

### The Bioenergy Ethiopia project: The case of Environmental sustainability and Human rightsinclusion

Project Partners: Hawassa University (Dr Meseret Tesema: Main coordinator) Norwegian University of Life Sciences (Dr Trine Hvoslef-Eide: Partner in Norway) Mekelle University (Dr Dereje A. Abera: Partner at LMCI)

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### **Energy Consumption and Production of Ethiopia**



#### Mainly comes from traditional biomass:

- covers ~89% of energy consumption
- 10% petroleum and 1 % hydropower
- Fuel imports account for over 90% of Ethiopian foreign earnings and expected to increase(FDRE, 2009)
  - Vulnarable economy
  - Energy insecurity



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Source: (AFREC, 2015

### Shift in Energy Sources Globally/Ethiopia

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- Environmental issues
- Climate change
  - $\circ\,$  huge emissions of  $\text{CO}_2$  and other greenhouse gases from fossil fuels
- Sustainability of the energy sources
   Demand for alternative (renewable) energy sources:



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### **Energy and Ecosystem Services (ES)**



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#### Sustainable Energy resources management is a key to enhance ecosystem services and ensure human wellbeing





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### **Sustainable Energy**





Source: Adopted from Fritsche et al., (2008)

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### **Renewable Energy in Ethiopia**

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#### Focuses on:

- Hydropower
- $\circ$  Wind power
- Biofuels/Bioenergy
- After the energy crises in 2008 (due to increase in petroleum price):
  - The first biofuel/bioenergy strategy was develop
    - 'Biofuels Development and Utilization Strategy'





### Source: Ethiopian Ministry of Water, Irrigation and Energy (2015)

- To achieve this:
  - GTP II : 3<sup>rd</sup> pillar of the 4 pillars



- 'Climate-Resilient Green Economy strategy (CRGE) policy': to establish five bio-fuel technology and research centers in the regional states
- o Being 'Green economy frontrunner'



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CRGE 2011, p. 21

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity lass 15 LIFE ON LAND



Ensure access to affordable, reliable, sustainable and modern energy for all



2 ZERO HUNGER

security and improved nutrition and promate sustainable agriculture



Source: World Agroforestry Centre, 2015

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### Sustainable Bioenergy



Source: Fritsche et al., (2008) calculation from IEA (2007), and Best et al. (2008)

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## **Bioenergy-Ethiopia Project:** *Environment Sustainability and Human Rights Inclusion*







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### The project itself: Clean and Renewable energy

- ".....clean energy...": Environmental Consciousness
- Renewable....': Sustainability

## Good Planning is good....BUT FOLLOWING THROUGH BRINGS ACHEIVEMENT



Course programme ~ First meeting

# Project Management 1 ~ 15 credits

Project management 1 ~ Continuing education ~ 15 credits

Hawassa, Ethiopia ~ 9th - 12th of November 2015

	Day 1 – Monday, October 9th							
	13.00 - 15.00 15.00 - 16.00	Welcome ~ Presentation of the The Project as a method of wo Concepts and definitions	ne participants and the projects.					
	16.00 - 17.30	<ul> <li>How do I get to grips with</li> <li>Pitfalls and benefits</li> <li>GDPM - Goal Directed Project</li> </ul>	Project management 1					
ок	MÅL)		*					



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Course programme ~ Second meeting

Project Management 1 ~ 15 credits

Continuing education

Mekelle, Ethiopia ~ 15<sup>th</sup> – 19<sup>th</sup> of January 2016

Day 1 – Friday, Ja	lanuary 15 <sup>th</sup>						
09.00 - 12.00	÷	Welcome ~ Practical information about second meeting of the Project Management Course.					
		Repetition – Topics from first meeting in Hawassa.		ę			

#### **Bioenergy-Ethiopia Project**



Social Sciences Socio-Economic Study of bioenergy:

- Contextual importance
- Policy perspective
- Risks and opportunities
- Sustainability
- Impacts on rural livelihood and health

#### **Biological Science**

- Identification of sustainable
   production systems
  - Feedstocks: Genetic diversity
  - Ecophysiological
  - Agronomic and biochemical characterization

#### Technology

- Identifying sustainable and feasible technologies
  - the study of quantity and quality of biodiesel, and economic feasibility
  - Identification of efficient and affordable technologies

#### Human Rights

- Rural livelihood
- Gender aspects

Environmental Sustainability

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## **Environmental Sustainablity: Biodiversity**

- Feedstock identification and characterization (Biodiversity)

   Different species:
  - Exploring diverse species which are indigenous and neglected
    - Sorghum, Castor, Jatropha, Brassica spp (Ethiopian Mustard), Okra, croton macrostachyus,
  - $\ensuremath{\circ}$  Maintaining diversity within species
    - Collecting over 800 accessions of different species



### **Use of Climate Smart Plant Species**



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16

#### **Environmental Sustainablity: Land Use**



Potential for biomass: no competition with food, no displacement, increase organic C in soils, but: risk for biodiversity if not properly mapped (Fritsche et al., (2008))

#### **Research Focus areas**

- Use of degraded land or «idle» land: the myth
  - Agronomic Requirements
- Climate Adaptation
  - Water stress tolerances
- Reuse of Bioslurry for fertilization in production of crops or the energy crops

### Environmental sustainablity: Integrated Food-Energy Systems approach



 Promoting sustainable production systems

 e.g. Agroforestry, intercropping, off season production



Proc. Natl. Acad. Sci., India, Sect. B Biol. Sci. DOI 10.1007/s40011-015-0518-9

RESEARCH ARTICLE

Ethiopian Mustard-Chickpea Intercropping System is a Viable Option for Yield Advantage in Dryland Condition of North India-Part II

B. Lal<sup>1</sup> · K. S. Rana<sup>2</sup> · Priyanka Gautam<sup>1</sup> · D. S. Rana<sup>2</sup> · Y. S. Shivay<sup>2</sup> · B. P. Meena<sup>3</sup> · R. K. Meena<sup>2</sup> · P. Singh<sup>2</sup>

Received: 27 September 2014/Revised: 14 December 2014/Accepted: 4 March 2015 © The National Academy of Sciences, India 2015

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## As higher education and research institution

 Including the environmental sustainablity theory in new curriculum

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Course code	code Course title	
BeST 520	Biomass Conversion Technologies I: Thermochemical Conversion	2
BeST 521	21 Bioenergy Genetic Resources and Production	
BeST 522	Biotechnology for Bioenergy Production	2
BeST 523	Bio-based Byproducts for Energy Production	2
BeST 524	Bioenergy Production and Utilization Efficiency	2
BeST 512	Policy and Economics of Energy	3
BeST 526	Bioenergy Business and Value Chains Management	2
BeST 527	Green Machines: Plant Physiology, Growth and Bioenergy	2
BeST 528	Climate Change and Bio-Based Carbon Mitigation	3
BeST 529	Biomass Conversion Technologies II: Biochemical Conversion	3
	Total	24

### As higher education and research institution

### Inclusion in our research

Biogas technology: challenges,
 opportunities, and synergies with forest
 management

- Biogas/bio-slurry technology and its potential utilization in crop production and farmers' income
- Technical potential of biogas energy to replace traditional biomass energy and to mitigate greenhouse gas emission

Identifying sustainable production systems

- e.g. Agroforestry, intercropping, off season production
- Identifying sustainable and feasible technologies

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## Human rights Aspect....



- The Project thrives to be o Inclusive
  - remote areas, small and margined groups, indigenous people
  - $\circ$  Sensitive
    - Culture, belief
  - $\circ$  Empowering
    - Female households
    - Giving scholarships to Female students

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### Huma rights.....

- Subproject-5 of our project:
  - Contextual importance of bioenergy/biogas to rural households
  - Policy perspective
  - Risk and Opportunities
  - o Sustainability
  - Impacts on Rural Livelihood and health







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# Thank you for your attention

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23