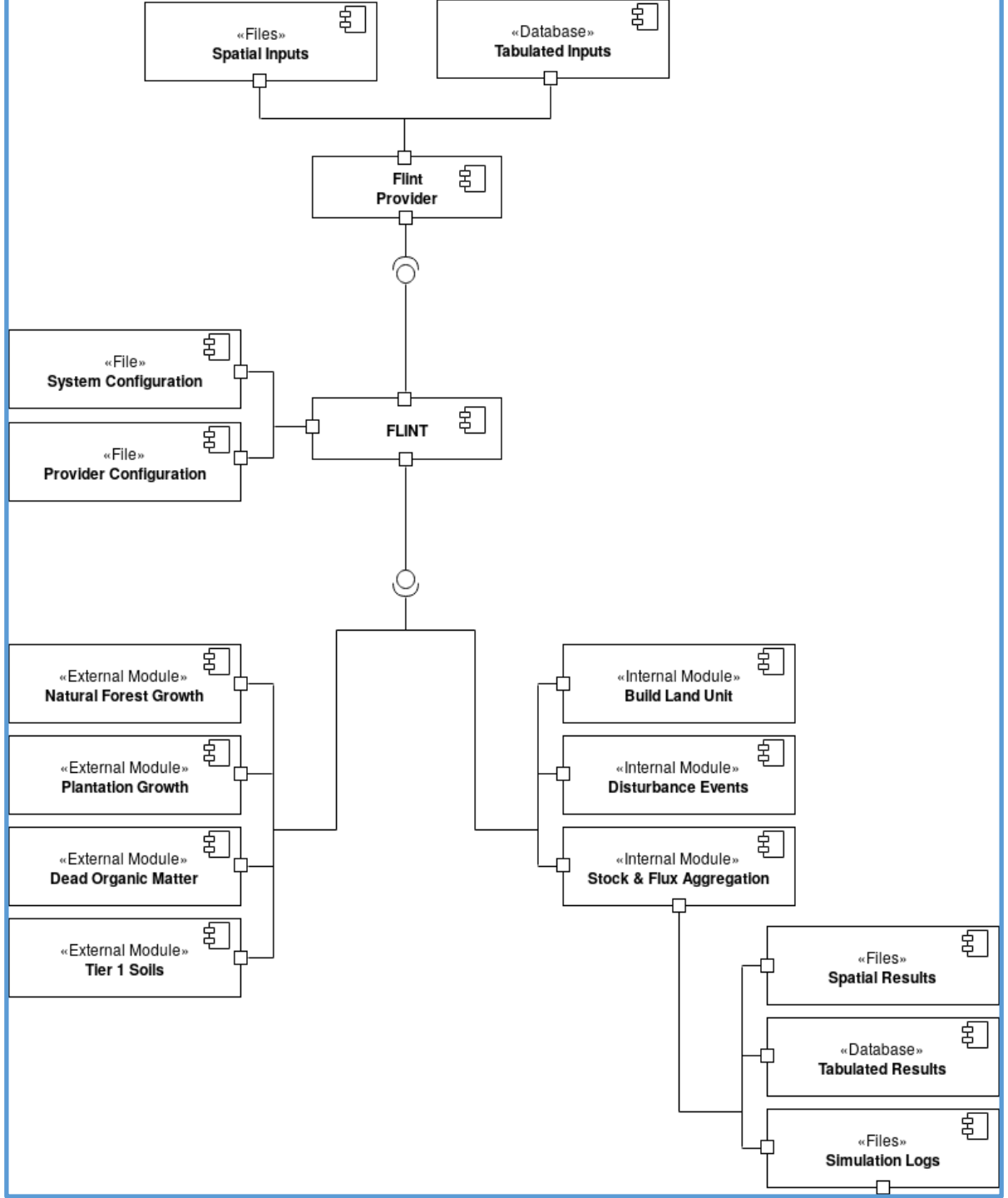
Kenya developed its own model – the Full Lands Integration Tool (FLInT for SLEEK) but with support from International experts

Working groups were created to generate and provide specific datasets – Forest module, climate data, crop data, soil data

The vision was for a Kenya generated data (Soil, Crop have never finalized their data to the required formats)

## Did your country apply it since the first inventory?

- Kenya is in the process of developing a NIR for the 3rd NC
- Kenya has used the FLINT results to advise scenarios of building the FRL and their implications on future emission monitoring




**INPUTS**

**Spatial inputs**

Land cover maps – time series

Country layers (AEZ, Forest strata, County boundaries, climate zones…

**Tabulated Data** – EF, growth rates

**PRODUCTS**

**Spatial maps**

Biomass maps

**Tabulated Data** –

Emissions/emission fluxes for each pool

**Graphs**

Representations of results

# What are the main assumptions made in developing and applying the model?

i. Emissions comprise a movement of GHGs from one pool to another and are never lost
ii. Develop a gain loss approach to estimating emission/fluxes based on land use change monitored at pixel level
iii. Use Kenya generated data (land cover maps, Forests strata, growth rates, management regimes etc.)
iv. Only CO2 is considered

# What are the advantages of using models to report LULUCF and how to capture the transfers of carbon between the carbon pools?

Quick/fast calculations

Allows for scenario building to advise on best approach

Reduction of gaps/uncertainties

Better conceptualization of the fluxes

# How are model outputs verified and how uncertainties are estimated? How the model parameters were calibrated? Are the model results less transparent than those based on tier 2 methodologies?

1. Comparison with manually calculated numbers
2. Confirmation of net fluxes as illustrated below

| Year | atmosphereCM | soilOrganicCM | forestAboveGroundCM | forestBelowGroundCM | forestDeadOrganicMatterCM | | NET FLUXES |
|---|---|---|---|---|---|---|---|
| 2012 | 22,839,914 | 64,580 | -15,616,881 | -5,341,859 | -1,945,754 | 0 | 0 |
| 2013 | 22,168,149 | 71,146 | -15,194,779 | -5,204,058 | -1,840,459 | 0 | 0 |
| 2014 | 21,605,962 | 77,659 | -14,854,933 | -5,092,516 | -1,736,171 | 0 | 0 |
| 2015 | 21,141,223 | 84,563 | -14,579,921 | -5,006,356 | -1,639,509 | 0 | 0 |
| 2016 | 20,902,062 | 91,707 | -14,462,953 | -4,978,300 | -1,552,515 | 0 | 0 |
| 2017 | 20,430,874 | 98,360 | -14,197,083 | -4,898,147 | -1,434,004 | 0 | 0 |
| 2018 | 20,091,505 | 104,707 | -14,016,788 | -4,847,223 | -1,332,201 | 0 | 0 |

# Are the model results less transparent than those based on tier 2 methodologies?

The FLInT is more transparent that Tier 2 methods

But

So far does not have modules that can estimate emissions from deforestation

The IPCC organized an expert meeting in Sydney in 2010 about the use of models and identified typical elements that, when reported, could improve the transparency of the report, and build credibility in its outputs. Are you aware of these elements and if so, information is reported for each one of them in the GHGI?

YES AND BEST EFFORT MADE TO MEET THE CONSIDERATIONS

# What the FLInT has done based on Sydney proposal

- Improved completeness filling in gaps in data.
- Increased temporal resolution of estimates – provided data for years without maps.
- Provided an opportunity to test our understanding of cause-and-effect relationships, hence to assess the impacts of mitigation efforts – scenario building.
- Provided comparability with other countries and systems e.g. use of local data vs Hansen maps.
- Improved transparency through stratification into strata
- Can reduce cost of data collection
- Represent non-linear and dynamic systems better compared to linear averaging done in Tiers 1 and 2.

# LIMITATIONS

1. The model is data intensive making it very hard to implement - A run (covering 28 years of land cover data) used to take several weeks but can now be done in one data
2. The model is still under development with only the Forest module complete.
3. Development of the model has been very expensive in terms of human skill, technology and hardware