

You can view the consolidated reply at <http://www.solutionexchange-un.net.in/food/cr/cr-se-food-wes-25070701.htm>



**Food and Nutrition Security
Community**



Environment

Water Community



Solution Exchange for the Food & Nutrition Security Community Solution Exchange for the Water Community Consolidated Reply

Query: Biofuel Plantation through Community Groups - Experiences

**Compiled by Gopi N. Ghosh and Pankaj Kumar, Resource Persons and T. N. Anuradha and Ramya Gopalan, Research Associates
27 August 2007**

**From [Rishu Garg](#), Association for Rural Advancement through Voluntary Action and Local Involvement (ARAVALI), Jaipur
Posted 25 July 2007**

Dear Members,

I am Rishu Garg and I work for ARAVALI, Jaipur. ARAVALI is a Government of Rajasthan initiated NGO working towards bridging the gap between government and non-government organisations. We work with partner organisations across the state on issues of Natural Resource Management (NRM), Microfinance and livelihoods providing sectoral inputs as well as for developing effective voluntary institutions. Besides, we also take up research and policy advocacy work and try to involve our partners into it.

Recently the government of Rajasthan has come out with a notification on allotment of wastelands for biofuel production. According to the rules the wastelands in the state can be allotted to Self-Help Groups (SHGs), community based organisations, panchayats, societies, companies and government undertakings with Below Poverty level (BPL) membership. The land allotment is for twenty years; a premium and yearly fees is charged for such allotments to companies, societies and government undertakings, for examples some other salient features in the programmes like mandatory installation of micro-irrigation system and provision of mortgaging the land from financial institutions etc. As a result a number of companies and other private institutions are vying for allocation of wastelands of the state. This is also (potential) livelihood opportunity for poor people of the state, therefore the poorest (BPL groups and community based organisations) must seize the opportunity.

I think the Solution Exchange communities can pour in with their experiences on biofuel plantation and learning from implementation of plantation projects, with high gestation period (at least four to five years for seed production), low returns and an element of privatization of Common Property Resources.

Apart from the above stated issues I request members to respond on the three specific queries below:

- Which are plant species other than *Pongamia glabra* (Karanj) and *Jatropha curcas* (Jatropha) that could qualify for biofuel plant?
- What have been the past experiences of promotion of these biofuels in semi-arid and arid regions (rainfall up to 450-500 mm)?
- Experiences of SHGs in taking up *Jatropha* and other plantation as a livelihood promotion activity?

I would be thankful to the community if some success or failure stories or any pertinent information regarding the same could be also be shared through this platform.

Responses were received, with thanks, from

1. [Usha Srinivasan](#), Development Alternatives, New Delhi
2. [B. S. Choudri](#), The Energy and Resources Institute (TERI), Goa
3. [Mrinalinee Vanarase](#), Ecological Society, Pune
4. [S. M. R. Prasad](#), JSW Steel Ltd, Vidyanagar
5. [K. V. Peter](#), Kerala Agricultural University, Thrissur
6. [B. L. Menaria](#), Indian Institute of Forest Management, Bhopal
7. Raj Ganguly, GMED, United States Agency for International Development (USAID), Jaipur ([Response 1](#); [Response 2](#))
8. [S. C. Prasad](#), Gramin Vikas Trust, Ranchi
9. [Somit Krishna](#), United Nations Development Programme–Global Environment Facility (UNDP-GEF) Land Degradation Project, Bhopal
10. [Dillip Kumar Das](#), ANTODAYA, Kalahandi
11. [Tripti Mathur Mehra](#), Indian Railways, Hyderabad
12. Ardhendu S. Chatterjee, Development Research Communication and Services Centre (DRCSC), Kolkata ([Response 1](#); [Response 2](#))
13. Viren Lobo, Society for Promotion of Wastelands Development (SPWD), Udaipur ([Response 1](#); [Response 2](#); [Response 3](#))
14. M. K. Dasgupta, Visva Bharati Santiniketan, Bolpur ([Response 1](#); [Response 2](#))
15. [Krishna Kumar](#), Centre for Community Economics and Development Consultants Society (CECOEDECON), Jaipur
16. [Amitangshu Acharya](#), Natural Resource Management Division, Winrock International India, New Delhi
17. [G. Mishra](#), Directorate of Economics and Statistics Office, Port Blair
18. [R. Jagannathan](#), FABCON Engineers (P) Ltd., Chennai
19. [Pradeep Mohapatra](#), UDYAMA, Bhubaneswar
20. Rishu Garg, Association for Rural Advancement through Voluntary Action and Local Involvement (ARAVALI), Jaipur ([Response 1](#); [Response 2](#))
21. [G. Nirmala](#), Central Research Institute for Dryland Agriculture (CRIDA), Hyderabad
22. [R. Sreedhar](#), Environics Trust, New Delhi
23. [Rahul Banerjee](#), Khedut Mazdoor Chetna Sangath, Indore
24. [R. Santhanam](#), Indian Society for Agriculture Professionals (ISAP), New Delhi
25. [H. S. Sharma](#), Independent Consultant, New Delhi
26. [Mahtab S Bamji](#), Dangorai Charitable Trust, Hyderabad
27. [B. L. Kaul](#), Society for Popularization of Science, Jammu

28. [C. R. Bhatia](#), Independent Consultant, Mumbai
29. [Pankaj Kumar S.](#), UNDP, New Delhi
30. [Vanisha Nambiar](#), Department of Nutrition, The M. S. University of Baroda, Vadodara
31. [Sudhirendar Sharma](#), The Ecological Foundation, New Delhi
32. [Surendra Kumar Yadav](#), National Institute of Health and Family Welfare, New Delhi
33. [Nafisa Barot](#), Utthan, Gujarat

Further contributions are welcome!

Summary of Responses

The query sought suggestions and experiences on biofuel production through community groups, like self-help groups (SHGs). Members responded by listing major plant species that can be used for biofuel, key concerns in the sector, suggested strategies to address various issues, and looked at alternative sources to biofuel. They also shared experiences promoting biofuels.

Respondents listed **various plant varieties**, in addition Karanj and Jatropha plants, from which it is possible to produce bio-diesel including: bamboos, bhikal, canola, castor, casuarina, cheura, coconut, jatropha (ratanjot), jojoba, kokum, kusum, mahua, mustard, nagchammpa, neem, nohar, oilpalm, pilu, pongamia (karanj), rapeseed, rubber, sal, soybean, sunflower, and undi.

Another possible source of biofuel mentioned was briquettes made from biomass, like Ipomoea and Lantana.

Discussing the **benefits of biofuel promotion**, respondents argued a well-designed biofuel programme, could help regenerate degraded wastelands along with providing employment (and perhaps land) to the poorest of the poor. Biofuel promotion do not require modification of conventional diesel engines and biofuels are cleaner than petroleum based fuels, because they contain almost no sulphur and aromatics, and have 'built-in oxygen' enabling them to burn fully. Moreover, biofuels are a renewable resource, benefiting not only farmers, companies, and consumers, but also the environment.

Sharing experiences of biofuel promotion, members mentioned an organization training farmers in cultivating Jatropha Carcus in [Goa](#), a women's SHGs working to convert biomass waste into briquettes in [Madhya Pradesh, Uttarakhand and Himachal Pradesh](#), and tribal communities in [Maharashtra](#).

Along with highlighting the benefits of biofuels, discussants outlined several **urgent issues related to biofuel promotion**. They questioned the approach of cultivating biofuel plants such as Jatropha on wastelands, pointing out there are no real 'wastelands' in the country. Most land with the capacity to grow anything is in use, especially by the very poor, who are dependent on these lands. [International](#) case studies demonstrate that monoculture cultivation of biofuels on wastelands could cause a drastic fall in biodiversity, adversely affecting the livelihoods of the poor. Similarly, the current trend to divert good agricultural lands to growing jatropha, members felt was alarming and they supported measures to ensure that biofuel cultivation is restricted to wastelands and low productivity lands (like field bunds). Participants also voiced their concerns over whether production of biofuels for the unpredictable export markets could possibly contribute to national fuel self-sufficiency.

Additionally, discussants listed the **risks in producing biofuel**. These included the need for high external inputs (fertilizers, irrigation, etc.) to achieve economical rates of production; the necessity for a minimum scale of production to make plant extraction viable; the lack of standardized packaging practices along with no enforcement of prices (i.e. not minimum support price) and regulations; the unreliability of existing plant material and the long gestation period for raising Jathopha plants. Members cited a case from [Andhra Pradesh](#), highlighting how the lack of market support resulted in farmers

growing *Jathropa* suffering major losses and the situation in [Jammu and Kashmir](#) where despite government support farmers did not have sufficient market support.

To tackle some of the above issues, respondents provided a number of **suggestions**:

- Ban monoculture of biofuel species, instead promote biomass landscaping, with local species (like lemon grass, medicinal herbs, fibre crops) that fit well with local ecosystems and provide additional income, and also encourage mixed plantations and intercropping of *Jatropha* with castor and legumes (like pigeon peas and cowpeas) to retain soil productivity
- Prohibit cultivation of *Jatropha* on croplands, restrict it only to wastelands, field bunds, waterlogged wastes and only plant *Jatropha*, castor, pongamia, and other non-edible oilseed bearing trees/shrubs as a live fence/windbreaks or along riverbanks/seashores
- Keep land ownership strictly in hands of local farmers/communities, do not allow leasing of land to companies with farmers/SHGs growing and supplying *Jatropha* seeds to companies that then extract biofuel from the seeds
- Use satellite imagery to help develop watersheds
- Achieve village-level self-sufficiency in biofuels, sell only surplus biofuel, balancing the need for food production and fuel
- Maintain an inventory and integrate various actors working in biofuel through a comprehensive policy and approach towards biofuels including production, minimum support price, protection of producers through technical support, micro-insurance, etc.
- Develop a biofuel programme to address sustainable land use and promote/conserv e indigenous biofuel varieties, as well promote livelihoods for the poorest of the poor

Participants also discussed **alternatives to promoting of biofuel plants** (like *Jatropha*). They worried the government was ignoring the use of bio-ethanol (e.g. agricultural wastes) for biofuel and focusing too much on bio-diesel. Additionally they felt it makes more sense to divert current investments towards raising productivity of wastelands to support sustainable and bio-diverse production. This would enable farmers to grow more food and make bio-ethanol from agricultural wastes. The current drive for bio-diesel also ignores, members noted the need to enforce efficiency measures to conserve existing fossil fuel resources.

Respondents agreed biofuels are vital for future energy self-sufficiency, and reiterated the impact of the current biofuel strategy of using common lands and urging the very poor to use biofuel production as a livelihood strategy. They stressed to the need to assess the productivity and economic issues related to biofuel production as well as examining closely other alternative renewable energy sources. Finally, members questioned the necessity in using scarce public investments giving due consideration to the absence of a national policy that addresses biodiversity, livelihoods and economic concerns related to biofuels.

Comparative Experiences

Goa

Extracting Biodiesel from *Jatropha Carcus* (from [Ardhendu S Chatterjee](#), *Development Research Communication and Services Centre (DRCSC), Kolkata*)

The [Pilar Nature Farm](#) has been training farmers in cultivating *Jatropha Carcus* in Panjim. A farmer can extract oil from the fruits, which can be transformed into bio-diesel after etherification. This bio-diesel can be used directly in cars, tractors, water pumps, etc. The oil extract can also serve as organic manure for producing organic food.

Jammu and Kashmir

Lack of Adequate Biofuel Marketing Services (from [B. L. Kaul](#), *Society for Popularization of Science, Jammu*)

In Udhampur district, a biofuel plantation was established. Jatropha grows in this hilly district. The government provided a rich seed variety to farmers, who successfully cultivated Jatropha, a source of bio-diesel. However, the farmers had problems marketing the seed, because of the lukewarm response to biofuel across the country, which has hindered large-scale cultivation of Jatropha.

Andhra Pradesh

Need for Non-Private Marketing Processes (from [G. Nirmala](#), *Central Research Institute for Dryland Agriculture (CRIDA), Hyderabad*)

The State Government is promoting biofuel plantations with the private sector publicizing the marketing of produce. However, this initiative has not benefited farmers. Farmers have sown in lakh hectares and incurred losses because they lack a range of support systems, such as packaging cultivation practices on plant protection. Therefore, the Central Research Institute for Dryland Agriculture ([CRIDA](#)) has started standardizing packaging and is promoting biofuel through the Krishi Vigyan Kendra.

Maharashtra

Large Scale Jatropha Plantations Providing Hope for the Tribals (from [Mrinalinee Vanarase](#), *Ecological Society, Pune*)

A man from a local tribe living in Malegaon district has been planting Jatropha saplings along with some other members of his community. Most of the community had forgotten there were Jatropha plants growing on their land. Then private firms offered to pay them for growing Jatropha in their land, because of the new biodiesel projects being planned in response to India's plans to replace around 5% of its current 40 million tonnes of annual diesel consumption with Jatropha bio-diesel. [Read more](#)

Madhya Pradesh, Uttarakhand and Himachal Pradesh

Livelihood Generation from Waste Biomass (from [Usha Srinivasan](#), *Development Alternatives, New Delhi*)

Women groups are involved in converting biomass waste into briquettes that are used in place of charcoal to meet various energy needs. The women harvest the biomass from plants like ipomea and lantana. They are trained on how to convert the biomass into char, which is sold to local entrepreneurs. Then the entrepreneurs turn it into briquettes using the [briquetting technology](#) developed by the organization Development Alternatives. The groups are earning about 25% of the capital cost. [Read more](#)

International

Brazil

Policy and Regulatory Instruments to Support Ethanol Production (from [Ramya Gopalan](#), *Research Associate*)

Here, large-scale production of biofuels is based on ethanol. Difficulties in sugarcane industry influenced the creation of ethanol program. Credits at low interest rates assured investments and guaranteed fixed prices for sugarcane/ ethanol reduced risks. After first initiation in 1970s, the government in 1993 defined by law share of ethanol in fuel blend to be 15-25%. Lower taxes incited consumers to buy ethanol cars and ethanol prices reduced to 65% of gasoline price. [Read more](#)

Related Resources

Recommended Documentation

Good Quality Briquettes from Invasive Biomass (from [Usha Srinivasan](#), *Development Alternatives, New Delhi*)

Development Alternatives; 2006

http://www.equatorinitiative.net/files/2006-0100_India_SocietyforDevelopmentAlternatives.doc (Size: 85 KB)

Provides information on the process of converting biomass to briquettes involving women groups and gives evidence of initiative's technological, social, economic and environmental sustainability

From [B. S. Choudri](#), *The Energy and Resources Institute (TERI), Goa* and [Amitangshu Acharya](#), *Natural Resource Management Division, Winrock International India, New Delhi*

Rural Energy Production from Bioenergy Projects

Centre for Land Use and Water Resource Research (CLUWRR)

http://www.cluwrr.ncl.ac.uk/research_projects/ongoing_research/prj_Re-Impact.php

Focuses on providing regulatory and impact assessment frameworks, furthering sustainable biomass production policies and reducing associated risks

Rural Energy Impact

Centre for Land Use and Water Research, Nairobi COP Meeting; November 14, 2006

http://www.cluwrr.ncl.ac.uk/related_documents/Re-Impact/Nairobi-Partners%20meeting.pdf (Size: 341 KB)

Describes the focus of intended study towards the impact of promotion of world forestry programmes are for their fuel wood, bio-fuel, and carbon sequestration (CDM) benefits

From [Mrinalinee Vanarase](#), *Ecological Society, Pune*

Maharashtra to Offer 30,000ha to Private Sector for Jatropha Cultivation

By Rahul Wadke; *The Hindu Business Line, Mumbai*; November 15, 2005

<http://www.blonnet.com/2005/11/16/stories/2005111601871300.htm>

Details of the state government plan to cultivate Jatropha on wastelands- 50% to be given to underprivileged women and self-help groups, and 50% of the land to private sector companies

China, India Face Water Risk from Biofuel: IWMI *

Adam Cox, *Yahoo! News*, 15 August 2007

http://news.yahoo.com/s/nm/20070815/sc_nm/biofuels_china_dc

Discusses how present plans by China and India for biofuel production could mean they face water scarcity by 2030

**Offline Contribution*

Biofuel Policy: Lukewarm Response from Industry (from [B. L. Kaul](#), *Society for Popularization of Science, Jammu*)

By R. Balaji; *The Hindu Business Line, Chennai*; October 19, 2005

<http://www.blonnet.com/2005/10/20/stories/2005102002291200.htm>

Reports on the lukewarm response from the industry on the biofuel policy of the Union Petroleum Ministry, because of the fixed price for biofuel, which does not reference the raw material price

Wild Jatropha Stirs Hope of Biodiesel Bounty in India (from [Mrinalinee Vanarase](#), *Ecological Society, Pune*)

Environment Society of Australia; November 2, 2006

<http://enviro.org.au/enews-description.asp?id=668>

Article on growing hopes among tribals in Malegaon, who are getting into Jatropha plantations, to earn a profit from Jatropha, because it is being examined as potential fuel source for cars

From [Viren Lobo](#), Society for Promotion of Wastelands Development (SPWD), Udaipur

AgroFuels – Reality Check

Biofuel Watch

http://www.biofuelwatch.org.uk/docs/agrofuels_reality_check.pdf (Size: 628 KB)

Document focuses on particular types of 'biofuel' or agrofuel, looking at the intensive, industrial way its produced, generally as monocultures, covering thousands of hectares, in the global south

How Biofuel Companies are Lobbying against Basic Environmental Safeguards: An Analysis of Industry Responses to the EU Biofuel Directive Consultation 2006

By Almuth Ernsting; Biofuel Watch; September 18, 2006

[http://www.biofuelwatch.org.uk/biofuelindustryresponses\[1\].pdf](http://www.biofuelwatch.org.uk/biofuelindustryresponses[1].pdf) (Size: 126 KB)

Responses of various stakeholders-industry, environmental NGOs, government and private citizens on the EU biofuel Directive requiring 5.75% of all transport fuel to come from bio fuels

From [Viren Lobo](#), Society for Promotion of Wastelands Development (SPWD), Udaipur

Constraints in Jatropha Cultivation Perceived by Farmers in Udaipur District, Rajasthan

H.R. Meena and F.L. Sharma, International Journal of Rural Studies (IJRS), Article 5, Vol. 13 No. 2, October 2006

<http://www.solutionexchange-un.net.in/food/cr/res2507073.pdf> (Size: 29 KB)

Aims at identifying the constraints perceived by farmers in adopting recommended Jatropha cultivation practices focusing on Udaipur where Jatropha is grown by a large number of farmers

Agrofuels (from [Amitangshu Acharya](#), Natural Resource Management Division, Winrock International India, New Delhi)

Seedlings, Grain; July 2007

http://www.grain.org/seedling_files/seed-07-07-en.pdf (Size: 3.21 MB)

Studies the agro-fuel boom in world, focusing on corporate sector involvement, the Jatropha dilemma and also recommends ten resources with more information on biofuels

Biofuels, Climate Change and GM Crops – Who is Really Benefiting? (from [Pradeep Mohapatra](#), UDYAMA, Bhubaneswar)

By Rod Harbinson; Environment Programme, Panos, London

<http://www.solutionexchange-un.net.in/food/cr/res25070701.doc> (Size: 27 KB)

Looks at some of the controversy regarding genetically-engineered biofuels, and their suggested role in fighting climate change

Biofuels for Transportation: Global Potential and Implications for Sustainable Agriculture and Energy in the 21st Century (from [Mahtab S. Bamji](#), Dangorai Charitable Trust, Hyderabad)

Worldwatch Institute, Washington D.C.; June 7, 2006

<http://www.solutionexchange-un.net.in/food/cr/res25070702.pdf> (Size: 1.4 MB)

Details opportunities and limits, of global biofuel production/ use in terms of energy, agriculture, environment, rural development and economics with advice for action

Fuel for Development? The Implications of Growing Demand for Biofuels from the South (from [Raj Ganguly](#), GMED, United States Agency for International Development (USAID), Jaipur)

By Göran Eklof; Swedish Society for Nature Conservation; 2007

<http://www.snf.se/pdf/rap-trafik-biofueldev.pdf> (Size: 964 KB)

Critically examines the increasing demand for biofuels and looks at the potential adverse impacts on local ecosystems and communities

From [Pankaj Kumar S](#), UNDP, New Delhi

Common Property Resources (CPRs) and Dynamics of Rural Poverty in India's Dry Regions

By N. S. Jodha; FAO Corporate Document Repository

<http://www.fao.org/docrep/v3960e/v3960e05.htm>

Provides the context of CPRs and their functions, and argues that biofuel promotion programs therefore need to be circumspect about using common lands for growing biofuels

Food or Fuel?

Foundation for Alternative Energy, Journey to Forever

http://journeytoforever.org/biofuel_food.html

Article examines the common objection to biomass energy production- that it diverts agricultural production away from food crops, which could lead to food insecurity problems in poor countries

Biofuels Directive Review and Progress Report - Public Consultation

European Commission (EC)

<http://ec.europa.eu/energy/res/legislation/doc/biofuels/contributions/citizens/green.pdf> (Size: 78 KB)

Provides a citizen's response to the EC Directive, arguing for the concern that biofuel promotion could destroy rainforests, natural grasslands, wet-lands, and other biodiversity

Doing More Harm than Good

Channel 4; 19 February 2007

<http://www.channel4.com/player/v2/player.jsp?showId=4934>

Video showing how the drive to promote biofuel production in the European Union increases global warming

An EU Strategy for Biofuels

Biofuels, Agriculture, European Commission

http://ec.europa.eu/agriculture/biomass/biofuel/index_en.htm

Discusses the Action Plan adopted by EU, supporting biofuels aimed at reducing greenhouse gas emissions, diversifying fuel supply sources, and offering new income opportunities in rural areas

Drivers for Bioenergy

United Nations Environment Programme Division of Technology, Industry and Economics (DTIE)

<http://www.unepdtie.org/energy/act/bio/Drivers.htm>

Discusses the main drivers - key economic, environmental and social advantages, which make bio-energy an attractive option to replace conventional fossil fuels

From Rishu Garg, Association for Rural Advancement through Voluntary Action and Local Involvement (ARAVALI), Jaipur; [response 2](#)

From Gas to Hot Air

By Darryl D'Monte; Hindustan Times; August 7, 2007

Click [here](#) to read

Editorial questions whether biofuels really answers consumption/environmental problems and raising issues like consequences of large scale Jatropha cultivation, use, etc.

Report of Expert Committee on Integrated Development of Water Resources

<http://www.solutionexchange-un.net.in/food/cr/res25070705.pdf> (Size: 1 GB)

Assesses water resources and requirements of Rajasthan estimating limited availability of safe water, which provides the context to question the cultivation of Jatropha seedlings in the state

From [T. N. Anuradha](#), Research Associate

IOB, Classic Jatropha Tie Up To Promote Biofuel

The Hindu, Business Line; December 2, 2005

<http://www.blonnet.com/2005/12/02/stories/2005120202781900.htm>

Reports on a collaboration between Indian Overseas Bank (IOB) and Classic Jatropha to establish bio-diesel manufacturing plants, including how IOB offers farmers loans for Jatropha cultivation

'Pongam Oil' Gaining Acceptance as Biofuel

By R. Balaji; The Hindu, Business Line, Chennai; September 22, 2005

<http://www.blonnet.com/2005/09/23/stories/2005092301661900.htm>

Reports on increased focus by industry and the state governments of Tamil Nadu and Karnataka on cultivating Pongamia for biofuel

Is Biofuel The Energy of Future?

By R. Balaji; The Hindu, Business Line; September 20, 2005

<http://www.blonnet.com/2005/09/20/stories/2005092003001100.htm>

Discusses how the huge oil import bill and the price uncertainty can be mitigated by cultivating biofuel crops on the over 60 million hectares of wasteland available in India

Biodiesel - Is Jatropha India's Solution?

By Syamala Ariyanchira; Frost; April 25, 2005

<http://www.frost.com/prod/servlet/market-insight-top.pag?docid=36738184>

Analysis of biofuel as an alternative way to address India's energy resource and capacity problems, and examines how it could support a biofuel industry

From [Ramya Gopalan](#), Research Associate

Biofuel: Good Idea, Bad Practice

By Sunita Narain; Down to Earth; May 15, 2007

http://www.downtoearth.org.in/editor.asp?foldername=20070515&filename=Editor&sec_id=2&sid=1

Editorial on how biofuels are the wave of the future and argues although it seems imperative, due consideration with regard to its implementation is required to achieve desired aims

Biofuels: Towards A Greener and Secure Energy Future

By P. P. Bhojvaid; The Energy and Resources Institute (TERI); 2006

Ordering details at

http://bookstore.teriin.org/book_inside.php?material_id=400&highlight_id=379&displayDetails=1#379

(paid publication)

Provides an assessment of current practices and knowledge on the production, conversion, and use of biofuels, capturing the experiences of a diverse group

Policy Note on Regulatory Issues in Biofuels

By Anandajit Goswami; The Energy and Resources Institute (TERI); 2006

Ordering details at http://bookstore.teriin.org/book_inside.php?material_id=415 (paid publication)

Brings together discussions held in the forum aimed at highlighting issues to be addressed by various stakeholders to design regulatory frameworks for biofuels

Biofuels in South Asia: An Overview

By K. V. Raju; Asian Biotechnology and Development Review, Vol. 8 No. 2; 2006

http://www.ris.org.in/article1_v8n2.pdf (Size: 90 KB)

Discusses the use of biofuels in reducing the dependence on petroleum import and catalysing rural economic development crucial to the South Asian context

Pro-Poor Biofuels Outlook for Asia and Africa: ICRISAT's Perspective

International Crops Research Institute for the Semi - Arid Tropics (ICRISAT); March 5, 2007

<http://test1.icrisat.org/Investors/Biofuel.pdf> (Size: 858 KB)

Working paper outlines the growing importance of biofuels, identifies potential biofuel crops, discusses opportunities and challenges, and highlights emerging biofuel enterprise models

Is Brazilian Biofuels Experience A Model For Other Developing Countries?

By Professor Arnaldo Walter; FEM and NIPE, State University of Campinas, Unicamp, Brazil; 2006

http://www.rural-development.de/fileadmin/rural-development/volltexte/2006/06/ELR_dt_22-24.pdf

(Size: 74 KB)

Describes the Brazilian experience with large scale ethanol production and discusses to what extent it can be a model for other developing countries.

Recommended Contacts and Experts

Fr. Inacio Almeida, Chairman of the Pilar Nature Farm Trust, Goa (from [Ardhendu S. Chatterjee](#), Development Research Communication and Services Centre (DRCSC), Kolkata)

Pilar Nature Farm, behind Fr Agnel Degree College, Neura Road, Goa; Tel: 919850610465;

<http://oheraldo.in/node/14751?PHPSESSID=6b2a4af5e64dd41e55e16ac5599f3f8c>

*Has experience producing *Jatropha Carcus*, a plant, which can be used as bio-diesel in vehicles*

Prof. Ian Calder, Director of Centre for Land Use and Water Research, United Kingdom (from [B. S. Choudri](#), The Energy and Resources Institute (TERI), Goa)

3rd floor, Devonshire Building, University of Newcastle Upon Tyne, Newcastle Upon Tyne, Tyne and Wear NE1 7RU UK; Tel: 44-0191-2464882; i.r.calder@ncl.ac.uk; <http://www.ceg.ncl.ac.uk/profiles2/nirc1>

*Extensively researched biofuels and the associated biophysical and societal impacts under present and future climates; presently working on issues of *Jatropha* cultivation*

Recommended Organizations and Programmes

Central Research Institute for Dryland Agriculture (CRIDA), Hyderabad (from [G. Nirmala](#))

Contact Director, CRIDA, Santoshnagar, Hyderabad 500059 Andhra Pradesh; Tel.: 91-40-4530161; Fax: 491-40-531802; <http://www.crida.ernet.in/>

Standardized packages of practices on biofuel cultivation and plant protection promoted by its Krishi Vigyan Kendra to prevent farmers from incurring losses in the absence of these packages

National Oilseeds and Vegetable Oils Development Board (NOVOD), Ministry of Agriculture, Gurgaon (from [Mrinalinee Vanarase](#), Ecological Society, Pune)

86/Sector 18, Institutional Areas, Gurgaon 122015 Haryana; Tel: 91-124-2343181; Fax: 91-124-2343281; novod@ndf.vsnl.net.in; <http://novod.nic.in/itbon.htm>

*One of NOVOD's programmes include production of bio-diesel through *Jatropha* by developing appropriate technologies and ensuring quality plantations*

Association of the Rajasthan Jojoba Plantation and Research Project, Jaipur (from [Dillip Kumar Das](#), ANTODAYA, Kalahandi)

Pant Krishi Bhawan, Jaipur 302005 Rajasthan; Tel: 91-141-2227499; Fax: 91-141-2227499; ajorp_jp1@sancharnet.in, jojoba@ajorp.com; <http://www.ajorp.com/index.htm>

Has been successful in raising Jojoba varieties with high yielding, high quality and high oil-content, suggested as an option for bio fuel

Foundation for Alternative Energy (FAE), Slovakia (from [Pankaj Kumar S](#), UNDP, New Delhi)
P.O. Box 35, 85 07 Bratislava, Slovakia; bedi@bratislava.telecom.sk; <http://www.fae.sk>

FAE opines that the issue of food security versus fuel is an oversimplification of a complex issue stressing that the issue needs to be looked at against food supply and demand

Recommended Tools and Technologies

TARA Briquetteers (from [Usha Srinivasan](#), Development Alternatives, New Delhi)
<http://www.tara.in/tara/websitepages/TARADefault.aspx?catalogid=133>

Clean fuel technology that converts biomass wastes from plants like ipomea, lantana, mustard, cotton and arhar to valuable non-wood charcoal briquettes

Recommended Portals and Information Bases

Biofuel Watch (from [Viren Lobo](#), Society for Promotion of Wastelands Development (SPWD), Udaipur)
<http://www.biofuelwatch.org.uk/>

Campaigns against using bio-energy from unsustainable sources; site contains info on biofuels linked to accelerated climate change, deforestation, bio-diversity losses, and human rights abuses

Recommended Upcoming Events

5th International Biofuels Conference, February 7-8, 2008, New Delhi (from [Ramya Gopalan](#), Research Associate)

Hotel Le Meridien, Janpath, New Delhi; Important Dates: August 31, 2007: Abstract Submission; September 15, 2007: Acceptance Notification; November 30, 2007

For Paper Submission Contact: B. Anil Kumar; Mobile: 91-9818756602; anil@winrockindia.org;
http://www.winrockindia.org/pdf/5th_intl_bio-con.pdf (Size: 110 KB)

Provides exposure to ideas and technologies, networking opportunities with specialists and understanding the regulatory framework, challenges, and socio-economic factors

Related Consolidated Replies

[Details of Biofuel Operations](#), from Ravi Prasad Garimella, Balaji Industrial and Agricultural Castings, Hyderabad (Experiences) Water Community and Food and Nutrition Security Community. Issued 16 November 2006 (Size: 246 KB)

Discusses alternate energy options through large-scale bio fuel production in India, covering biofuel sources, jatropha and alternatives, programmes, policies and economic instruments

[Utilizing Agricultural Biomass for Feed](#), from Vijay Sardana, CITA, New Delhi (Experiences) Issued 1 June 2006 (Size: 150 KB)

Provides a range of insights, analytical perspectives and techno managerial options that could be considered for better utilization of this potential farm resource.

[Increasing Cultivation of Oilseeds & Production of Edible Oils](#), from Ramesh Chand, NCAP New Delhi (Advice) Issued 4 August 2005 (Size: 132 KB)

Bottlenecks and challenges that Indian farmers face in producing more oilseeds to replace imports, and the various nutritional benefits of increasing vegetable oil consumption

Responses in Full

[Usha Srinivasan](#), Development Alternatives, New Delhi

Development Alternatives has adapted and developed a **Charring and Briquetting Technology package** using invasive and waste biomass for fuel. The briquettes are a smokeless and cost-effective alternative to wood and charcoal addressing the cooking and heating needs of households and small eatery businesses.

After researching the social, environmental and economic aspects, we developed an indigenous process to convert the invasive *Ipomoea* and *Lantana camara* (not used by man or animals) into high quality briquettes in an economical and environmentally sound manner. A set of quality, affordable and easy-to-use machines and tools were optimized for the rural setting using the renewable weeds while providing an opportunity for income generation.

The enterprise model:

- Village groups (women) harvest and cut the biomass
- They burn it in 3-4 pyrolysis drums; Pyrolysis is a charring process
- The char is sold to the community entrepreneur per season (4 months)
- They buy the char from 4-5 such groups
- They then grind and blend the char, compressing it into briquettes

The profit earned is around 25% of the capital cost, making up the capital in about 2-3 years.

The final product: the **briquette** – is superior to traditional fuels like charcoal and:

- Addresses energy needs
- Burns without smoke
- Is energy rich - high calorific value of > 4500 KCal/kg
- Priced lesser compared to charcoal - a cost effective alternative, affordable by peri urban households, village tea shops and small hotels
- Reduces dependency on illegal felling of trees, allows valuable plants to grow, and decreases the risk of forest fires.

The product has a combined impact of conserving the forests and empowering and uplifting members of the most marginalized sections of society. Rural poor, especially women have been targeted and trained in the charring process. Since it has no pre requisites of education or skills and needs a small initial investment, it has generated livelihoods for the poorest of the poor. Each enterprise can create 15-20 livelihoods. The output from two-three such enterprises in villages can be absorbed by a very small neighbouring town.

This model was first tested in Tikamgarh and Datia districts in the state of Madhya Pradesh with the participation of the local community at every stage. Now, working with regional partners, two independent charring and briquetting units are operating profitably in the hill states of Uttaranchal and Himachal Pradesh.

[B. S. Choudri](#), The Energy and Resources Institute (TERI), Goa

You can refer to the following links, which gives valuable information on *Jatropha* studies. European Union funded project is trying to address some of important aspects using case study of India as well.

Rural Energy Production from Bioenergy Projects

http://www.cluwrr.ncl.ac.uk/research_projects/ongoing_research/prj_Re-Impact.php

http://www.cluwrr.ncl.ac.uk/related_documents/Re-Impact/Nairobi-Partners%20meeting.pdf (Size: 341 KB)

Professor Calder (<http://www.cluwrr.ncl.ac.uk/news/>) at The Centre for Land Use and Water Resources Research (CLUWRR), trying to address some of important issues involved in the *Jatropha* cultivation.

I hope you will find this information useful.

Mrinalinee Vanarase, Ecological Society, Pune

Biofuel plantations are a big subject and I am happy you are working on it. Here are some salient points I would like to bring to your notice:

- Land is our definite resource. Thus instead of taking one or two species for plantations we should aim at maximum productivity increase of wasteland. Thus it can be a mix of grasses, shrubs, small and big trees as per the succession stages suitable to the area under consideration. All of this should require low external inputs in terms of water, fertilizers and other maintenance. Plantations based on succession are less vulnerable to drought or other disasters. Such landscape also preserves moisture and humidity in the soil in much better way. So only biofuel plantations should be strictly avoided. Instead the land can be treated as biomass landscape.
 - Local native varieties and climatically appropriate species should be encouraged. *Pongamia pinnata* and *Jatropha curcus* definitely bear oil seeds but there are other species in India for TBO (tree born oilseeds). Details are available on National Oilseeds and Vegetable Oils Development Board (NOVOD) website (<http://novod.nic.in/>). it is always better to look for their saplings in nearby areas rather than importing them from outside for they acclimatize well in that surrounding. Tissue saplings are little expensive, and there are no enough reasons why only tissue culture saplings should be planted.
 - Landscape topography, soil depth and texture, water and moisture are very important parameters of species selection and composition. Use stream sides for Pongam, it performs better and also helps enhancing riparian corridor. Such ecological niche of every plant should be taken into consideration.
 - Avoid monoculture of *Jatropha* in any circumstances. It has to be intercepted with other varieties and cover types at places.
 - You are asking for examples, there are examples of pongam plantations in Konkan area of Maharashtra and *Jatropha* plantations in Buldhana (Maharashtra). There are lots of plantations all over India. But they are not done in above mentioned way. There is no project to the date in my information carried out in above mentioned way but I would definitely like to help if anybody is interested.
-

S. M. R. Prasad, JSW Steel Ltd, Vidyanagar

Bio fuel has become commercially viable. We have seen in places like South America, bio fuels are being grown in commercial scales. EU is planning major initiatives in this. One concern of mine is whether the increased emphasis on the bio fuels will lead to food security issue. Since the lucrative bio fuel will wean away the farmers from food crops, there is a need to restrict the bio fuel growth on wastelands.

It is also possible to get carbon credit under Kyoto protocol if the growth is large. I think a viable size will be about 2000 acres

K. V. Peter, Kerala Agricultural University, Thrissur

The Planning Commission, Government of India has identified following plants for use on bio-fuel projects.

Soybean, Rapeseed Mustard, Castor, Oilpalm, *Jatropha*, Coconut, Jojoba, Bamboos, *Pongamia*, Neem, Mathua, Kusum, Casuarina, Sal, Nohar, Pilu, Bhikal and Undi.

The Energy plantations conceived earlier were to meet household energy needs primarily cooking thus preventing encroachment to forests. Bio-diesel, Ethanol and Bio-gas are products from entirely different biological processes. Every seed has fat and oil, which release energy on combustion. Ethanol is a product from carbohydrates especially available in molasses and celluloses. Bio-gas is a product of fermentation.

We are compiling botanical information on Plants for Renewable Energy.

B. L. Menaria, Indian Institute of Forest Management, Bhopal

Increasing energy demand and spiraling oil prices are putting financial strain on countries and also causing environmental degradation. Energy security has assumed greater significance than ever as energy consumption; food production; improved livelihoods and environmental quality are interrelated. Bio-diesel is a fatty acid ethyl or methyl ester made from virgin or used vegetable oils (both edible and non-edible) as well as animal fats. Biofuels are presently receiving much worldwide attention. The bright prospects are primarily driven by Brazil, the United States and Europe. The trend continues in some Asian economies largely because of the increased economic activity, which has resulted in high growth of primary energy demand specifically for industrial and transportation use.

The important sources for bio-diesel in India are non-edible oils obtained from plant species such as *Jatropha curcas* (ratanjot), *Pongamia pinata* (Karanj), *Calophyllum inophyllum* (Nagchammpa), *Herea brasiliensis* (Rubber) etc. Bio-diesel contains no petroleum, but it can be blended at any level with petroleum diesel to create a bio-diesel blend or can be used in its pure form. Just like petroleum diesel, bio-diesel operates in compression ignition engine, which essentially require very little or no engine modifications because bio-diesel has properties similar to petroleum diesel fuel.

The use of bio-diesel in conventional diesel engines results in substantial reduction of unburnt hydrocarbons, carbon monoxide and particulate matters. Bio-diesel considered as clean fuel since it has almost no sulphur, no aromatics and has about 10 % built in oxygen, which helps it to burn fully. Its higher Cetane number (a measure of the combustion quality of diesel fuel) improves the ignition quality even when blended in the petroleum diesel. In this context, as an indigenous and renewable energy source, use of biofuels can play a vital role in reducing the dependence on petroleum import and catalysing the rural economic development. In the last few years, interest in these green fuels has grown dramatically followed by the equivalent market responses.

**Raj Ganguly, GMED, United States Agency for International Development (USAID), Jaipur
(response 1)**

Mrinalinee has highlighted a very important point in the on going discussion on Biofuel. If the commercial interests on the economical produce, in this case 'bio fuel' is not integrated with the overall sustainable design of the eco-system, then this will also end up as an exploitative industrial venture. In different part of the country, wastelands are being leased out for bio-fuel plantations. There should be policy initiatives towards 'Biomass landscaping' of these fragile lands, before being leased for commercial bio-fuel plantations.

The advantages of integrating bio fuel plants in 'integrated systems' will be immense and will reflect not only on ecological safeguarding (soil, water and biodiversity conservation) but also on commercial outputs (cost effective management, commercial value of other crops). In these kinds of landscape design several other plant species like Lemon grass, Medicinal herbs, Fibre crops like (Agave) etc. which can fit well in the local ecosystem, should be screened out and integrated to generate additional revenue.

S. C. Prasad, Gramin Vikas Trust, Ranchi

Without any controversy, India has to depend upon Bio- Diesel in the years to come. The large area as wasteland can be converted into useful resource to grow Jatropha. As high energy output it will need rich input in form of fertiliser, insecticides and fungicides with alternative live saving water resource. I am placing these facts as it is said to grow in unproductive land.

This will be a serious bottleneck in good harvest of Jatropha. Otherwise it will be serious mistake in achieving the target of much needed bio-diesel. This message of high input for high energy crop need to be popularized sooner the better.

Somit Krishna, UNDP-GEF Land Degradation Project, Bhopal

Bio-fuel plantation initiatives is a good effort to bring in community participation for degraded land or wasteland management especially in the arid or semi arid regions of the country. I would focus my present concern on the issue of exploring the livelihood aspects through such efforts.

In some areas of the country, the bio-fuel extraction process or for that matter oil extraction process by local communities especially tribals is a continuous traditional practice. But the interventions that is planned by development professionals or organizations becomes a strategy to involve the local pro-poor communities for economic well being. This has to be planned in a manner where, before the end product successes one has to plan the complete institutional mechanism to draw a sustained support of the local community has to be chalked out. Since in such practice the benefit sharing mechanisms are long term returns where in the inputs of community involvement as human resource cannot be justified initially by any incentive mechanism except their labour cost.

In this "building on" stage, the community should be approached not for livelihood motives but for institutional and own capacity building and awareness measures of the future benefits and returns. The passage of gestation should be very critically used for the appropriate technology intervention viable and feasible for the community to handle and maintain, as well as to explore the possibilities of support from such agencies to support the cost of technological interventions. Because here the community interests and sustenance if not gained clarity, would fail the effort of the livelihood impact to the community involved in the process, and it would remain a NRM intervention only.

The livelihood interventions through the bio-fuel initiative should also primarily focus on its consumption in the local scenario. The use of the end product as a market should focus and limit itself to the needs and gap filling of local consumers, as it would develop a better and efficient system of consumption from the producer to the end user level, which faces a lot of difficulty when the channels are broadened front end to regional marketing strategies. The goal is to produce locally for the consumption of local end users, if this gets sustained then to extend the value chain to regional limits and so on.

I don't have much details, but there are some palm varieties too which if suited to the dry land or arid region climate can also be explored for bio-fuel extraction processes.

Dillip Kumar Das, ANTODAYA, Kalahandi

What I heard and read from some papers that Jatropha is harmful for the human beings and for the environment also. I have also heard that one species called Jojoba is also used for fuels and there is an Association of the Rajasthan Jojoba Plantation and Research Project (<http://www.ajorp.com/index.htm>)

[Tripti Mathur Mehra](#), Indian Railways, Hyderabad

I have secondary information that oil seed plants like Rapeseed, Sunflower and Canola can also be used for extracting biofuels. But, then it is Jatropha only which is non edible and can be extensively used for the purpose as its indigenous production does not hamper our demand and supply of edible oils.

[Ardhendu S. Chatterjee](#), Development Research Communication and Services Centre (DRCSC), Kolkata (*response 1*)

Regarding the question of Jatropha Plantation, few points may be worth reflection.

Single species plantations are never a good idea, from both soil and water conservation angle; pest build up and long term economic viability. Jatropha, Castor, Pongamia and other non-edible oilseed bearing trees and shrubs can be planted as part of living fence, windbreaks, riverbank/seashore plantation etc.

Dominantly single use species such as Jatropha, is less preferable to multi-use species such as Pongamia. Species selection has to be based first on ecological zone criteria e.g. soil fertility status, climatic factors, wildlife needs etc; then ecosystem criteria i.e. roadside, farm border, riverbank etc comes in question.

India has shortage of fertile land, degraded lands need to be made productive; but only if the chosen species combination can also improve soil fertility, water retention capacity etc. Whenever a community woodlot is designed, we try for multi-use species (food, fodder, fuel, bio-pesticide, medicine etc), multi level planting (to optimise photo synthesis and to reduce erosion), and multi functional (shade, windbreak, bee forage, erosion control). The life cycles of the species used should also be different. Jatropha, Pongamia etc should be seen as part of such Diversified-Integrated agroforestry design rather than one miracle crop.

For practical information on making oil from Jatropha in small scale, you can contact father Almeida at PILAR brothers seminary GOA.

[Viren Lobo](#), Society for Promotion of Wastelands Development (SPWD), Udaipur (*response 1*)

In response to initiatives by the Government in the State of Rajasthan and in other States, SPWD conducted a study across six states to understand the issues related to biofuel production. The study and subsequent workshop proceedings is available with me or SPWD office in Udaipur.

In the study and subsequent developments, the following issues need to be taken to account

- To produce biofuel of the quantities required (20% blending with Diesel around 11 MT) a huge amount of land is required. Biodiesel Mission has estimated the requirement to be 11 m ha.
- The Biodiesel Mission expected to use wastelands for the purpose, but as we know the wastelands are being used for grazing and some identified wastelands even for agriculture. Land, water and grazing are major issues in India and the programme has come across active and passive resistance in many states.
- A similar requirement for biofuel is felt in the EU and USA. Due to constraints of land and competing demand from agriculture, there is expected to be a demand from the South East Asian Countries and including India and China. The lucrative market expected has interested many companies including Reliance, DI Mohan Oils, Adani, IOCI. How this demand for export will increase the demand for land will need to be seen in practice. It is already reflected in the move by various governments to allot land to companies.

- The requirement of large amounts of oil for an expeller unit, means that a large tract needs to be devoted to plantation. Such large tracts are not available. Also there is the issue of productivity in the wild and productivity required to limit the land demand for biodiesel which would otherwise be even 30-40 mha. This requires heavy investments, some studies talk of it being even in the range of Rs. 30,000 per ha. It can well be imagined how small farmers can benefit from this. Arrangements are also being made to provide credit provided the produce is tied to purchase by a company and hence companies have arrived at agreements with banks to do this (DI Mohan with SBI and Union bank in Tamil Nadu). However, the agreement is with the farmer and the risk remains with the farmer.
- The above will have severe impact on the biodiversity, particularly since degraded forest lands are being considered for the purpose.
- The forest department of Rajasthan is considering that local village management committees enter into an agreement with companies for sale of Jatropha seed grown on degraded forestland.

Considering that the major issue is large scale diversion of land and its impact on agriculture, grazing and biodiversity, I would request inputs on this burning topic of land use management from the point of view of food, fodder, energy and livelihood security.

I would like to share following documents:

AgroFuels – Reality Check http://www.biofuelwatch.org.uk/docs/agrofuels_reality_check.pdf (Size: 628 KB)

How biofuel companies are lobbying against basic environmental safeguards: An analysis of industry responses to the EU Biofuel Directive Consultation 2006
[http://www.biofuelwatch.org.uk/biofuelindustryresponses\[1\].pdf](http://www.biofuelwatch.org.uk/biofuelindustryresponses[1].pdf) (Size: 126 KB)

M. K. Dasgupta, Visva Bharati Santiniketan, Bolpur (*response 1*)

I welcome Ardhendu Chatterji's suggestions. Mixed planting of Jatropha at least two species (non-diesel included) and other plants of similar heights but of varied cultural needs and economic use would be a good idea and it can find out good combinations of crops.

Jatropha (indigenous) may be is inhibitive on Parthenium. Jatropha can also be tried in cities and townships as a mixed crop with some ornamentals. Bio-diesel Jatropha without good extraction and marketing is not a well thought out proposition.

It makes a case for a bio-diesel policy of the government as presently it is being introduced without any bio-diesel and bio-petrol policy.

Krishna Kumar, Centre for Community Economics and Development Consultants Society (CECOEDECON), Jaipur

These are some of my initial thoughts on the subject being discussed.

Kindly look at the core issue at the heart of the Jatropha plantation. It's all about how the land (degraded, wasteland and other such nomenclature) can be put to a better/productive use or basically meeting the agenda of National Wasteland Development Board. To me, under the garb of Jatropha plantation, it's basically the acquisition of land which is pushed across the country.

I think that we should look at the plantation history of the country rather seriously which were aimed towards afforestation (and to achieve the so called "benefits"). The social forestry projects, which

included Eucalyptus species and Poplar, actually led to monoculture and decline in water tables across the country where Eucalyptus species were promoted as plantation. We are now fully aware of the implications of such monoculture approach, and I see no substantial difference between the earlier approach to plantation and the Jatropha plantation. Like Eucalyptus, Jatropha extract lot of water and also needs continuous watering. Besides, it doesn't survive in all soil types and best yields are reported from only red soils.

Pros and cons of the Jatropha plantation notwithstanding, the sustainable community based approach that I could think of is that the Government should promote plantation of Jatropha with the farming communities who could grow Jatropha seeds on the farm bunds (as the plant is unpalatable to most ruminants including sheep and goat) or as plantation. Government could even allocate land to landless (degraded or otherwise) communities/agriculture laborers rather than to biofuel/industries at concessional rates. SHGs could be formed/and existing ones involved in the collection and sale of the seeds. Government can offer MSP on Jatropha seeds, as Rajasthan Government did i.e. Rs 7 per kg. Government may also offer incentives to companies willing to set up extractive units who can procure seeds from SHGs. Simply put, the land should remain with the farmers and new land allocated to landless and agriculture laborers who could use the land the way they want it, including Jatropha. This can also be a way to address the need for the land reforms and also speed up the tardy pace of existing land reforms in the country.

Another aspect of the Jatropha seed is, that being poisonous, unsuspecting cattle, sheep and goat could get poisoned especially in those areas where Jatropha is not known to occur (either as cultivated or as an escape). Members could throw light on how cattle and other browsing/grazing animals cope or respond to Jatropha. This is important in the context of Rajasthan, where livestock contributes to the rural economy as much as agriculture, and even more especially in Western Rajasthan.

[Amitangshu Acharya](#), Natural Resource Management Division, Winrock International India, New Delhi

Winrock International India (WII), the NGO that I work with, is implementing the Rural Energy (RE) Impact project in India in collaboration with IIT, Delhi (mentioned by B.S Choudri earlier) that attempts an assessment of bio fuel cultivation in rural India on social and environmental parameters. I find the questions raised by Rishu to be extremely pertinent in the present context. India is presently on a high on bio fuel generation; however, there is absence of comprehensive assessment of its impact on the above mentioned parameters. Wastelands have a tragic history of being termed so since very little understanding goes into assessing the ecosystem goods and services that flow out of them. We also need to figure out biodiversity issues and whether large-scale monoculture on "wastelands" has negative impacts that may offset livelihoods gains on a longer time line.

Issues of grazing rights also needs to be looked into as graziers will face greater difficulty in livelihoods as more land comes under bio fuel cover. I am attaching for the benefit of all members the latest issue from Agro Fuels (http://www.grain.org/seedling_files/seed-07-07-en.pdf) that provides an international view of Agro Fuel plantations, seen through various lenses. As of now, Europe, Latin America and USA are witnessing major conflicts primarily because of edible crops being grown as alternate supply for bio fuel. Viren has sent links to some documents already on this.

It would also be beneficial to have an inventory of NGOs and other actors working on this very issue. It would allow us to draw up a comprehensive list of stakeholders we need to consult with at a later stage.

[G. Mishra](#), Directorate of Economics and Statistics Office, Port Blair

I agree with Krishna Kumar, firstly, there has never been any evaluation done on previously implemented schemes of waste land development in various states. What we have achieved by these schemes during past years should be our yardstick to march forward. The myths of eucalyptus and poplar with their rumours are with us. *Jatropha* should strictly be taken up on the wasteland. In Rajasthan it can be considered as one of the activity for "forestation" I mean to increase the green cover for having its beneficial effects on environment and not only in Rajasthan same can be in dry places. Also I think that it can be considered on the lines of Water hyacinth which was considered for water purification despite of it being a weed. Thus on the lands where water is to be taken out the plantation of *Jatropha* and similar varieties can be considered.

In Andaman Islands this plant grows very well. But this requires huge lands to grow it to get economical benefits. At this stage where we should think for food security we should move very cautiously in field for these type of experiments. Also probably, learning from experiences around the world on this would be useful.

Waste lands should be utilized for other purposes first for enriching the fertility, then growing Indian known varieties which are tough-resistant (genetically) Ber, Babool, Neem, etc.

R. Jagannathan, FABCON Engineers (P) Ltd., Chennai

I totally agree on the point made by Somit Krishna that the end product should be useful for the local communities which would fill up the gap of the local consumers.

We have a small project in Manaparai in Tamilnadu which is being initiated by UNDP SGP. It has enhanced the confidence amongst local SHG to build up their self confidence.

We are also engaged in design manufacture, supply erect, and commissioning of small bio fuel plants, which are technically/commercially viable for the local communities. We have a small pilot plant for live demonstration in rural areas.

Pradeep Mohapatra, UDYAMA, Bhubaneswar

I would like to share the document on Biofuels, climate change and GM crops – who is really benefiting? (<http://www.solutionexchange-un.net.in/food/cr/res25070701.doc>); Rod Harbinson, Head of the Environment Programme; London. Looks at some of the controversy regarding genetically-engineered bio fuels, and their suggested role in fighting climate change

Rishu Garg, Association for Rural Advancement through Voluntary Action and Local Involvement (ARAVALI), Jaipur (response 1)

As I could understand from the discussion so far there are concerns as raised by Viren lobo, Ardhendu Chatterjee, M K. Dasgupta, Raj Ganguly, Dillip Kumar Das and by Mrinalinee Vanarase over the possible ecological and environment damage and the uncertainty involved in promotion of *Jatropha* as single species for plantation to reclaim wastelands across the country. There have also been concerns regarding the need for providing an institutional set up before such large scale initiatives are taken up, as raised by Somit Krishna. Similarly, Viren lobo and S M R Prasad have expressed concerns over the emerging food security issue that is emerging from a scenario where large tract of lands are brought under cultivation of *Jatropha* and the information that it is possible to get carbon credits for planting *Jatropha* under the Kyoto Protocol. Information regarding which species could qualify under bio-fuel projects was also shared

by K V. Peter and B. L. Menaria. All this is helping us at ARAVALI understand the issues related to Bio-fuel plantations.

I think as the issues raised by the members are so directly related to food security issues and also as there could be severe ecological long term implications, I am sure we need to further take the discussion to the issues that have come up. Experiences from fields and especially where only *Jatropha* (monoculture) has been cultivated on private or community land holdings and also the issue of response of the community appears important in this context. I would also request Somit to share more on his idea of 'requisite institutional set up'. Experiences in Southern Rajasthan support the concern raised by Somit. Agitations and protests have been reported and the initiative has now become an opportunity for those whose livelihood was never even partially dependent on the wasteland. Issues as raised by Viren Lobo that as the land being vied is not necessarily the wasteland and may include land which is presently being cultivated for agricultural crops, have come to fore.

Therefore, it would be really beneficial to us if we could also share experiences from fields that help us understand these issues and also on returns and information on productivity.

I hope the dialogue process would help all of us to comprehend the issues, so that concerns and issues are discussed beforehand rather than learning from the school of hard knocks. The concern is more so because the community involved is the most marginalized and failed experiments/initiatives could mean a big financial jolt to them. I would therefore request Mrinalinee Vanarase to share her experiences of *Jatropha* plantations in Buldhana and information about what other crops can come up well with specific reference to their suitability in degraded lands and low rainfall areas (as low as 250mm and that too erratic). *Pongamia Pinnata* (Karanj) as I know is an evergreen plant, which comes up well when planted on the bank of nalla/river or other water bodies, where the moisture content is high throughout the year. Experiences of planting Karanj have been encouraging in roadside plantations in Madhya Pradesh and some districts of Rajasthan.

But I am really skeptical of it coming up well in un-irrigated conditions with low to very shallow soil depth areas. Similarly, *Jatropha* comes up well on bunds of agricultural fields (where there is constant supply of moisture and nutrient supply) in Madhya Pradesh and on mountainous slopes of southern Rajasthan. But to cultivate on degraded areas would require additional inputs that would mean increased costs. My query on this is, whether *Jatropha* can grow and produce seeds adequately when grown on wastelands? And if yes, are there examples from fields or studies to support the reasoning that selection of *Jatropha* over other possible species means more returns to the cultivator? There is also the issue of the gestation period as it would increase significantly when planted on degraded soils as compared to it being cultivated on irrigated agricultural fields? Also, can it be inter-cropped with agriculture crops?

Castor is identified by planning commission for use on bio-fuel products (information shared by K.V.Peter) and it is cultivated in western Rajasthan by farmers on agricultural fields. Farmers have reported of even higher returns from it as compared to other crops like Jeera and Isabgol that were cultivated earlier by them. It does not even require much soil depth and it can be seen wildly coming up on wastelands and adjacent to railway lines. I would request members to also share their experiences of intercropping of *Jatropha* with Castor if it has happened and also if it qualifies for carbon credits of the Kyoto Protocol.

From our discussions on the solution exchange on this issue, so far, concerns over four areas have emerged. First, the issue of suitability of cultivation of *Jatropha* over wastelands in low rainfall areas and shallow soils, second, the issue of damage to bio-diversity from mono-cropping, third, is the issue of livelihood concerns and returns to the people dependent on them and lastly the concern of how it contributes to our global commitment to reducing dependency on fossil fuels.

Taking the debate ahead I would again request the community to share sources of information like studies and reports (if any and specifically in reference to arid and semi arid areas) that could help us

overcome doubts and may be also on how such initiatives have impacted on all the four over the issues raised above. There are two more dimensions on which I would request members to respond to. As the entire state of Rajasthan is affected by salinity problem and large tracts of wastelands are affected by it, experiences that suggest variation in production of Jatropha seeds on such lands and how it is responds to saline water?

I take this opportunity to thank you all for sharing information and concerns on the issue.

G. Nirmala, Central Research Institute for Dryland Agriculture (CRIDA), Hyderabad

Andhra Pradesh government is promoting bio fuel plantations and private sector has publicised for marketing of produce. This has taken farmers on ride. Farmers have sown in lakh hectares and have incurred losses for want package of practices on cultivation plant protection etc., Central Research Institute for Dryland Agriculture has standardized these packages and is being promoted through its Krishi Vigyan Kendra.

For more information contact Director, CRIDA, Santhoshnagar, Hyderabad or visit <http://www.crida.ernet.in/>

R. Sreedhar, Environics Trust, New Delhi

Though I am not an expert on bio fuels, I have been following this thread of conversations with great interest. My concern is that with any plant we know mono-culture is a problem and our experience working with rural communities suggest that the existing diversity of livelihood must be enhanced rather than restricted by single crop and product dependency.

The failure of many medicinal plant cultivation programmes have also been due to the fact that it has been provided as an alternative crop rather than as an add-on crop. Just as a good evaluation of the current and past efforts on wastelands - many of which are not so, given the diverse uses people put it to- we need to first map which are the endemic sites where such plants can grow. After all botanists tell us that Jatropha is a sign of degraded land and why should we put better lands to this state.

Rahul Banerjee, Khedut Mazdoor Chetna Sangath, Indore

The main concern is about the productivity of the plants. There is no way in which any degraded wasteland can give the kind of productivity that will produce oil in enough quantities without external inputs. As Viren has pointed out this means making not only heavy investments but also seriously affecting the eco system negatively. Why not make these investments in developing these wastelands for bio diverse and sustainable cultivation instead. The crux of course is that such cultivation is not profitable.

But then we must consider why is bio-fuel cultivation being touted as profitable. It is only for the purpose of big industry. The rising demand for petro-products has shot up the price of these products. That is why it has become profitable to make bio-fuels and big companies are getting into the act. Bio-fuel is a no go proposition for the landless, small and marginal farmers of this country and is yet another conspiracy to divest them of what little resources they still hold.

R. Santhanam, Indian Society for Agriculture Professionals (ISAP), New Delhi

ISAP consulting services division has continuously monitored for its clients the bio fuel industry developments worldwide.

This discussion thread hopefully will help shed misconceptions by addressing major issues and help pilot the green field opportunity of bio fuel plantations. Some of these issues include:

- The controversy, debated as "food or fuel" in allocating precious farmlands for food or fuel crops, in the context of burgeoning population. Europe, USA, South American countries are using food crops and edible oils like rape seed oil, palm oil, for converting into bio diesel and corn, sugar and wheat into ethanol.
- Intercropping with other remunerative crops to help raise additional output from the plantation. Since the purchase price of transesterified vegetable oils, called as bio diesel is Rs 26/litre, commercial viability in terms of unit area of cultivation and returns thereof, will improve with additional revenue by intercropping, at least in the three years from seedling stage.
- The definition/classification of a wasteland. This has some relevance with reference to the Food vs fuel option as mentioned above.
- Agricultural practices on raising fuel or food crops, namely organic vs intensive inputs of chemical fertilisers + pesticides + copious amounts of irrigation water, using ground water resources as is the common practice.
- Community ownership and benefits of fuel crops.
- Price realisation on fuel generated. This is similar in concept to other agricultural produce where we now address issues like value realisation ex farm gate for farmers and the intermediation in the supply chain and its management.
- Comparative analysis among types of fuels and their feedstock
- Overall Environmental Impact Assessment (EIA) of the Bio fuel plantation used for generation of biofuels. This includes pollution from processing and net carbon sequestration.
- Fulfilment of Triple Bottom Line in the economic enterprise.
- Level and sophistication of technology and its comparative efficiency in converting oils / lipids of various vegetative crops into biofuels like Bio diesel and ethanol.
- The practice of razing virgin forest cover to raise biofuel plantations. This apparently raises a cloud of Green House Gases (GHG) and in effect makes the overall effort net negative in its impact through release of on GHG in the atmosphere.

One of the well documented efforts which is positive in its overall impact is the success story of Dr Udipi Sreenivasa, of IISc , Bangalore. He has used a combination of sophisticated technology like satellite imagery for topography definition to help carefully construct a water shed management system that captures monsoon run off and stores it in check dams for year long use. The villagers are made to pay for the water they use. Intercropping with several remunerative crops is made possible due to the assurance of continuous water supply, a critical natural resource in short supply worldwide. The Bio diesel from Karanjia has made the village in a remote Karnataka rural area, self sufficient for local energy needs and the surplus is made available to meet industry needs of the area. Hence we could possibly conclude that this effort is positive in overall environmental impact, and also helps deliver equitable and economic returns to rural populace, involved in a participatory mode. More information available at <http://www.goodnewsindia.com/Pages/content/discovery/honge.html>

In respect of net energy addition to Biofuel, probably only organic farming methodologies would be efficient, since they rely on natural systems. Dr David Pimental's study at Cornell has concluded that US's corn based ethanol is energy negative in production. He has carried out exhaustive EIA right from cultivation stage. Hence recycle of waste biomass is essential to ensure that low cost inputs go into bio fuel plantations.

Waste management needs to be holistic and must adopt an approach that is closer to nature to bring about multi fold benefits. Waste management techniques need to be revisited and modified to suit present day's complexities to avoid entry of toxic wastes into the environment, which are being

increasingly produced at homes and other establishments. Treatment of waste generated at household, farms and other biological waste generating sources must include segregation, methanation and stabilisation along with the use of Biosanitizers to treat waste in a holistic manner. The paper on [Effective Management of Solid and Liquid Waste](#) provides further details.

Another related Blog <http://www.voy.com/61461/2/470.html> on Bio Diesel using stabilised wastes, suggested as an experimental concept and is yet to be verified. Some plantations use vermi compost, which is also good. However new technologies help make it simpler.

There are major technology development efforts mostly in the U.S and some in Europe, which can help develop bio fuels at much lower cost and effort, but these are not yet fully developed and may be several years away from full-scale commercialisation, which is the ultimate test of any technology. Low cost energy sources may also be developed which render bio fuels obsolete.

[Ardhendu S. Chatterjee](#), Development Research Communication and Services Centre (DRCSC), Kolkata (*response 2*)

Good to receive your summary, whether Karanj will survive in Rajasthan I am not sure. Jatropha survives in very degraded land of South Arcot in Tamil Nadu the yields will be low, castor will do better. The intercrop need not necessarily be oilseed, bio-diesel is one fuel, the stalks of pigeon pea can be used as fuel or converted to high value charcoal.

Bushy varieties of cowpeas and dolichos beans may provide food and fodder, and can conserve soil too, in Rajasthan Moth Bean can be used as soil cover. Residues from such plants can be converted to charcoal and compressed.

[Viren Lobo](#), Society for Promotion of Wastelands Development (SPWD), Udaipur (*response 2*)

Thanks to Rishu for raising some very pertinent issues. However, I would like to caution here that the entire state of Rajasthan is not affected by salinity, and therefore, by no means is promoting Jatropha plantations at a large scale advisable.

I would like to reiterate that the thrust of my article is on balancing different demands of land use, food, fodder, energy and livelihood needs. Since large-scale diversion of land for Jatropha may affect biodiversity - particularly if large scale plantations are being done as legitimate forestry use – this will affect the diverse needs of the poorest households. The same would also apply to any other mono plantations for bio fuel in forest areas.

I suggest we also look into the consumption angle of fuel. Consumption of fuel could be reduced with better town planning, for instance, or by banning individual vehicles from plying in certain areas, etc. Currently, consumption is being governed by the transport and automobile industries. The SPWD study also discusses how companies are looking at the lucrative European Union market while entering into the bio fuel industry. For cultivators, it will just be a 'wage' employment, as seen by Dr Sudhirender Sharma's mention of 941,000 farms and 60 lakh persons being affected by forcible cultivation of biofuel.

In my opinion, we also need to look seriously into the aspect of sustainable land use to meet the needs of the small and marginal farmers. Further inputs from members on this would be most useful.

[H. S. Sharma](#), Independent Consultant, New Delhi

The *Jatropha* initiative is more grabbing of wasteland. I would like to mention some facts of *Jatropha* cultivation, one *Jatropha* plant gives 2 kg of seeds, it requires 8 yrs to fructify and the minimum viable esterification unit is 30,000 tons/annum capacity. One requires 15,000 ha of land and it does not grow without irrigation. Honda of Japan and a German company have developed bacterial strain which can make Bio fuel from agriculture waste. Why not grow food in place of *Jatropha*.

Mahtab S. Bamji, Dangorai Charitable Trust, Hyderabad

An interesting article on this subject Biofuels for Transportation: Global Potential And Implications For Sustainable Agriculture And Energy in the 21st Century (<http://www.solutionexchange-un.net.in/food/cr/res25070702.pdf>) has been sent to me by Mr. Phani Mohan K of Anagha Datta Trade, who mentions that biofuel initiative of India has not really taken off in spite of all hype. There is no Governmental support on price as well on enforcing blending. Biodiesel has feedstock problem and this if worked with a vision may take a direction in next 5 years. Ethanol has cane but no support of government and oil companies which sell their own MTBE (Methyl Tertiary Butyl Ether) blended fuels polluting environment, soil and water.

B. L. Kaul, Society for Popularization of Science, Jammu

Bio-fuel Plantation has been tried with great success in Udhampur District of Jammu and Kashmir. *Jatropha* grows in this hilly district and farmers have cultivated the rich seed variety provided by Government agencies with success. As pointed out the problem lies with marketing the seed, which is a rich source of bio-diesel.

The lukewarm response to the bio-fuel marketing aspect is coming in the way of encouraging farmers to cultivate *Jatropha* in a big way. I agree with Mr. Phani Mohan that biofuel initiative has not taken off in India. It is going to take time unless and until Government comes forward with its support.

C. R. Bhatia, Independent Consultant, Mumbai

In the context of various experiences reported on Bio-fuels, and the ongoing debate on food or fuel, it is pertinent to recall that in the past plants were the main source of energy as firewood for cooking, heating and oils to light the lamps. Transport of men and materials was dependent on horses or other animals feeding on plants in the neighbourhood. Availability of cheaper coal, oil and natural gas, which can be transported globally, changed all that. In the long term world will have to fall back on renewable energy resources, and certainly plants will have a major role in economy based on renewable resources. Innovations, new knowledge and technologies will open new possibilities. However, to harvest food, fuel and raw materials for the green chemical industry from the finite land mass, the society will have to opt for negative population growth for maintaining the current life styles of the affluent.

At present, bio fuels can partly meet the energy needs in countries with large land area such as Brazil, or regions with high crop productivity, surplus food production, stabilized or declining populations as in the North America and Europe. However, diversion of farm land to bio fuel crops would not be acceptable in countries yet to achieve food production to meet the needs of the growing population. India still imports edible oils and pulses, even if the recent import of wheat is ignored.

Wastelands do provide an opportunity. Some of the projected yield levels of *Jatropha* are higher than those harvested for edible oilseed crops where plant breeding efforts have gone to enhance productivity for several decades. The best *Jatropha* plantations are the ones with intensive management and drip irrigation. Plant breeding efforts can increase productivity levels several fold.

The success of the bio fuels will be determined by two major factors. The net energy efficiency (energy of the biofuel/total energy used in production and processing) and carbon balance (carbon dioxide released on using biofuel/carbon sequestered from the atmosphere through photosynthesis). Carbon credits now available can make plantations economically viable.

Those involved in wasteland development programs may explore possibilities of converting wastelands into "energy farms", wherever feasible, instead of aiming for bio-diesel alone. Such farms will have different vertical tiers for energy harvesting - the modern wind mills at the highest level, followed by solar panels, perennial tree oils crops for bio-diesel, and fodder or grain legumes at the ground level to fix and meet the nitrogen requirements. This would simulate the harvest of sunlight in natural, tropical forests by different plant species.

It would also be necessary to go below ground and enrich soil with blue green algae, phosphate solubilizing microbes, mycorrhiza and earthworms. Rain water harvesting and pumping the same using on farm energy sources can augment water resources for crop growth. Integration of animals into the system can further add to the income. These are validated technologies and their benefits have been demonstrated at different locations. A multidisciplinary, high-tech approach using several of such technologies in concert convert wasteland into an economically viable "energy farm" to generate, energy, employment, and improve environment can be thought of. Specific components will have to be location specific. The initial investment, and maintenance cost will be high. Industry – NGO partnership can seek support from different Government Agencies to explore the feasibility in different areas.

M. K. Dasgupta, Visva Bharati Santiniketan, Bolpur (*response 2*)

There's no problem with any technology per se. As no Government Policy is there, leaves the programme to private and corporate initiatives. Both Bio-diesel and Bio-petrol technologies have come handy with the consumerist way to development. Entire course of development is consumer-oriented. Jatropha production is not matched by efforts in extraction. Same thing happens while introducing new agri-business crops, those needing processing at the farm level such as soybean, cotton, sunflower, even Bt-cotton when they were introduced to new areas. The farmers suffered and do suffer.

Viren Lobo, Society for Promotion of Wastelands Development (SPWD), Udaipur (*response 3*)

I would like to share the study [Constraints in Jatropha Cultivation Perceived by Farmers in Udaipur](#).

Raj Ganguly, GMED, United States Agency for International Development (USAID), Jaipur (*response 2*)

I appreciate Mr. Dasgupta's points, but development has to be consumer centric in a market economics, always and the missing link for a farmer is not seed, not technical inputs but is the 'market'. However, in a market economics, it has to be seen that how well the benefits are shared with the producers. In a free market if the farmers have multiple options and if they are fully informed and empowered then the success and failure will be decided by the market pull thus avoiding exploitations.

Jatropha case is no different. Jatropha economics - on any cash crop introduction the value chain economics depends upon the amount of value addition at different levels. And in many cases, including Jatropha the economical value addition is at much higher level involving sophisticated processing like esterification, blending, packaging etc. On this basis, the benefits accrued to the farmer should not be compared with the benefits at higher level. Also the farmers cannot be expected to gain skills and take

up all the value chain operations. In many cases, the farmers have upgraded on a value chain, but in those cases the scaling up and organisational efficiency becomes a big challenge, except otherwise dairy/sugarcane co-operatives.

I believe in Jatropha, we are talking to take it up in waste lands, village community lands, railway lands and as a subsidiary crop as border rows etc. Even in the waste lands Jatropha can be integrated into a broader 'bio-mass landscaping' or 'energy farms', as suggested by many members. In these scenarios the Jatropha economics will be certainly positive and environment friendly. We should not also ignore the other related benefits e.g., green coverage of waste lands, checking soil erosion, increasing percolation of rain water and ground water recharge etc. besides being income generating. In such circumstances the revenue model can be on 'collection basis' in the lines of minor forest produce. In any commercial venture the farmers are at the receiving end, because they are less informed, less empowered and less connected to market. If all these are taken care of then there is no point why they cannot succeed in a market or consumer centric economics.

I would like to share the document Fuel for Development? (<http://www.snf.se/pdf/rap-trafik-biobfueldev.pdf>)

[Pankaj Kumar S.](#), UNDP, New Delhi

I would like to add the following interesting perspectives to our engrossing discussions on Bio fuels:

1. "Wastelands" or Used Lands?

N S Jodha, known for his seminal work on the role of Common Property Resources (CPRs) in the livelihoods of the poor, identifies the following functions played by various types of CPRs:

TABLE: Contribution of CPRs to village economies in dry regions of India

Contributions	Common Property Resources					
	A	B	C	D	E	F
Physical products						
Food, fibres	X		X	X		
Fodder, fuel, timber, etc.	X	X	X		X	X
Water				X	X	
Manure, silt, space	X	X	X			X
Income and employment benefits						
Off-season activities	X				X	X
Drought period sustenance	X	X				X
Additional crop activities			X	X		X
Additional animals	X	X				
Petty trading and handicrafts	X					X
Broader social and ecological benefits						
Resource conservation	X	X				
Drainage and recharge of groundwater			X	X	X	
Sustainability of farming systems	X	X	X		X	X
Renewable resource supply	X	X	X			
Better microclimate and environment	X	X		X	X	

Where A = community forest; B = pasture/wasteland; C = pond/tank; D = river/rivulet; E watershed drainage/river banks; F = river/tank beds. Source: <http://www.fao.org/docrep/v3960e/v3960e05.htm>

In the above context, biofuel promotion programmes need to be extremely circumspect about use of common lands for growing biofuels (or other currently fashionable alternatives). I completely agree with members who have emphasized that there is no such thing as a wasteland. Virtually every inch of land in this country, on which anything grows, is being used by some stakeholder or another.

Learning: Carefully evaluate the alternative uses of “Wastelands” and look for how they support livelihoods of the poorest before making alternative plans for such lands. Where possible, organise these users into SHGs and link them to proper agricultural support, micro-insurance and corporate entities to ensure that their risks are minimised.

2. Food versus Fuel OR Food AND Fuel?

The Foundation for Alternative Energy (FAE), a Slovakia based non-governmental organization feels that the issue of food security versus fuel is an oversimplification of a complex issue. Stressing that the issue needs to be looked at in the light of “the real situation of food supply and demand” and under-utilized agricultural production potential, increased potential for agricultural productivity, and advantages and disadvantages of producing bio-fuels.

On the issue of lack of food security, it stresses that “People starve because they're victims of an inequitable economic system, not because they're victims of scarcity and overpopulation”, going back to the argument that the poorest face food-insecurity not because there is not enough food, but because there is not enough purchasing power among the poorest to buy this food.

Taking the case of Brazil, where it is alleged that increase in sugarcane production for ethanol led to a fall in food production, the agency stresses that the amount of land put under sugarcane in Brazil was only 7.5% of the total area under primary crops. Also, crop rotation in sugarcane areas is reported to have actually increased productivity of certain other food crops, while some by-products such as hydrolyzed bagasse and dry yeast are being used as animal feed.

It therefore stresses that developing countries need to balance BOTH the need for food production and the need for fuel, to be able to “cut dependence and cash expenditure on imported fuels, increase community self-reliance, and provide a spur for local job creation and growth”. Source: http://journeytoforever.org/biofuel_food.html

3. Biofuels versus Biodiversity OR Biofuels and Biodiversity?

In 2003, the European Union (EU) sent out a “Biofuel Directive”, stating that. “Member States should ensure that a minimum proportion of biofuels and other renewable fuels is placed on their markets, and, to that effect, shall set national indicative targets. A reference value for these targets shall be 5.75%, calculated on the basis of energy content, of all petrol and diesel for transport purposes placed on their markets by December 2010.”

The rush to meet this market among biofuel producers in the third world has left many stakeholders worried about possible “rainforest destruction, the destruction of natural grasslands and wet-lands, biodiversity loss, soil or water pollution, or human rights abuses, and adverse effect on food supplies”. For further details, please see

(<http://ec.europa.eu/energy/res/legislation/doc/biofuels/contributions/citizens/green.pdf>)

An interesting video on how this demand in the EU increases global warming is available at <http://www.channel4.com/player/v2/player.jsp?showId=4934>

The EU has recognized this and states in its document “An EU strategy for Biofuels”:

“In countries where a large-scale expansion of feedstock production is likely to take place, environmental concerns relate to pressures on eco-sensitive areas, like rainforests. There are also concerns regarding

the effect on soil fertility, water availability and quality, and pesticide use. Social effects concern potential dislocation of communities and competition between biofuel and food production. These concerns need specific investigation and quantification and, if necessary, should be addressed through strong regulatory frameworks."

The debate on this issue carries on, but a definite way out of the same is to ensure that biodiversity is not reduced by growing monocultures of biofuels, but that it is enhanced through measures suggested by Mrinalinee and others.

An example is given in the UNEP website, which says, "Some energy crops can help to increase biodiversity, soil fertility and water retention. This is especially true if nitrogen fixing species are used with sufficiently long rotation periods and fertilization, which also helps maintain watershed health". (<http://www.uneptie.org/energy/act/bio/Drivers.htm>)

Rishu Garg, Association for Rural Advancement through Voluntary Action and Local Involvement (ARAVALI), Jaipur (response 2)

There was an article in HT editorial yesterday (7th August) titled "[From gas to hot air](#)" by Darryl D'Monte trying to address the question, Are bio-fuels really the answer to our consumption and environmental problems? The article raises issues like consequences of large scale cultivation of Jatropha, use of water and reach of the poor to the common property resources.

In my earlier response I had meant that there are villages and habitations spread across the state which are affected by poor water quality (including salinity), there are also villages spread almost across the state where mining is done and that there are also areas that have reported of increasing soil salinity and therefore my query of "experiences that suggest variation in production of Jatropha seeds on such lands and how it responds to saline water" was to know if Jatropha cultivation is feasible in such circumstances. I am sharing with this mail a "[Report of Expert Committee on Integrated Development of Water Resources](#)". The expert committee was formed by government of Rajasthan to assess state water resources and requirements in policy, identify measures for integrated development of water resources in the state, analyze ground water resources and to identify corrective measures to enhance water to use efficiency in the state. The report estimates that in 2004 status of only 14 percent of the blocks of the state could be categorized as safe. The report states that there are large tracts of Chambal; Mahi and Indira Gandhi Nahar Project (IGNP) areas that are affected by salinity and water logging problems.

The report also compares the ground water quality of the state with the status in rest of India. Of the total habitations and villages across the country that have multiple water quality problems, 76 percent are in Rajasthan. In all there are 41,072 villages and habitations in the state reportedly having water quality problems. The report also suggested that of the total water use 83 percent is used for irrigation and that there are issues related to equitable access to water and the need for more efficient use of water. My query on response of Jatropha seedling to low quality water was based on the above mentioned status of water quality in the state, as it becomes all the more important in this context to also ensure that such water use (for irrigating Jatropha plantations) would not jeopardize use of water for drinking or irrigation of crops or for that matter further deplete ground water resources and at the same time yield adequately so as to be financially feasible. C.R. Bhatia has talked about it, "The best Jatropha plantations are the ones with intensive management and drip irrigation".

Viren Lobo have raised two important issues. First, that 60 lakh persons being affected by forcible cultivation of bio-fuel and second, the need to look into the aspect of sustainable land use to meet the needs of small and marginal farmers. I agree with him. C. R. Bhatia has also talked about the need for developing wastelands as "energy farms". I would request Viren to share the study of Dr Sudhirender Sharma's.

Amitangshu Acharya shared the latest issue of Agrofuels. The issue assesses the problems that have started to surface in South Asian countries, Brazil and U.S. At this point of time I am sure we need to learn from experiences across the globe. The article also talks about the increased release of nitrogen dioxide in atmosphere those results from use of fertilizers in the production of bio fuels. R. Santhanm has suggested use of organic farming methodologies to be efficient in Indian context. Amitangshu has also suggested of identifying and listing of NGOs working on the issue. I think it's a good suggestion and this network could easily help us in doing so.

This would also help us in drawing grass root concerns before it too late. Concerns for landless, small and marginal farmers have been raised by Rahul Banerjee and M.K.Dasgupta. I would request Rahul to share experiences of his organisation on *Jatropha* in Malwa region. As I know, districts around Indore (Indore, Dewas, Ujjain, Sehore) are highly fertile black cotton soil areas where cotton and soyabean yields are high and *Jatropha* have been grown by farmers on their agricultural bunds for fencing. Similar concerns have been raised by H.S. Sharma. Concerns regarding marketing of produce from bio-fuel plantations in Andhra Pradesh have been raised by G Nirmala. Subhash Mehta by sharing observations of Macaulay have also expressed concerns regarding long term implications of policies that affect food security of the country.

[Vanisha Nambiar](#), Department of Nutrition, M. S. University of Baroda, Vadodara

Here are some more suggestions:

There are many Non volatile seed plant like *Balinites aegyptica*, *Simarouba*, *Neem*, *Madhuca indica*, *Linum* etc. that can be planted other than *Pongamia glabra* (Karanj) and *Jatropha curcas* (*Jatropha*). For biofuel plantations it is estimated that a minimum of 2 litres of water is necessary per month per plant for better yield and consistency. Cross pollination - insect pollination is must, so the need for growing a row of ornamental will improve the yield.

For livelihoods, it should be clearly understood that for initial 3 years, there won't be sufficient income. So one needs to grow some vegetables simultaneously.

[Sudhirendar Sharma](#), The Ecological Foundation, New Delhi

This is an interesting discussion on bio-fuels with *Jatropha* in focus. The genesis of the query relates to Rajasthan government's decision to allot wastelands for *Jatropha* plantation. Although the discussion has gone quite far, I intend raising a fundamental question. I feel that we need not take the design suggested by the government as final but should be able to question it to ensure that the interests of the marginalized are covered.

To explain further, the global picture on the shift towards bio-fuels is scary, to say the least. From increasing food prices to emerging food scarcity; from competition for water to corporatisation of land; and from peoples' alienation to resultant land grab, the story of bio-fuels is this and much more. There are many studies that one can Google to get a clear picture. The worst part of the story is that even if the projected 379 million hectares is brought under bio-fuels the world over, including India's projected 14 million hectares, it will make up for only 9 per cent of the global energy consumption. The fundamental question we need to ask is: is it worth the effort with its associated negative socio-economic-ecological impacts?

My greatest worry is that NGOs are playing into it, rather inadvertently. Let there be no doubt that *Jatropha* is no longer a marginal crop but big business. No wonder, shares of bio-fuel companies are at a

premium at the stock market. Further, it is but a matter of time before patents on improved germplasm of *Jatropha* get filed. Experiments are in a fairly advanced stage. The consequences would be very grim if we were to encourage self-help groups to go for *jatropha* and later learn that the varieties they grow are not fetching market price, and that the improved (patented) germplasm will cost a fortune.

[Surendra Kumar Yadav](#), National Institute of Health and Family Welfare, New Delhi

The idea to grow plants for bio-fuel is a nice one and justified; but following points are also important to note in this connection:

- Output in terms for financial input estimation; and input versus output estimations
- Bio-fuel plantation over other trees/ crops plantation by farmers
- Ecological sustainability, financial gains and other viable parameters involved
- Government subsidies, if provided.

Keeping in mind such points, in conjugation with Government policy, the programme of bio-fuel plantation has to be assessed; and promotion of such programme is dependent on such issues.

[Nafisa Barot](#), Utthan, Gujarat

I have been following the discussion on bio fuel with great interest. I fully agree that there has to be a balance between food and fuel but also between what is needed locally and for external consumption. In fact Utthan's own experience working in the coastal and tribal communities on livelihood security issues, in Gujarat, suggests that the moment you listen to the most vulnerable communities, specially women - their demand is bio diversity, need for food crops, fodder, fuel and other species for local livelihood security and only the surplus for the market. This is more towards peaceful co existence with nature and people.

The moment - demand comes from 'outside' market, it is mainly for money, profit, sustaining the life style which is displacing local livelihood security and also not viable in the long run, in the name of ' means to improve livelihood security for poor or increasing GDP, in today's world'.

I feel we need to ask a question - what is available and how much, as for example in this case of 'bio fuel' - and how that could be efficiently, equitably used rather than - how do we convert other resources such as 'unused wastelands' to meet certain unsustainable demand. And why should we be worried about fulfilling those demands? So many examples of communities consciously adapting bio diversity approach - may not necessarily cater to such demand as there may not be any surplus after meeting the basic livelihood security needs of the local community without a conflict with nature?

When I had posed this question of bio fuel plantation - to some of the community leaders in the coastal area, one of their women leaders from village Akhtaria, Raupaiben stared at me and asked me "but why do we need bio fuel plantation? Is it to run the cars and big machines? Then how will we run our 'chullah' (our stoves for cooking)? We are forced to manage our living in the given resources then why should 'they' (those who are demanding) not forced to manage within what is available? Without displacing our right?"

I am all for such alternatives where bio fuel plantations meet the basic needs of the local community not just for today but on a sustainable and a priority basis.

Many thanks to all who contributed to this query!

If you have further information to share on this topic, please send it to Food and Nutrition Security Community se-food@solutionexchange-un.net.in and/or Solution Exchange for the Water Community at se-wes@solutionexchange-un.net.in with the subject heading "Re: [se-food][se-watr] Query: Biofuel Plantation through Community Groups - Experiences. Additional Reply."

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