India:
The Development of Alternative Biofuel Crops

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PANGEA panel, EP
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Who are we?

• One of the 15 CGIAR research centres

• employing about 500 scientists and other staff.

• We generate knowledge about the diverse roles that trees play in agricultural landscapes

• We use this research to advance policies and practices that benefit the poor and the environment.
What makes us tick?

• By 2050, we need to...

  – Produce 60% more food on ~ the same amount of land
  – Make farms, fields and landscapes more resistant to climate change
  – Massively reduce GHG emissions from land use.
  – Ensure bioenergy sustainably replaces much fossil fuel use.
Hence: our IFAD-ICRAF Biofuel programme.

An effort to develop a sustainable, commercially valid biofuel chain using smallholder production on marginal lands, initially in Karnataka, India.
Why smallholders?
Why India?
India’s exploding energy needs
India: bioenergy accounts for a quarter of all energy sources...
Diesel is a key ag input...
...but its subsidies are becoming unaffordable.

As diesel prices were last revised when crude was at about $76 a barrel...

- PRICE OF DIESEL (₹/LITRE) - BRET CRUDE ($/BARREL)

<table>
<thead>
<tr>
<th>JAN 2009</th>
<th>FEB 2011</th>
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<tbody>
<tr>
<td>2 Jan</td>
<td>24 Feb</td>
</tr>
<tr>
<td>46.91</td>
<td>111.36</td>
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<tr>
<td>32.86</td>
<td>37.71</td>
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...the resulting low prices have led to rising consumption...

GROWTH IN DIESEL CONSUMPTION (%)

<table>
<thead>
<tr>
<th>FY 06</th>
<th>07</th>
<th>08</th>
<th>09</th>
<th>10</th>
<th>11*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4</td>
<td>6.7</td>
<td>11.1</td>
<td>8.5</td>
<td>8.8</td>
<td>5.8</td>
</tr>
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...making current subsidy provision look inadequate

PETROLEUM SUBSIDIES (₹ CRORE)

<table>
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<tr>
<th>FY 10</th>
<th>FY 11 (RE)</th>
<th>FY 12 (BE)</th>
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<tr>
<td>14951</td>
<td>39385</td>
<td>23640</td>
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Our objective: Develop Alternate Biofuel Crops

• Improve cash income to poor including women

• Improve Food Security

• Increase Access to affordable energy
A programme with a difference:

• Avoid food-fuel crop competition
• Focus on smallholders
• Build biofuel crop production system on agroecological principles - Select farming systems that maintain or improve soil quality while minimising need for inorganic inputs:
  – Avoid monocrop fields; encourage polycrop systems
  – Focus on polycrop systems involving trees – agroforestry
  – Select system plants to ensure production around the year
  – Optimise systems for use on marginal lands
• Covers the whole value chain
• Takes the landscape as the unit of intervention (not just a field, or a farm, or a village)
## Value Chain

### Involve Private Partners
- End users (road, aviation fuel..)
- Technology developers
- Small scale biofuel plants / parks

### Community Development
- Boost food security
- Develop local energy
- Use marginal Land
- Work through cooperatives
- Access to markets

### Use smart agroforestry
- Choose and mix food, non-food and multiple use crops
- Ecosystem-adapted
- Develop quality inputs – seeds, clones, agronomy
- Play with cropping intensity
- Integrated production system
Value Chain

So: we aim for a business model that meets 3P sustainability criteria - planet, people and profit
Linking food, energy and environment

Integrated Food Energy System (Anne Bodanski, Olivier Dubois), GBEP – sustainability indicators (Maria Michela Morese)

Biofuel programme, Bioenergy, Oilseeds

Environment & Climate Change Division (Elwyn Grainger Jones), National Programs

Linkages with FAO / IFAD explored: Initial discussions 11-12 April 2013
A basic workplan...

- Value Chain Analysis & Interventions
- Improved Market Participation
- Livelihood Impacts

Agri Business Development
... with a twist.

- Inclusion of multiple locally adapted species
  - Pongamia (*Pongamia pinnata*)
  - Madhuka (*Madhuka latifolia*)
  - Neem (*Azadirachta indica*)
  - Simarouba (*Simarouba glauca*)
  - Jatropha (*Jatropha curcus*)
  - Amoora (*Amoora rohiyuka*) &
  - Surahonne (*Calophyllum inophyllum* L)

- Smart farming system, e.g. fence planting

- Area covered – 7000 Ha; No of seedlings – 1.5 millions
In brief:

Developing linkages with Karnataka:
- Develop agroforestry system
- Identify programme gaps
- Develop a pilot
- GBEP’s sustainability criteria test
Why Karnataka?

• An experienced partner: the Bangalore University of Agricultural Sciences
  – Introduced tree with oil seeds in 1995
  – Has documented 95 non-edible oil species in the state
  – Started genomic improvement of selected species in 1998
  – Nurseries since 2002
  – Initial trials very promising
...and a centre of biofuel excellence
...and a centre of biofuel excellence

Hassan: very diverse environmental conditions

- Rainfall 450 - 7000 mm
- Altitudinal range from 300 - 1600 m
- Varied soil types
- Diverse crops
- Diverse vegetation types
Karnataka: AF landscapes...
Learn from the Brazilian experience with biodiesel:

- Focus on social inclusion, environmental sustainability and promotion of regional development.
  - More than 100,000 smallholders.
  - About 70 biodiesel refineries.
  - National savings of US$ 3.4 billion.
  - Annual average household income: twice the previous income.
- Main challenge: overcome the excessive
  - dependence on soy beans and castor oil
  - dependence on weather (rainfall).

Partner with Embrapa on the development of alternate feedstocks:
- Agroforestry model on Jatropha, Macaúba Palm and others.
- Agro-ecological zoning in process.
Programme Road Map

Karnataka : Perennial Species
Meghalaya: Pongamia
Tamil Nadu : Nipa palm + Salicornia

Nipa palm

Mozambique: CleanStar
Jatropha - Gliricidia

EMBRAPA Oilpalm, Macauba

www.worldagroforestry.org
Thank you!

For more information

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