Universidad Nacional Autónoma de México

Centro de Investigaciones en Ecosistemas. *Laboratorio de Bioenergía*

CARBON MITIGATION THROUGH SUSTAINABLE WOODFUEL MANAGEMENT

TWO TECHNOLOGY OPTIONS

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CO_2 mitigation due to wood energy occurs in two ways:

a)Sequestration

b)Substitution

We evaluated the mitigation of two bioenergy options

- cookstoves
- power generation

using the CO2Fix model V. 3.0.

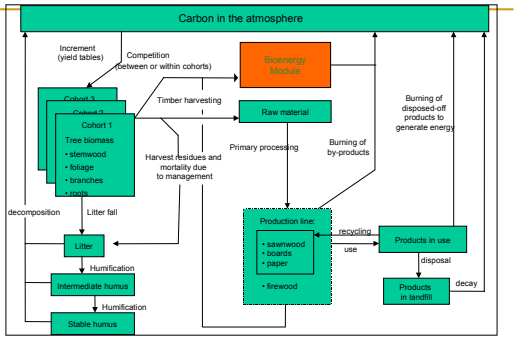
FOREST MANAGEMENT

Pinnus spp. and *Quercus spp*. in natural forest. The maximum density of the stand was 400 Mg/ha.

The rotation cycle was 50 years, with thinnings every 10 years.

Pines and Oak are completely removed at the end of the cycle.

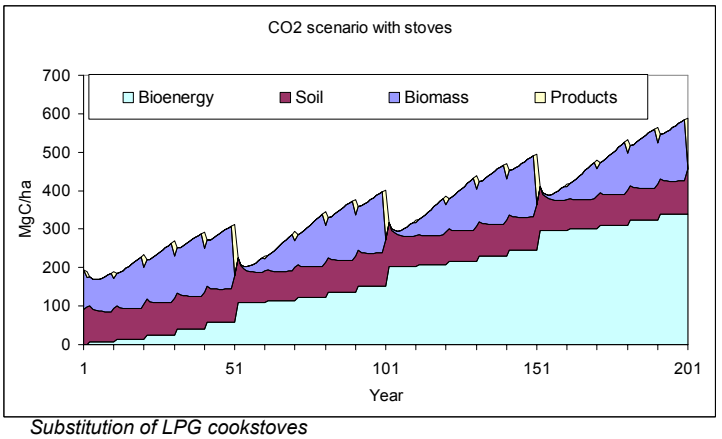
The information needed includes the growth rates, density, mortality, harvest, of each species



The bioenergy module needs the global warming potential of the greenhouse gases and the heat content of the fuel are given, as weel as the emission factors due to the technology option

Option1: **Substitution of LP gas**			
Current Fuel & Technology	LPG	Heating values (MJ/Kg)	47.31
Technology	Stove	Efficiency (%):	60
Technology Emissions Factors (g/Kg fuel)			
CO_2:	5057.439	CH_4:	0.99
N_2O:	0.088	CO:	0.00
TNMOC:	0.00		
Alternative Technology for use with slash fuelwood			
Technology:	Improved cookstoves 3	Efficiency (%):	50
CO_2:	0	CH_4:	7.92
N_2O:	0	CO:	69.5
TNMOC:	6.84		

RESULTS

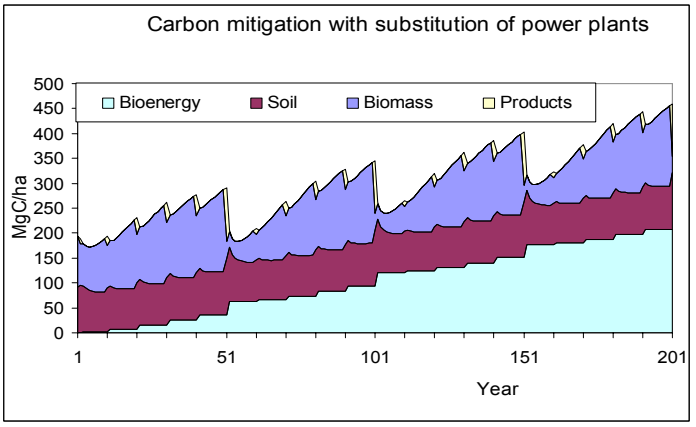


Substitution of LPG cookstoves

Total carbon stored at 50 years is 283 MgC/ha. The bioenergy contribution is 55 MgC/ha (19% of the total).

At the end of 200 year the total stock is 439 MgC/ha with a bioenergy contribution of 45 %

RESULTS



Substitution of Power Generation

The carbon mitigation is 291 MgC/ha, with a bioenergy contribution was 62 MgC/ha (21% of the total). The total stock at the end of 200 years was 550 MgC/ha, bioenergy contributes with 207 MgC/ha 37% of the total carbon.

Emissions of non-CO2 gases

	TonCO2/ha	TonCO2equiv/ha
Stoves	**202**	**70**
Power generation	**231**	**221**

The difference is due to the relatively high non-CO_2 emissions associated to the improved woodburning cookstoves.

Conclusions

- The simulation shows that there is an important potential for mitigating carbon emissions, both in terms of carbon sequestration, and carbon substitution.
- Important mitigation can be achieved by both small scale and large scale applications. The net mitigation of greenhouse gases –including non-CO2 gases- is larger for power generation as, in the case selected, improved woodburning cookstoves have relatively large emission factors of methane and carbon monoxide.
- The results also show that the CO_2Fix model provides a versatile platform that can be adapted to different management options and end-uses technologies, thus bringing an integrated picture of the bioenergy system.