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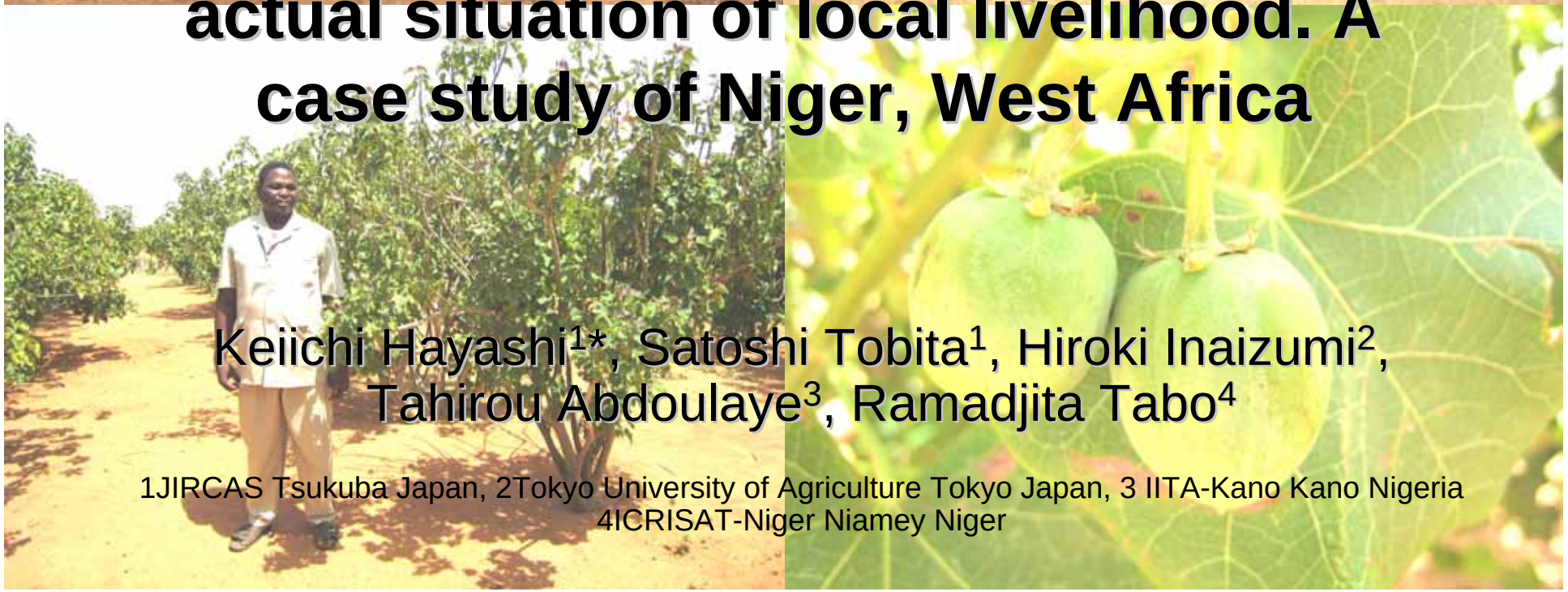
Assessment of the *Jatropha* production for African development based on the actual situation of local livelihood. A case study of Niger, West Africa



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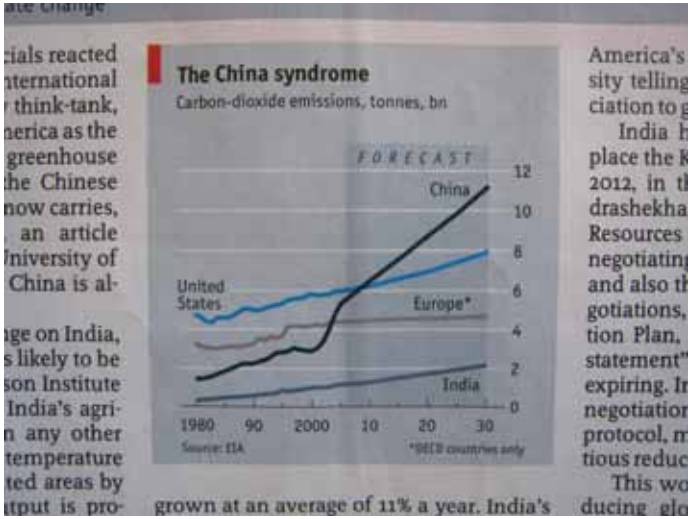
Context of Biofuel

- ✓ Global warming, increase of surface temperature on land and water cause by GHG
- ✓ Increase crud oil price (100USD/barrel=75,000JPY/kL/2007)
- ✓ Augmentation of energy consumption along with the economic growth in India and China
- ✓ Growth of inflation in commodities supply



The Economist June 7th, 2008

Context of Biofuel (cont'd)

- ✓ Biofuel production by conventional staples like corn, wheat grain and sugar for bioethanol, rape seeds, soybeans and palm oil for biodiesel.
- ✓ Augmentation of agric-production as a feedstock than provisions
- ✓ Growth of inflation in commodities supply

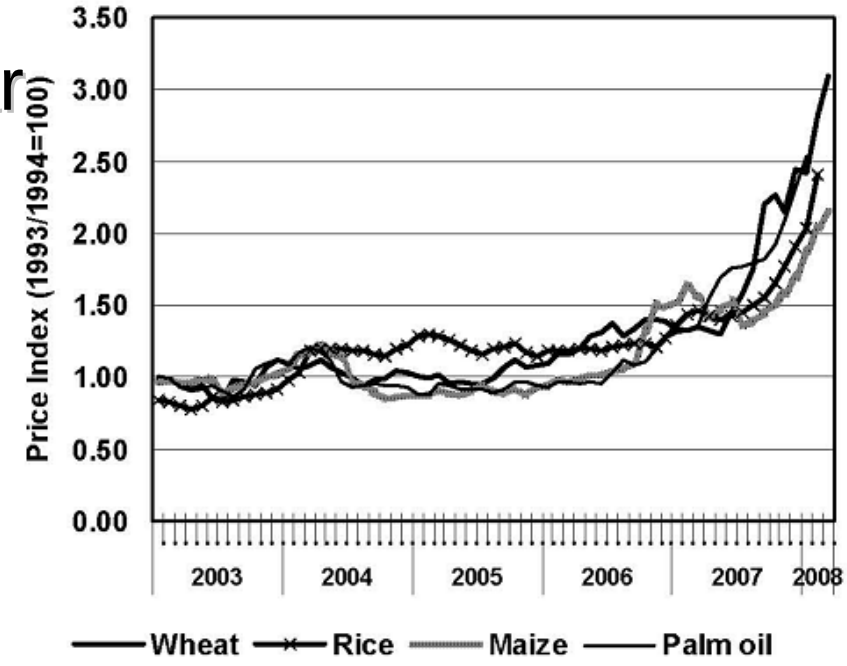


Fig. 1. Price index of major crops (1993/1994=100)

Mitigation of inflation

- ✓ Shifting from Bioethanol (low nenergy output) to BDF (high energy output)
- ✓ Quality improve of LCA on palm oil processing
- ✓ Utilization of non-edible oils for feedstock (Jatropha, Castor bean, Neem,Pongamia,Meswak,Mahua, etc)

BDF feedstock; Jatropha curcas

- ✓ A shrub originated from Mexico and Central America
- ✓ Non edible and high adaptability to degraded lands of arid and semi-arid environments
- ✓ Its height reaches up to 5 meters.
- ✓ 300 mm to 1,000 mm average rainfall necessary for *Jatropha* growth
- ✓ Well adapted to marginal soils with low nutrient content

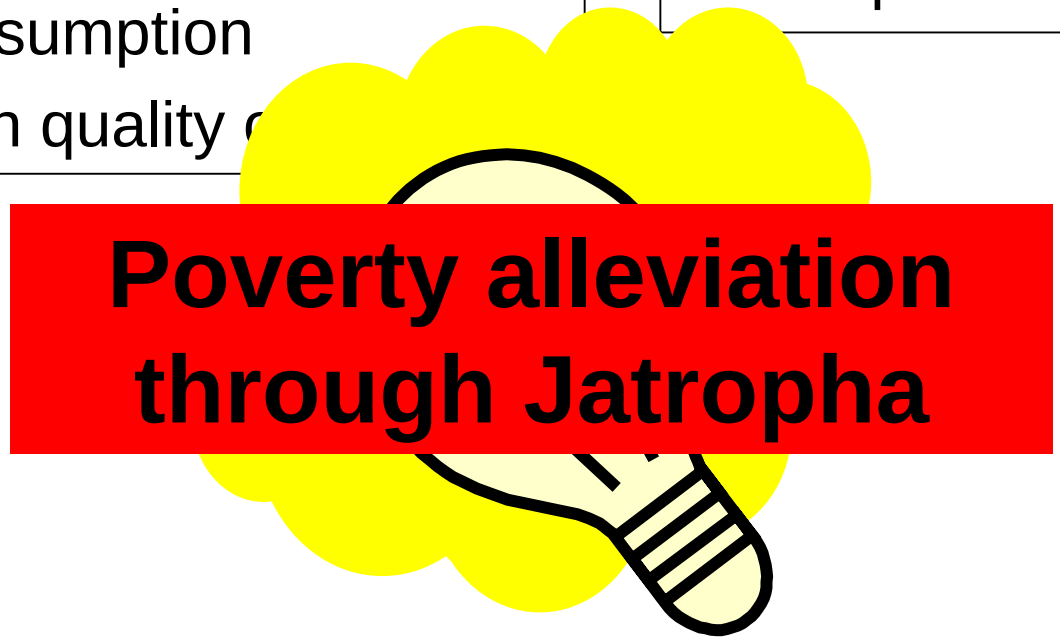
Jatropha in African development

J. production

- High adaptability to arid and semi-arid environment
- No conflict with food consumption
- High quality o

Af countries

- Population exploration
- Expansion of degraded land
- Deep rooted poverty



Poverty alleviation through Jatropha

Jatropha production in African

- ✓**Swaziland**, **Madagascar**, **South Africa**, **Zambia** (D1 Oils)
- ✓**Nigeria** (Viscount Energy of China)
- ✓**Ghana** (BD1 of S. Africa)
- ✓**Kenya** (Bio-energy Int'l of Switzerland)
- ✓**South Africa** (Alco Group of Belgium)
- ✓**Ivory Cost** (21st Century Energy of the USA)
- ✓**DRC** (MagIndustries of Canada)
- ✓**Tanzania** (BAFF, SEKAB of Sweden, WILMA of the USA, etc)

Gap in Jatropha production

- Few studies have been conducted so far on the *Jatropha* production in Africa and debates have just started on whether *Jatropha* brings benefit or not in terms of agricultural development because the self-sufficiency in food production within Africa is still a challenging issue. Hence, research on this feedstock should be enhanced to assess its potential and sustainability.

Hypothesis in Jatropha for Africa

- ✓ Degraded land in arid and semi-arid environment is identified as a suitable area for *Jatropha* production but may not be always available for its production due to local livelihood highly depending on a marginal land. A judicious approach with a sustainable manner should be taken by researches in order to avoid aggravating the poverty in the poor.

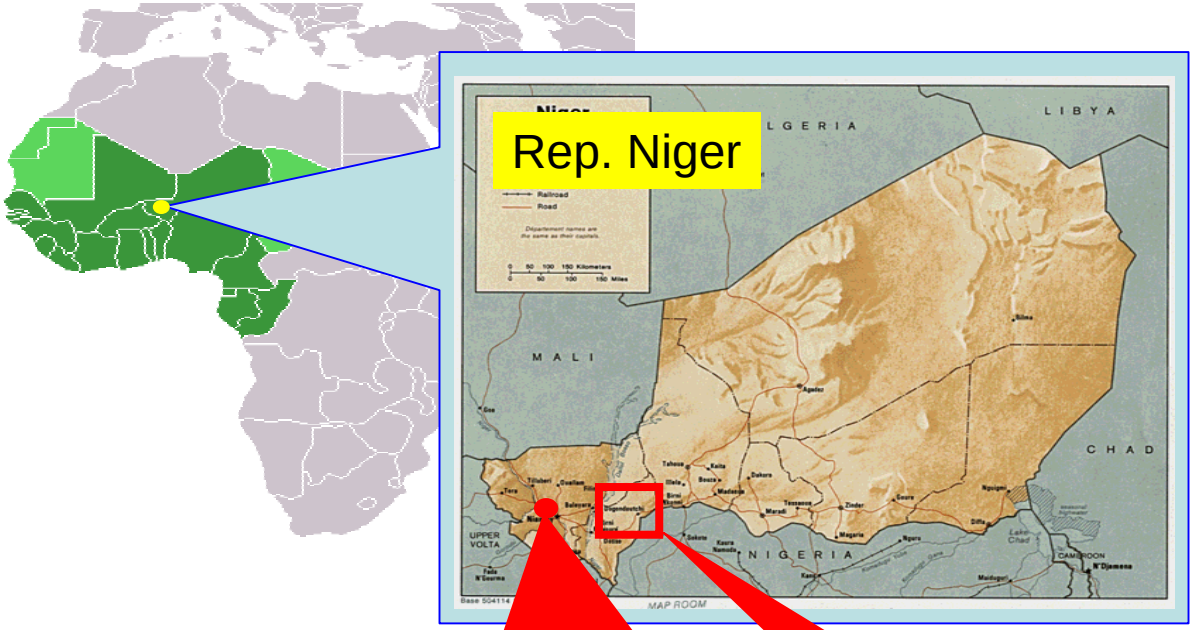
Approach

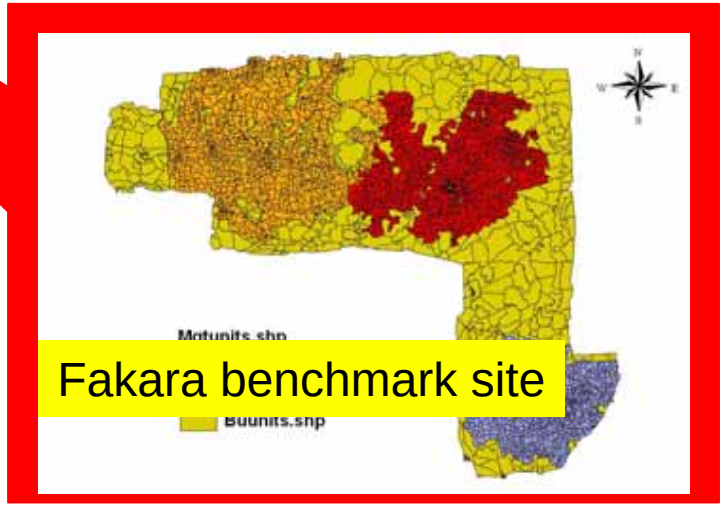
- ✓ Assess the possibility of *Jatropha* production by local farmers in the Sahelian villages through the results from a case study on sociological and economical situation of their agricultural systems

Materials & Method

- ✓ A case study, carried out in the on-going JIRCAS-ICRISAT collaborative research project in Niger.
- ✓ A candidate area for *Jatropha* cultivation and its potential production were assessed for three villages in the project site through obtained results from the socio/economical analysis of the benchmark site by the project activities.

JIRCAS-ICRISAT project



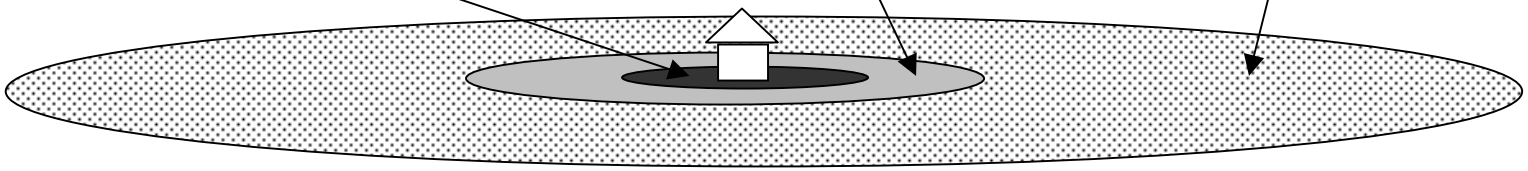


Local land management

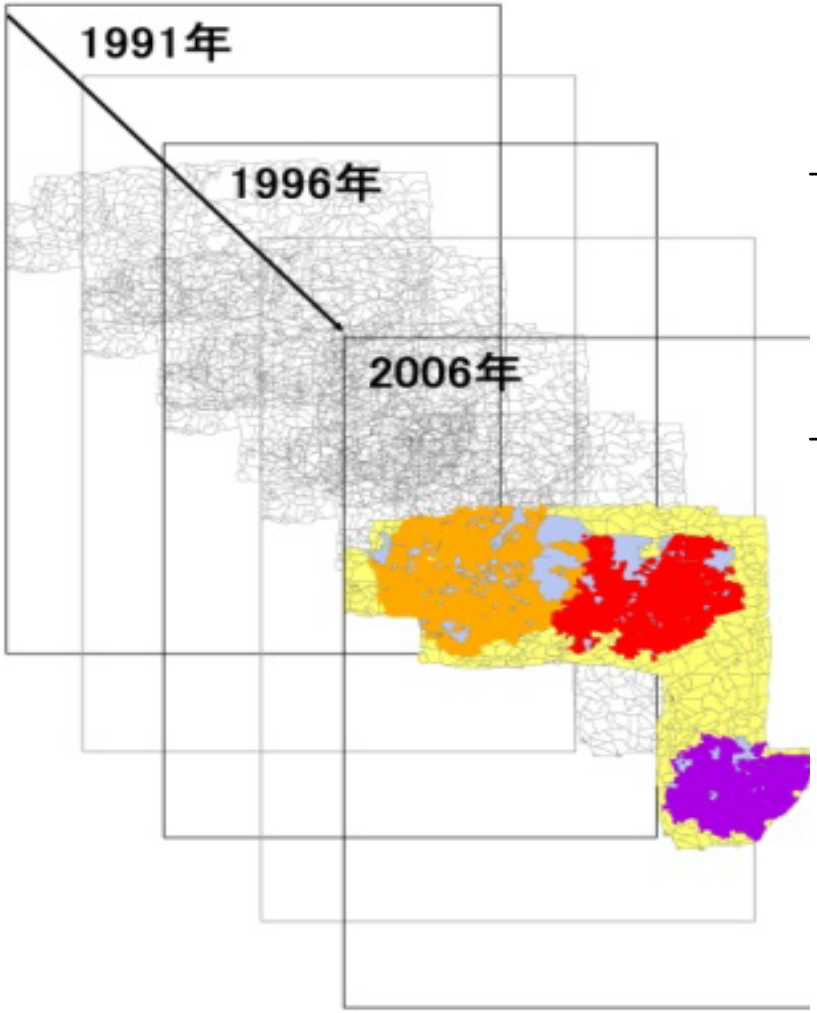
No fertilized
(Fallow system ,66%)
2000m< from residence

Corralling (18%)
1000-1999m

Recycling (16%)
500-999m



Identification of area for Jatropha production



	Fakara total	
	ha	%
Recycling	818	6
Corralling	2246	16
No fertilized	7080	52
Plateau	3513	26

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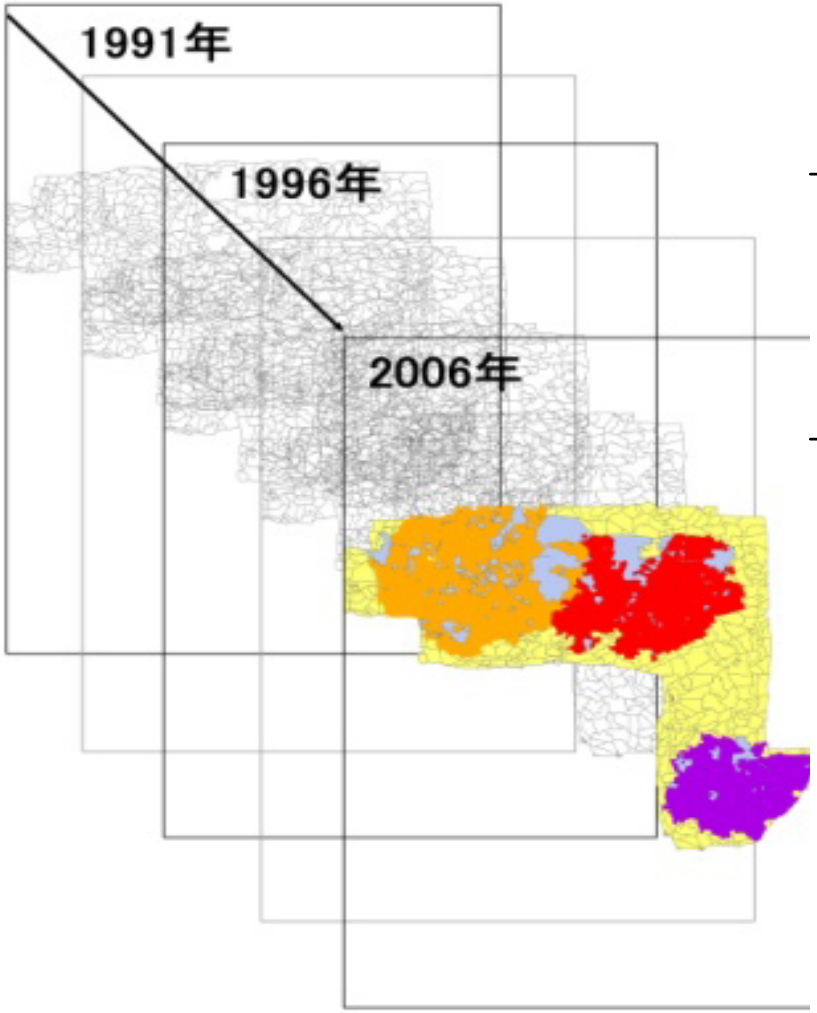

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Suitable land for Jatropha

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Role of fallow land for local households (Top 5 in 35 plant spices)

Scientific name	Family	Recognition (%)	Other utilization			
			food	forage *	medicine	materials**
Cenchrus biflorus	Graminaceae	94.3	0	91.7	2.8	0
Cassia mimosoides	Caesalpiniaceae	57.1	0	52.8	44.4	47.2
Eragrostic tremura	Graminaceae	48.6	0	47.2	47.2	47.2
Alysicarpus ovalitolius	Papilonnaceae	45.7	0	44.4	33.3	2.8
Sida cordifolia	Malvaceae	37.1	0	0	19.4	30.6

* for rain season only, **local mat, fence, roof

Nutrient balance

	Area	Input	Output
	ha	N kg/ha	
Recycling	818	26.4	18.9
Corralling	2,246	43.8	20.0
No fertilized	7,080	0.1	16.2

Evaluation of food security in local households

per capita	2001	2002	2003
Average production	275 kg	278 kg	254 kg
Consumption-production gap	70 kg	67 kg	91 kg

Suitable land ≠Available land

- ✓ Fallow land is considered as a marginal land due to its extensive management, nevertheless it has an important role for local households through providing food and other purposes from natural vegetation.

Win-win situation in production

- ✓ In the benchmark site, borders of farmlands are the places not directly involved in crops production and demarcated with indigenous vegetation like *Andropogon gayanus* or *Combretum glutinosum*.
- ✓ In Mali, *Jatropha* was planted as a hedge by GTZ in the 1990's and currently producing 0.8 kg/tree per meter hedge.
- ✓ So borders of farmlands could be one of the better candidate areas for the exploitation of *Jatropha* production.

Demarcation in farmland

Estimated production

	Total length of borders	Estimated production*
	km/village	t/village
Banizounbou	429	343
Tchigo Tegui	359	287
KoDey	175	140

*Estimation of yield was applied with 0.8 kg/tree (Henning, 2002)

Conclusion

- ✓ The majority of Fakara's households are still facing food deficit and increasing crop production is still top priority. JIRCAS-ICRISAT project can contribute to this task through technology generation and dissemination.
- ✓ However, it is also necessary to enhance economy for poverty alleviation and thus income generating activities is needed.
- ✓ *Jatropha* can be one of the better candidate crops when an appropriate orientation in local system and this could avoid any conflict with local food production.
- ✓ Further research on the productivity of Jatropha in African environment should be carried out for better incentive to local farmers.

Vicious situation in Africa

The Guardian / Tuesday June 24 2008

International

Wildlife and livelihoods at risk in Kenyan wetlands biofuel project

Republican admit Obar is winning online batt

Ed Pilkington New York

International

Kenya biofuel plan puts delta at risk

Plans to clear a tract of wetlands in Kenya for biofuel crops were described as an "ecological and social disaster" after being approved by the Nairobi government. The £190m project will turn 80 square miles of the Tana river delta into a sugar cane plantation for ethanol production. The area is home to lions, hippos, reptiles, primates, rare sharks and 345 bird species, and sustains thousands of farmers and fishermen whose protests have been largely ignored, campaigners say. Paul Matiku of Nairobi-based conservation group Nature Kenya said the plan would damage the delta, jeopardising local livelihoods.

livelihood depends on the Tana delta. Below, malachite kingfishers are found in the region Photograph: Michel

demand from the US and the European Union for clean energy sources such as ethanol.

River delta in jeopardy

the area much coveted by sugar companies who must rely on variable rainfall on their plantations in other parts of Kenya. Mumias Sugar, which will run the £190m scheme with the Tana and Athi Rivers Development Authority, insists the net effect will be positive, with thousands of jobs created and vastly improved infrastructure in the area. The company employed two private consulting firms to produce an environment impact assessment report showing that the ecological damage will be limited.

Kenya's National Environmental Management Authority (Nema) was revealed to have approved the scheme last week, subject to conditions. But villagers and fishermen, who treat the land in and around the Tana river delta as communal, say that their concerns about the loss of livelihoods have not been addressed. Pastoralists who bring 60,000 cattle from as far afield as the Somali and Ethiopian border regions to graze

The Guardian, Thursday June 24, 2008

Thank you!