

Village Level Biodiesel (VLB)

**Sustaining Transitions and Generating Livelihoods:
Lessons from a “Local Production for Local Use”
Biodiesel Agro-Booster in Odisha, India**

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CTxGreEn CTxGreEn XIMB

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Who is CTx GreEn?



- CTx GreEn is a Canadian NGO registered as a not-for-profit corporation in Canada since 2003 (founders Geeta Vaidyanathan and Ramani Sankaranarayanan)
- Our major focus is community-based renewable energy projects and we have worked in partnership with Gram Vikas since 2003



What is CTx GreEn's vision?



- **Our VISION** is to energize proven models of 'local food and fuel security' in communities of marginalized rural economies and mid-size inner cities. These 'local production for local use' models will be tried in at least one Southern and one Northern country context through green energy technology exchange

Our GOAL:

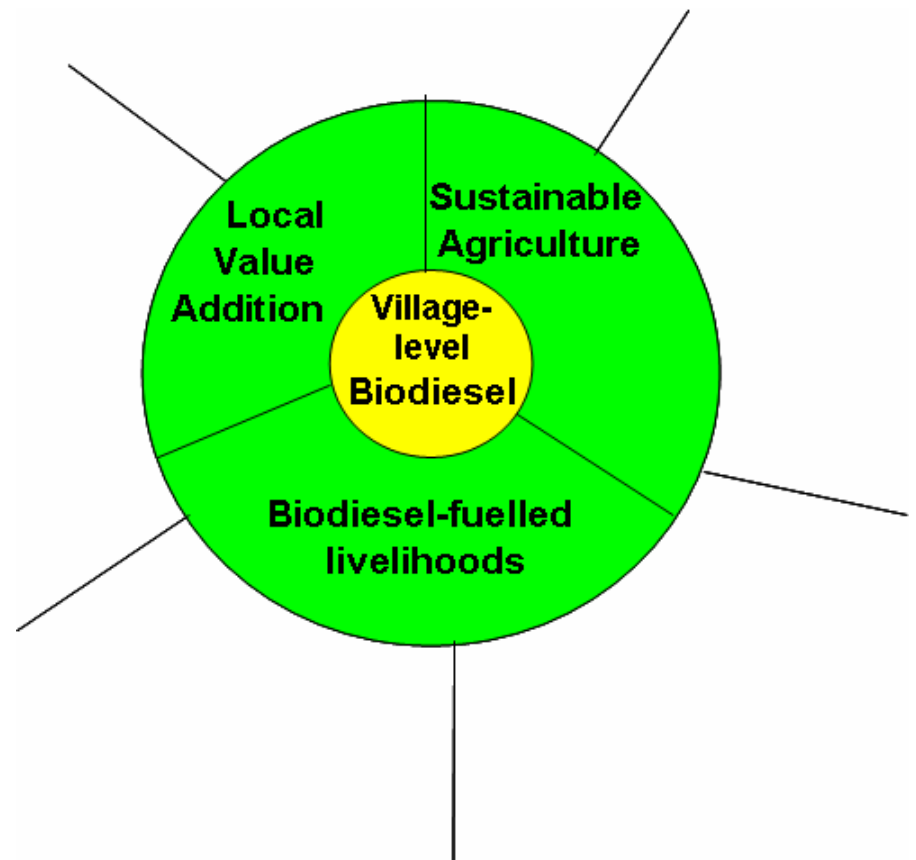
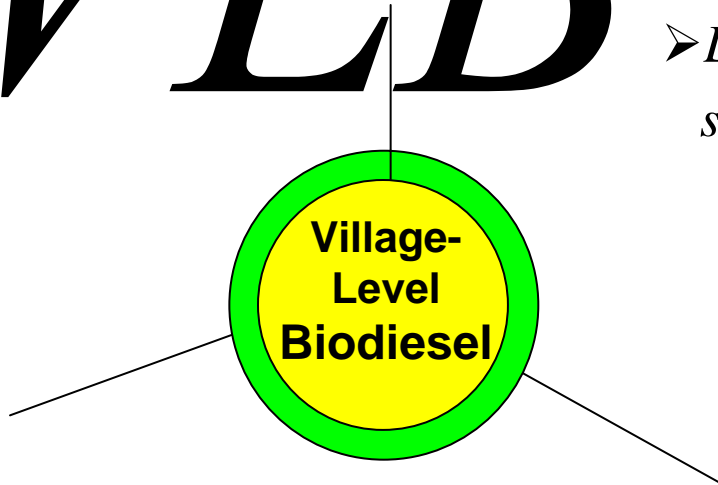
- Local food and fuel security for global environmental security



VLB

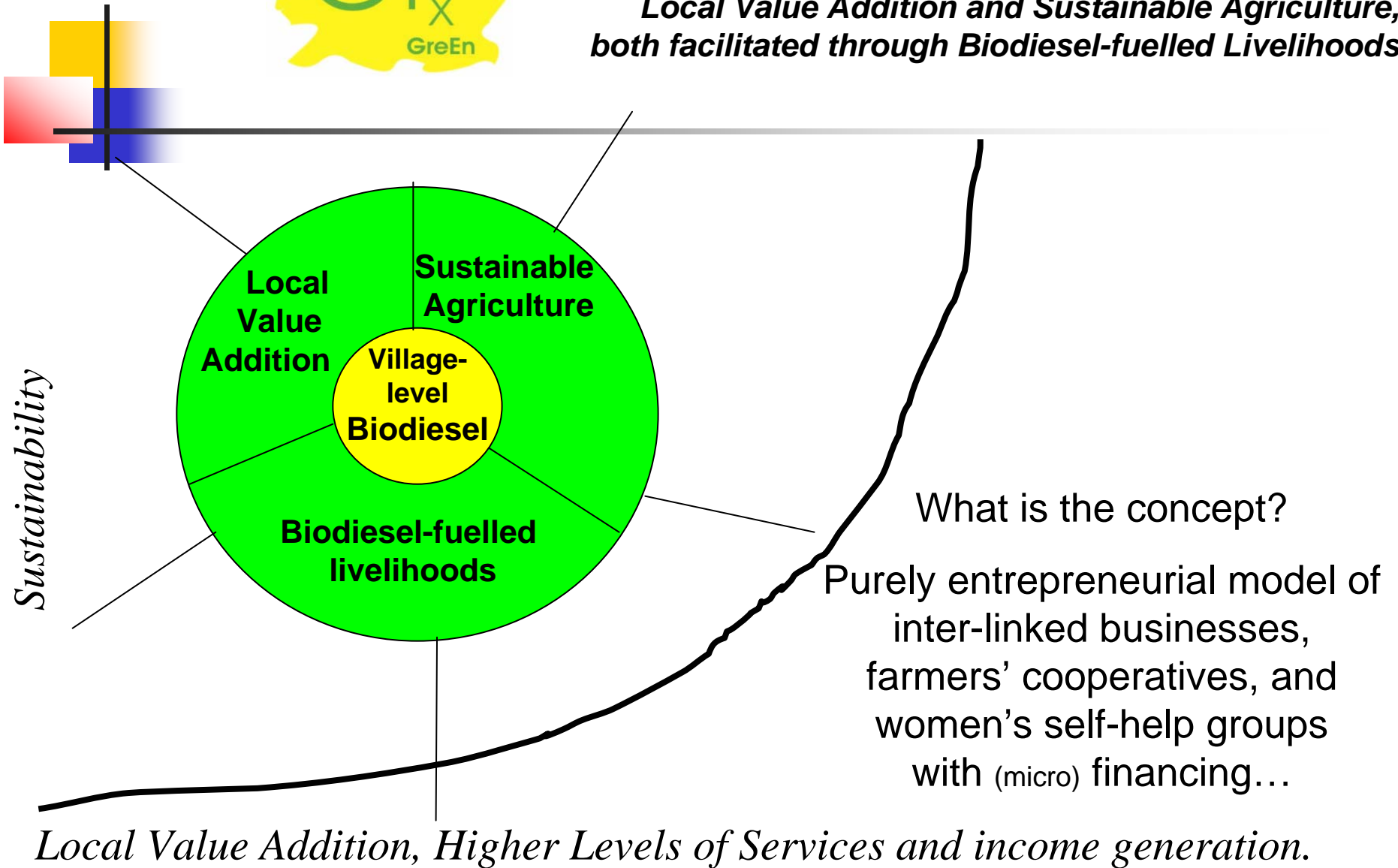
is a local production for local use model.

- *Local production of biodiesel from locally underutilized raw materials.*
- *Local use of locally produced biodiesel to catalyze sustainable agriculture and other local livelihoods.*





Sustainability of our “Local Production for Local Use” Biodiesel Model increases with increasing degrees of Local Value Addition and Sustainable Agriculture, both facilitated through Biodiesel-fuelled Livelihoods



Four Hours to Fuel: VLB Biodiesel Production

- oil + alcohol + lye = biodiesel + glycerin
- oil is pressed from underutilized edible or non-edible oil seeds using the Mafuta Mali press (oil expeller fuelled by biodiesel is suitable for larger operations)
- biodiesel is produced in the biodiesel reactor
- biodiesel byproducts are:
 - oil,
 - oilcake,
 - glycerin and
 - soap





Village Level Biodiesel (VLB)



What it is

- ✓ A detailed assessment of community needs vs local resource availability
- ✓ Produced from locally available edible and non-edible underutilized oil seeds

What it is not

- A new government subsidized livelihood scheme
- Produced from non-indigenous oil seeds and displacement of local food cultivation



Village Level Biodiesel (VLB)



What it is

- ✓ Locally produced fuel for local energy needs, local agricultural production and new local livelihood opportunities

What it is not

Mass 'jatropha' plantations for mass production of transportation fuel for national or international export



Village Level Biodiesel (VLB)



What it is

- ✓ Local value addition through use and sale of byproducts
- ✓ Locally priced and marketed byproducts

What it is not

For national and international sales

Externally fixed sale prices for seed production

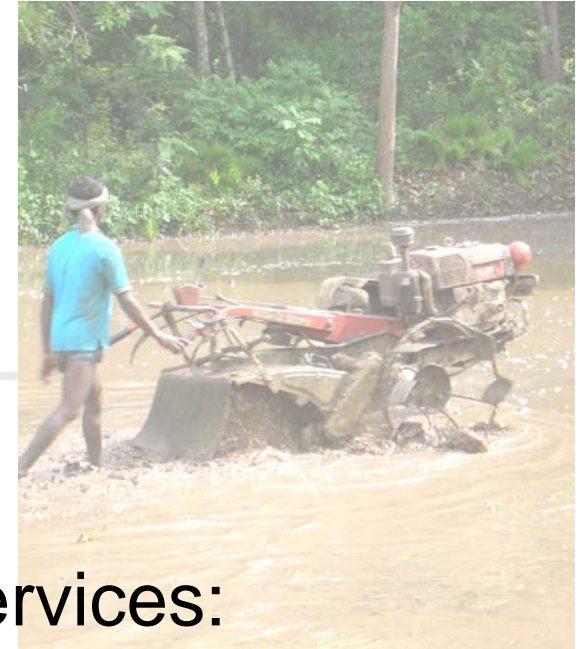
Uses of biodiesel (1)



- To fuel any standard diesel engine:
 - Multi-purpose power tillers for agricultural applications – tilling, sowing/harvesting, threshing; post-harvest operations such as oil expelling, paddy polishing
 - Irrigating a “second” crop in Jan-April
 - Pump sets for essential water needs
 - Generators for electrification

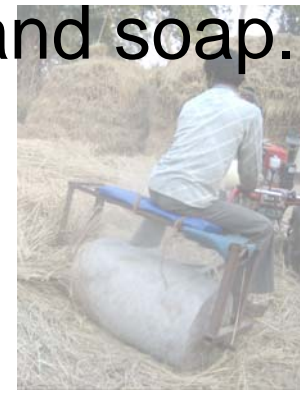


Uses of biodiesel (2)



- To generate income

- from the sale of biodiesel services: irrigation, ploughing (tilling), seeding, harvesting and threshing, oil expelling, *etc.*
- from the use and sale of biodiesel byproducts: oil cake as fertilizer and/or animal feed, glycerin and soap.



Uses of biodiesel (3)



- To increase agricultural productivity
 - through the use of oilcake as fertilizer
 - by reduced pest damage through use of karanj and neem oilcake
 - by 2nd crop irrigation
 - by timely sowing (seeding) and harvesting



Uses of biodiesel byproducts(4)



- Oil for edible purposes: reduce purchase of edible oil from market (instead of selling seeds cheaply, make your own and sell excess locally to reduce cash outflow for edible oil purchase)
- Excess Oil for soap: use excess oil (after meeting biodiesel and edible oil demand) to make value-added soap (with local medicinal herbs and additives)
- Oilcake: use as a fertilizer at a rate of 350+ kg/acre for rice cultivation and
100-250 kg/acre for vegetable cultivation
- Glycerin: used for the production of soap and sold at Rs xx to xxx per bar

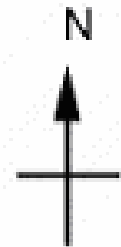
Sustainability of Local Production and Use Biodiesel Model increases with increasing degree of Local Value Addition and Sustainable Agriculture, both aided by Biodiesel-fuelled Livelihoods

Sustainability

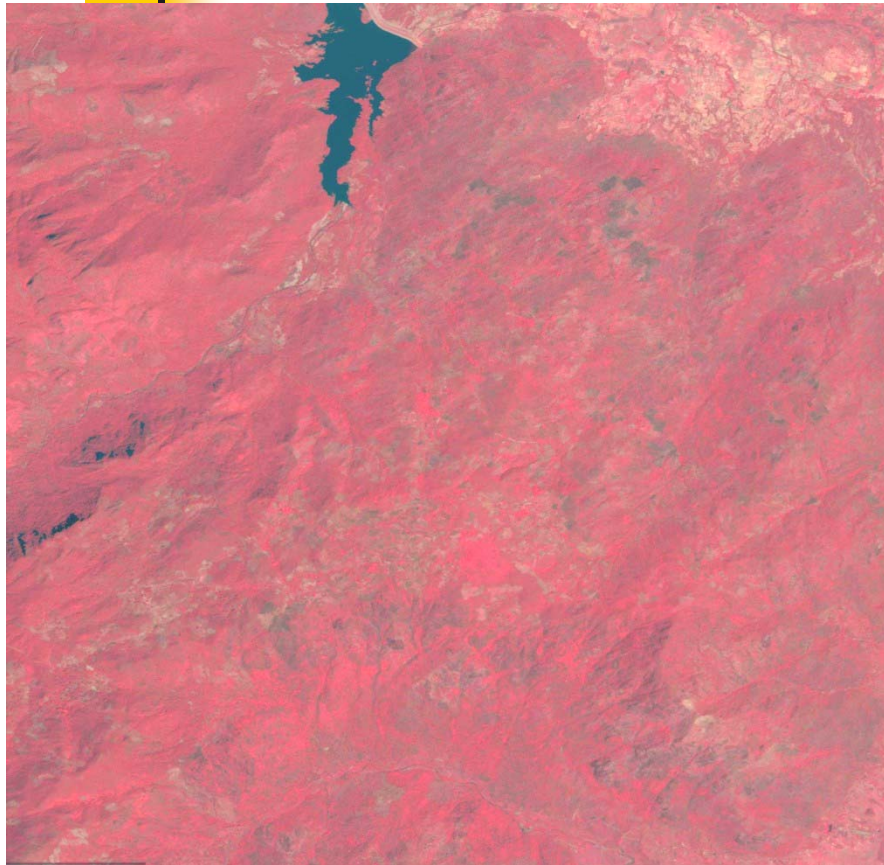


Local Value Addition, Higher levels of services and income generation

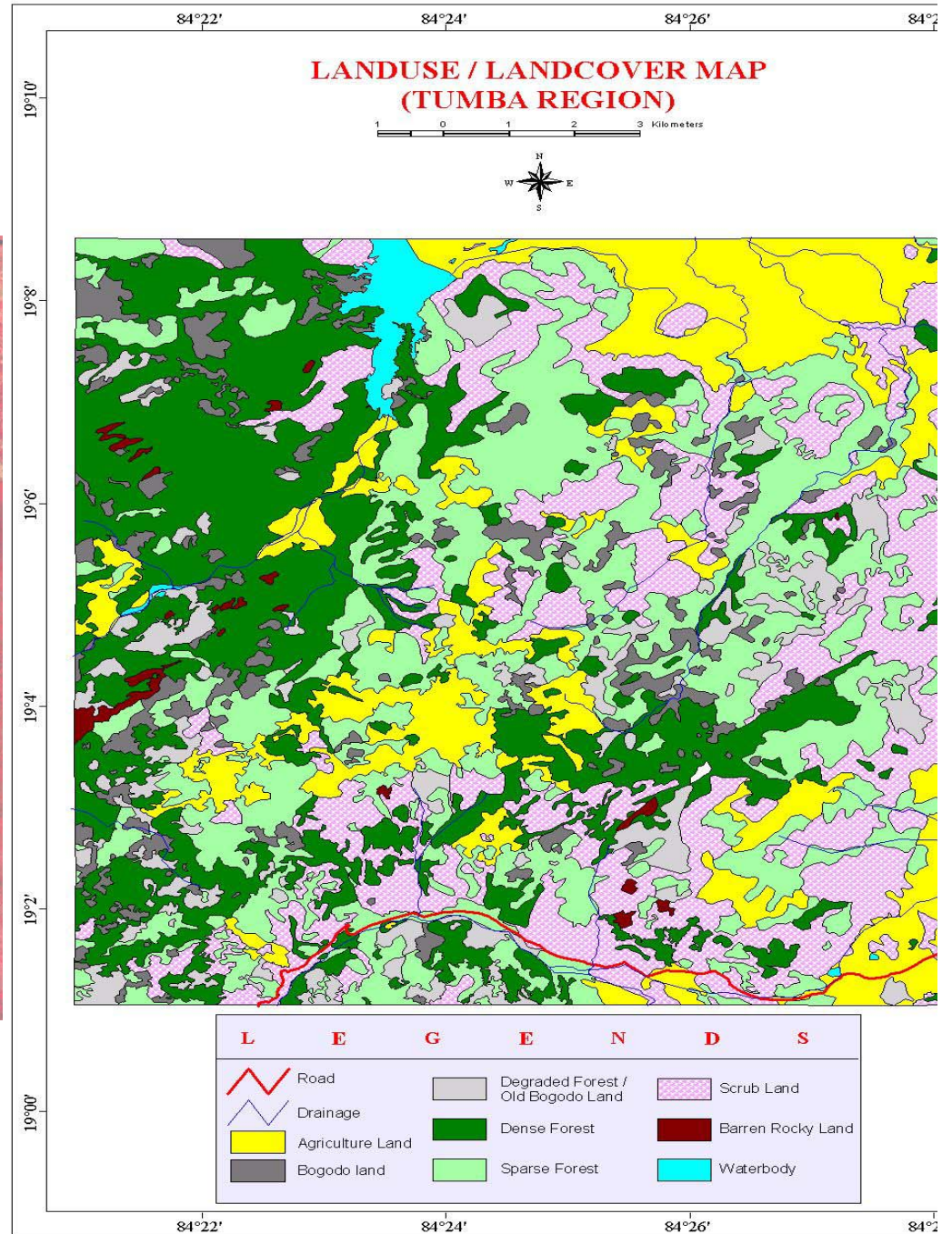
Gram Vikas - Area of operation

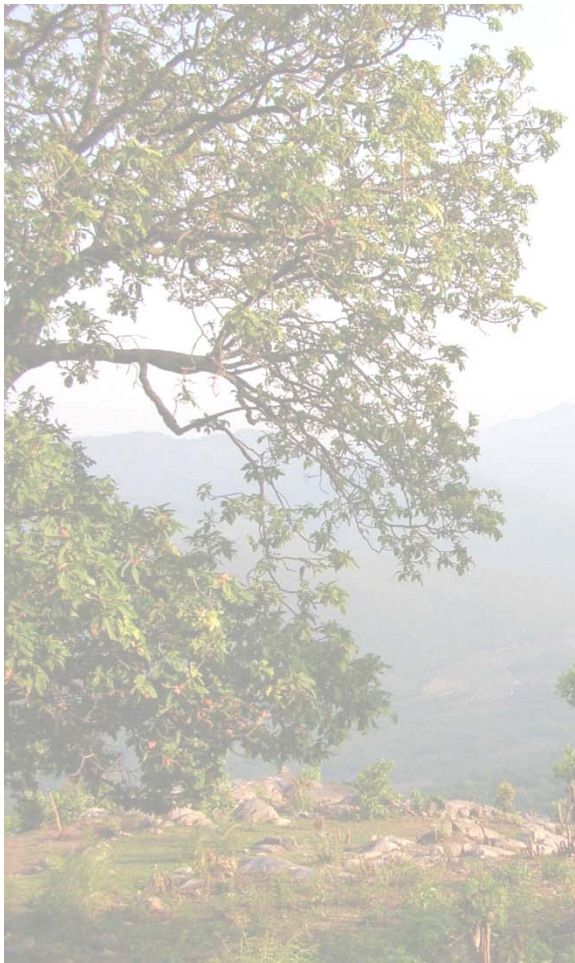


SATELLITE IMAGE OF TUMBA AREA



**IRS P6 LISS IV image
(08.04.2004)**





CO2 Red'n Estimate for cluster of 50 villages; 30 hh/village (average); 1500 hh/cluster - Tumba

| | 50 villages | | | |
|---------|--|----------------------------|----------------------------|--|
| | 30 hh/village (average) | | | |
| | 1,500 hh/cluster | | | |
| Sl. No. | CO ₂ Reduction Potential by Item | kg CO ₂ per day | t CO ₂ per year | Notes and assumptions |
| 1 | Avoided Kerosene for home lighting | 480 | 174 | 50 villages; 1500 hh/cluster |
| 2 | Avoided Diesel for Genset-LED Lighting | 160 | 58 | 1500 hh; 2 LED/hh; 18.25 kL BD/y |
| 3 | Avoided Urea: Use Oil cake as fertilizer | 152 | 56 | 925 acres; 55.5 tonnes avoided urea |
| 4 | Avoided Slash&Burn acres (replantation?) | 9,107 | 3,324 | 750 acres 'avoided slash&burn/year' |
| 5 | Avoided Diesel for BD-fuelled Oil Expelling | 109 | 40 | 20000 trees; 375t seeds; 12.5 kL BD/y |
| 6 | Avoided Diesel for 2nd crop irrigation | 110 | 40 | 1500 acres; 12.6 kL BD/y |
| 7 | Impact of 1,500 acres/year replantation | | | not included |
| 8 | Avoided firewood (usu. Collected in slash & burn) | | | Biodiesel stoves for cooking - not incl. |
| | Total CO₂ Reduction Potential | 10,118 | 3,692 | |
| | Subset of the above: | | | |
| | CO₂ Reduction Potential w/o including Slash-and-burn credits | 1,011 | 368 | avoided slash-and-burn credits constitute more than 90% of 'total (not including biodiesel stoves for cooking and plantation credits)' |

Estimated BD Req'd., no. of BD production units, and no. of BD-fuelled end-use devices - Tumba

| Sl. No. | Biodiesel Consumption by Item | L BD/d | L BD/y | Notes and assumptions |
|---------|---------------------------------------|--------------|---------------|---------------------------------------|
| 2 | For BD-fuelled Genset-LED lighting | 50 | 18,250 | approx 4 to 6 BD-fuelled gensets |
| 5 | For BD-fuelled Oil Expelling | 50 | 12,500 | 6 BD-fuelled expellers @ 30 kg/h |
| 6 | For BD-fuelled 2nd crop irrigation | 50.4 | 12,600 | approx 4 to 6 BD-fuelled mobile pumps |
| 8 | For BD-fuelled cook stoves | | | not considered - needs more dev'pmt. |
| | Total BD Consumption Potential | 150.4 | 43,350 | approx 4 BD Reactors - 20L/batch |

150 l Biodiesel / day

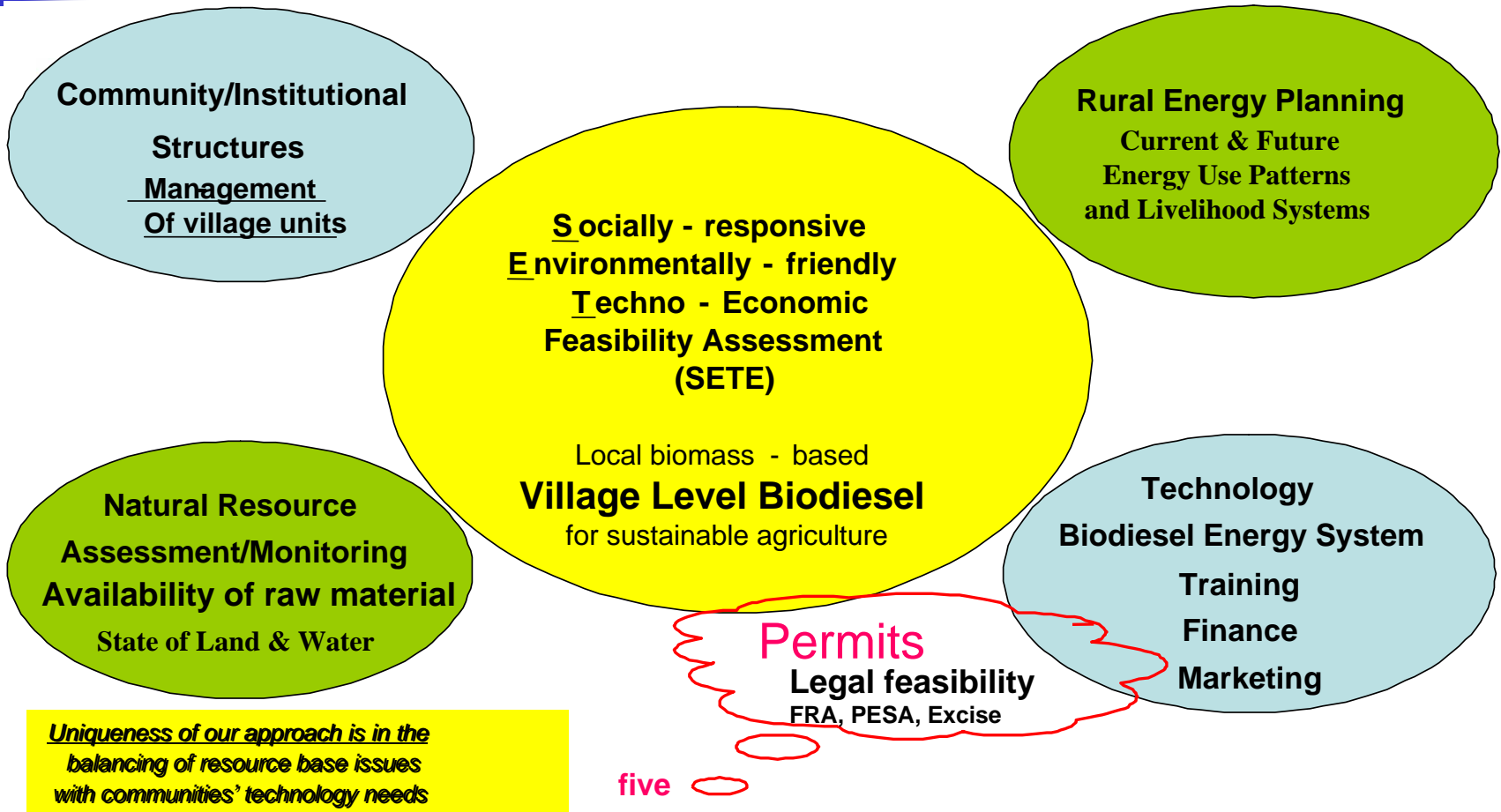
10 tonnes CO₂/day

\$150/day or \$1/Litre BD

Entire production cost....



In my village? How to decide?

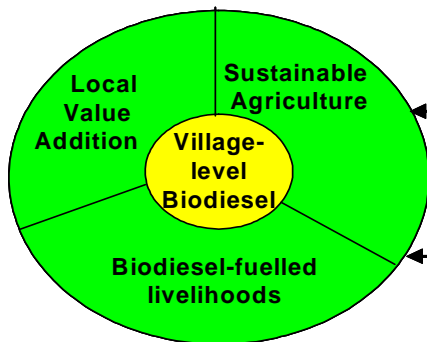
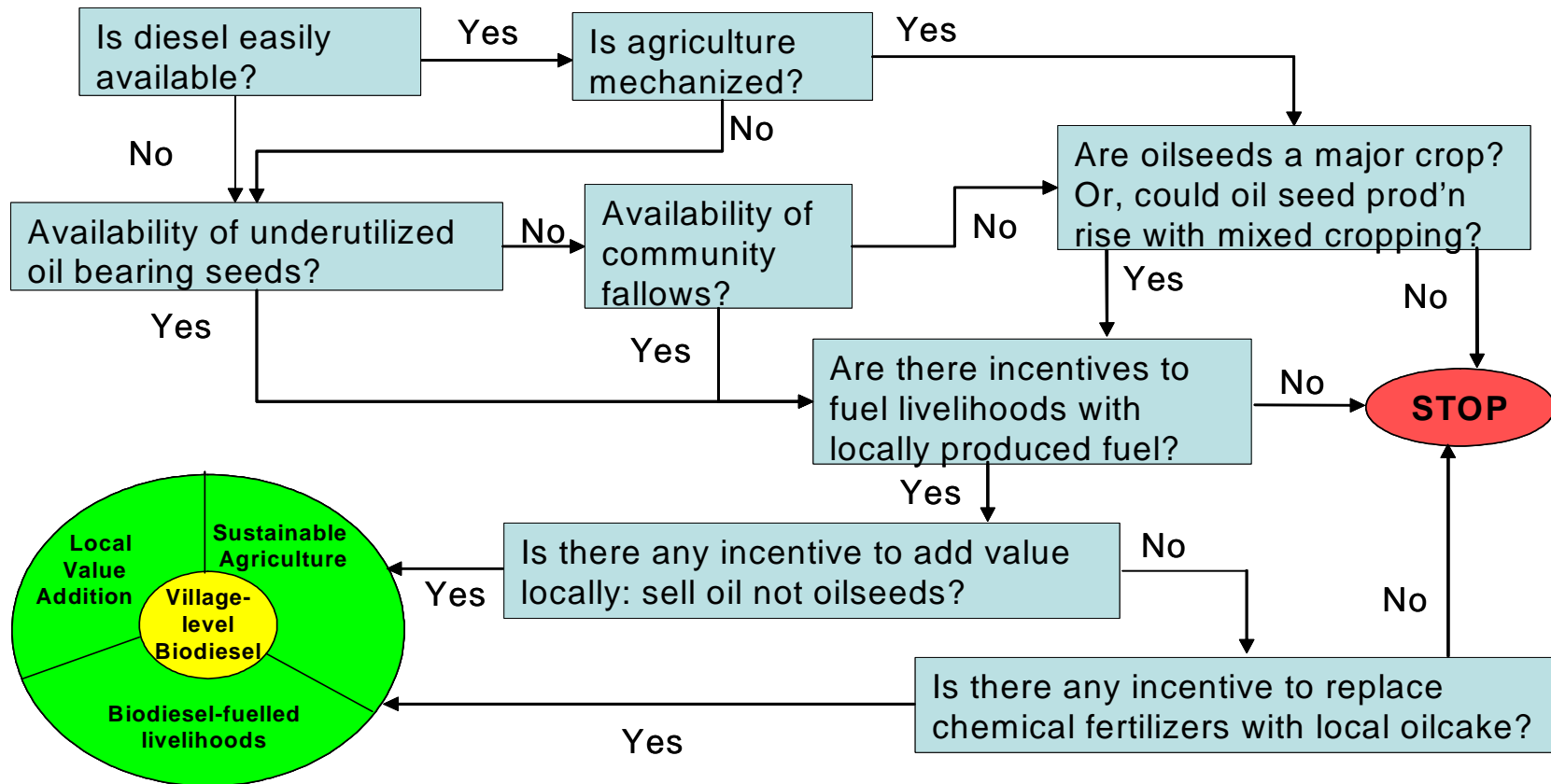


Technology is only one among ~~four~~ five other aspects critical to project sustainability

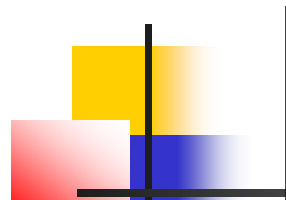


VLB Decision Tree

How do I decide if VLB is suited for my region

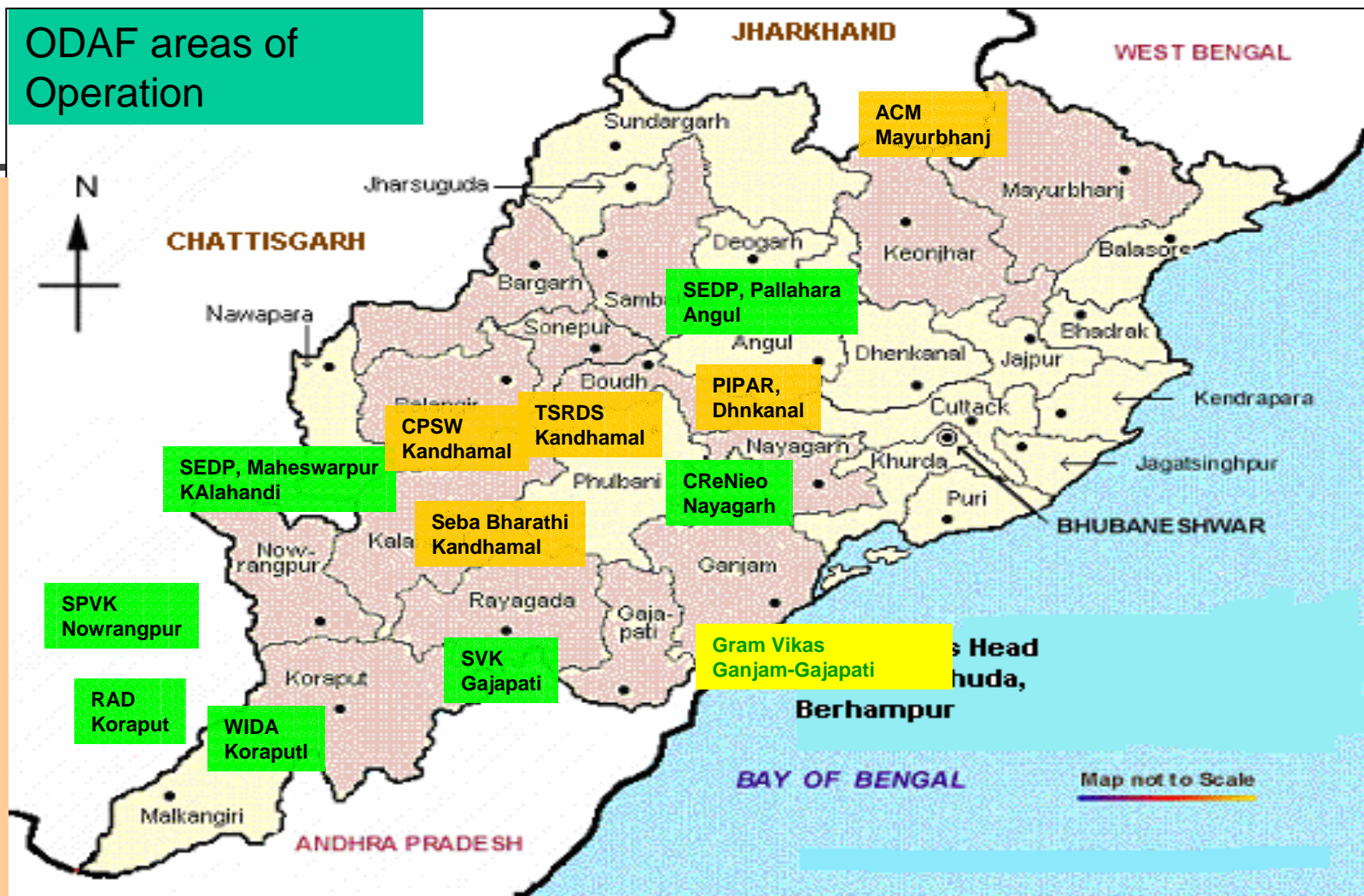


Odisha map indicating status of VLB survey activities (Jun-Oct'10)



Odisha has 40 million people living in 155,707 sq.km. accounting for 4.9% of India's geographical area and 4% of India's population.

Odisha's population includes 22.1% Scheduled Tribes (STs) and 16.6% Scheduled Castes (SCs)



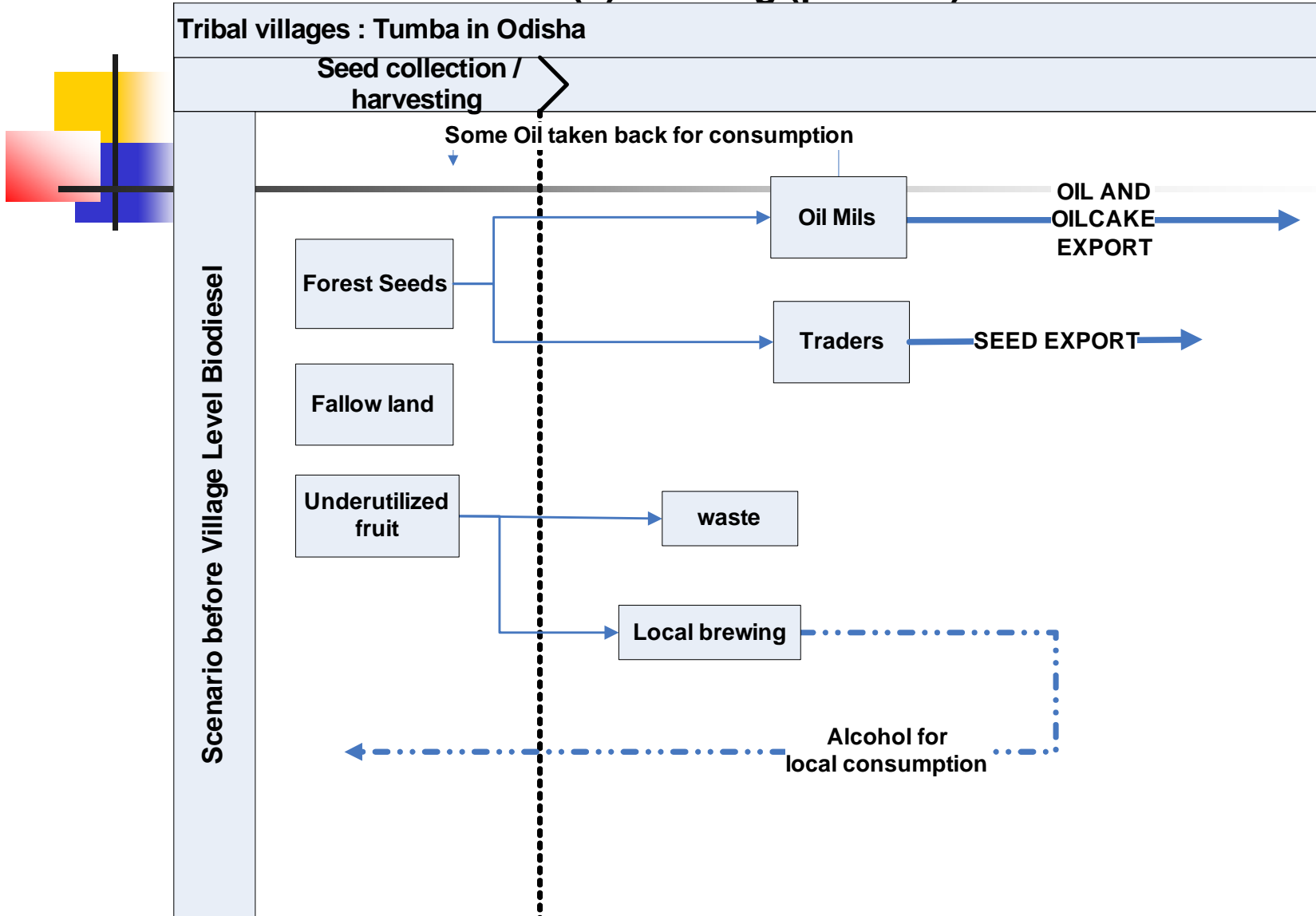
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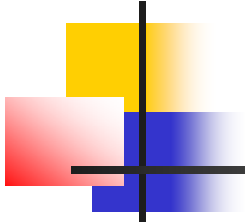
Feasibility surveys (village data available)

Only pre-feasibility data (Second assessment not done)

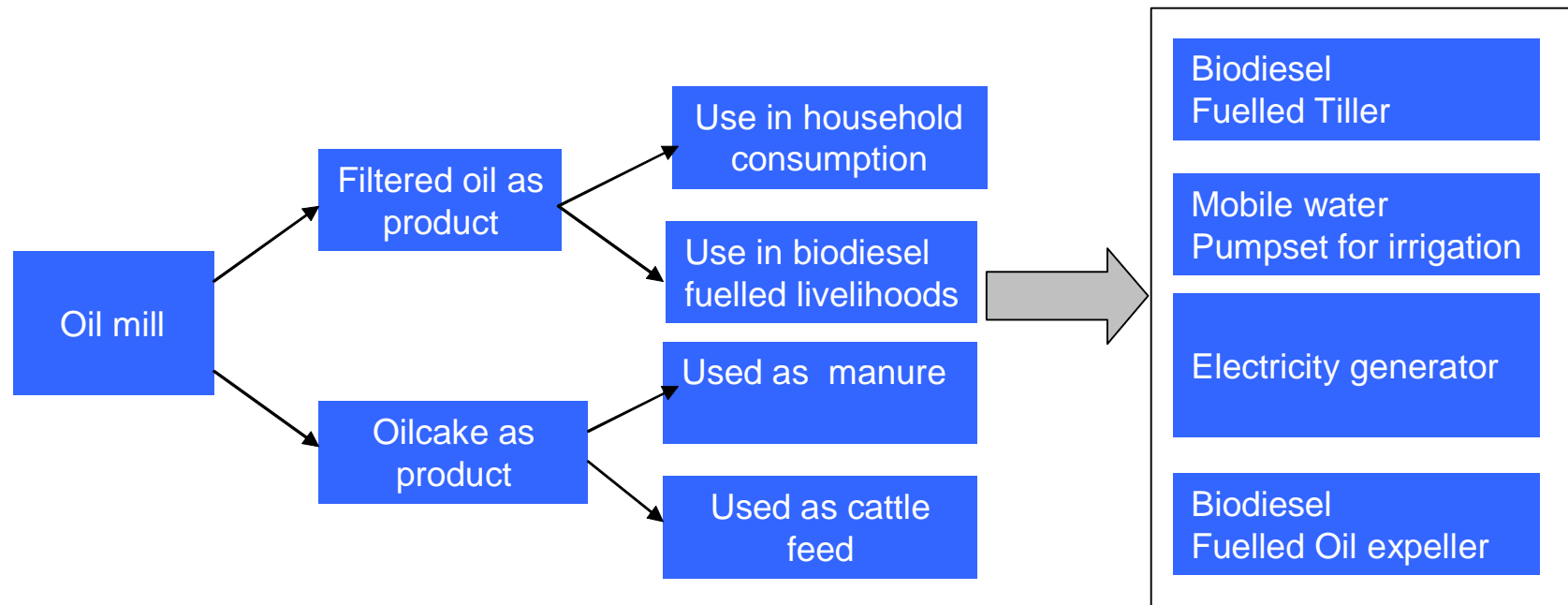
Gram Vikas Activities ongoing

Role Transformations: (1) Existing (pre-VLB)

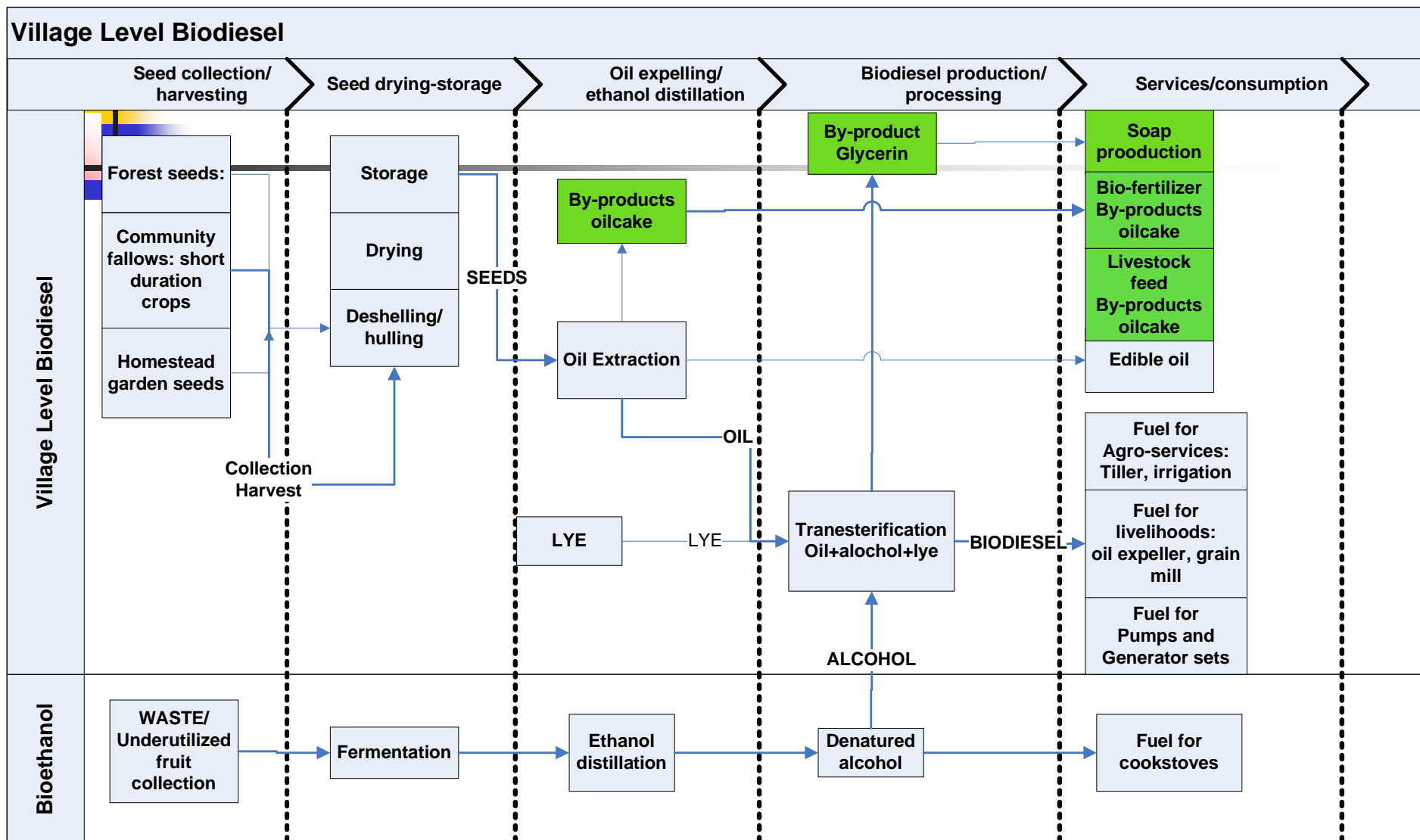




Core Activity of the Village Level Biodiesel

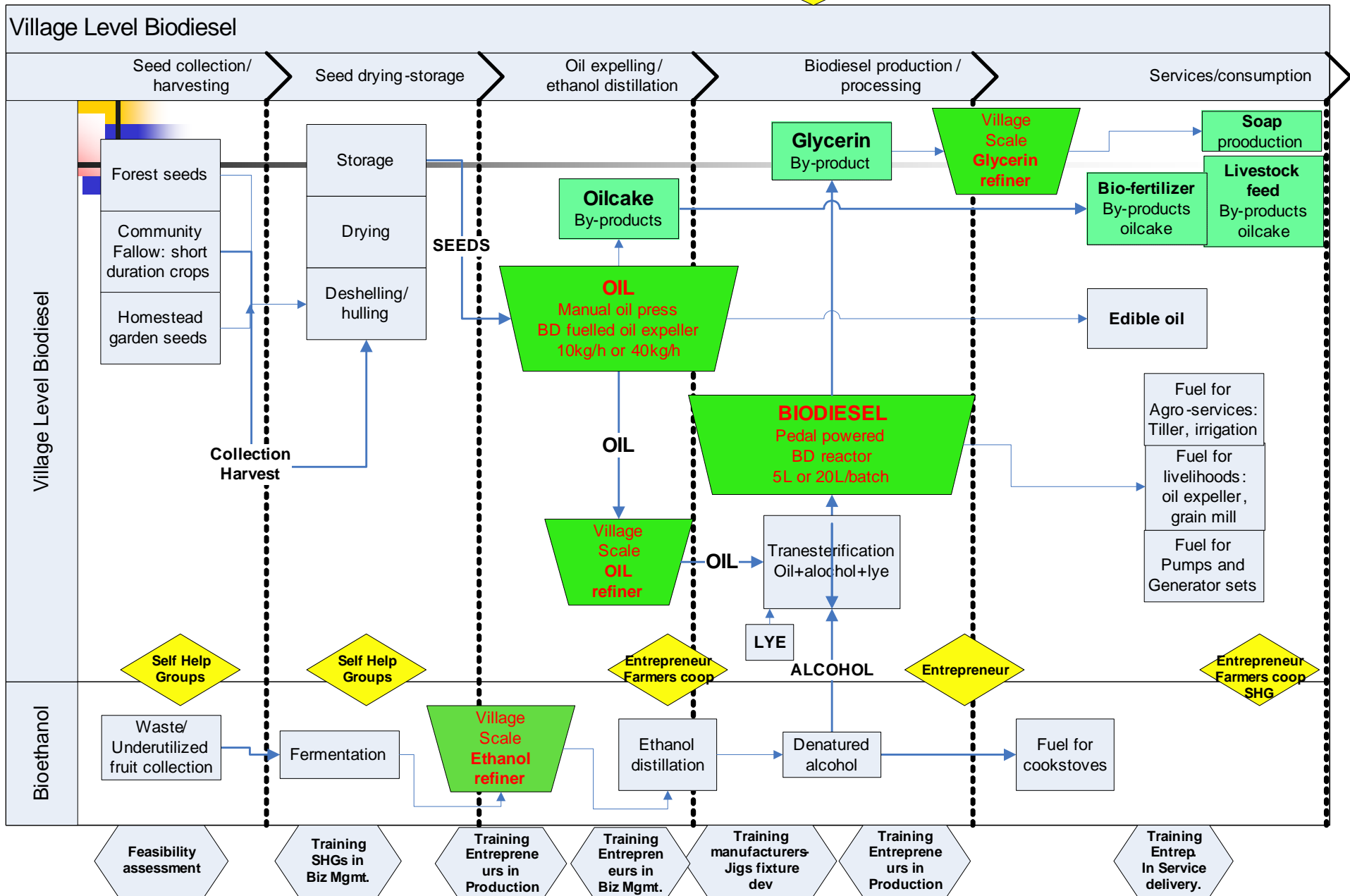
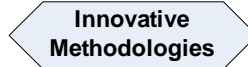


Role Transformations: (2) Post-VLB



Role Transformations: (3) VLB – Innovative Technologies, Methodologies & Actors

INDEX/KEY:





Micro-finance linkages
 MFIs, Banks, Green investors (Venture Capitalists), Revolving Funds, CDM/VERs/Fair Trade

Strategies for Raw Material Security & Market linkages
 SHG Groups, Farmers' Co-ops, Stores?, Cash now - SHG?, Role of Traders? (who now buy seeds for bulk sale of excess oils)

Entrepreneurs
 Manual Oil Press, BD Production, BD Services, Mobile Pumpset(s), Lighting, BD-fuelled Oil Expeller(s)

Self-sufficiency in edible oils
 (stop edible oil seeds leaving area, stop cash outflow to buy edible oil from outside)

Self-sufficiency in oil cake (retain all non-edible oil cake in area, build-up soil fertility - reduce bogodo)

Empowering Gram Sabhas
 to initiate legal changes in favour of biodiesel (RCDC-ELDF-SICI)

Policy Workshop to overcome excise barriers (RCDC-ELDF-UW-SICI)

Capacity bldg / Training for:
 Entrepreneurs, SHG's (GV/Vas/OutR), Farmers (SDC/MSSRF?), Gram Sabhas (RCDC-ELDF-SICI?), VISIONS SEPS?

Livelihood Services Demo's and Business Plan Packages
VISIONS SEPS?

Technology Packaging/IP Rights Protection
VISIONS SEPS?

Avoid Comparison with price of petro-diesel
 Integrate biodiesel with livelihoods - Vasundhara, Biodiesel on Wheels - AFPRO

