

# Bioenergy Market System Development

## Comparing Participatory Approaches in Kenya and Sri Lanka



### WORKING PAPER

January 2011

Prepared for PISCES by Practical Action Consulting





Although this research is funded by DFID, the views expressed in this report are entirely those of the authors and do not necessarily represent DFID's own policies or views. Any discussion of their content should therefore be addressed to the authors and not to DFID.

Authors: John Ndegwa  
Contributors: Namiz Musafer and Tameezan wa Gathui  
Editors: Ewan Bloomfield and Miriam Hansen  
Cover Images: Jane from PAC EA office and workshop participants discussing market map  
All images: Practical Action (unless otherwise stated)

---

## Contents

Executive summary	3
Introduction	3
Mapping the market	4
Promoting sustainable charcoal production and marketing in Kenya	5
Background	5
Bondo case study: a successful case of community driven commercial afforestation	6
Kitui case study: challenges of a less-established charcoal value chain	7
Kitengela case study: a sustainable charcoal business	7
Participatory market mapping for Bondo and Kitui	8
Emerging issues: comparing the Bondo and Kitui charcoal market maps	9
Kenya workshop: conclusions and next steps	10
Unblocking the biomass market system in Sri Lanka	11
Participatory market mapping for industry, service and household sectors	12
Issues emerging from the market maps	12
Enabling environment	12
Supporting services	13
Market chain actors	14
Sri Lanka workshop: conclusions and recommendations	15
Comparing Kenya and Sri Lanka: market mapping exercises	16
Lessons learnt	16
Market system similarities	17
Conclusions	18
References	19
Glossary	19
Executive Summary	20

---

For more information contact [Steven.Hunt@practicalaction.org.uk](mailto:Steven.Hunt@practicalaction.org.uk)

---

## Executive summary

The Policy Innovation Systems for Clean Energy Security (PISCES) project is developing new knowledge for the sustainable use of Bioenergy to improve energy access and livelihoods in South Asia and Eastern Africa. Enhancing bioenergy market systems through Participatory Market System Development (PMSD) offers the potential to improve efficiency and sustainability of such systems. Participatory Market Mapping (PMM) is a key tool in this approach which increases market knowledge and connections by engaging key market stakeholders in the generation of detailed market maps. Such processes have previously shown strong impact on a variety of agricultural market chains, and the PISCES project has trialled the application of these techniques to bioenergy. Workshops were held in Kenya and Sri Lanka in 2009 aimed at identification of market chain actors, external factors affecting the market chains and sub-sector service providers. The workshop in Kenya successfully developed comprehensive recommendations for sustainable charcoal production by comparing three local charcoal market systems and the Sri Lankan workshop effectively analysed issues affecting the national biomass market system. The lessons learnt from each experience show similarities in the challenges faced by both countries, and provide a model for blending market mapping approaches for future application to Bioenergy market system development.

## Introduction

Biomass is the most commonly consumed form of energy in Kenya at about 68% of the national energy consumption. The charcoal industry employs over 700,000 people and represents the second largest rural industry in the country (ESDA, 2005). In Sri Lanka, biomass makes up 47.4% of the primary energy supply and is important for a range of stakeholders, from household and industrial applications through to large and small power generation (Nissanka & Konaris, 2010). As bioenergy is so important to energy supply it is important to develop new knowledge for its sustainable use to improve energy access and livelihoods in poor communities while protecting the environment and mitigating climate change. Participatory Market Mapping (PMM) is a method of analysis, developed by Practical Action, which produces valuable new knowledge for policy-makers to use in national planning processes, as well as developers and interest groups in the bioenergy sector.

Recognising the factors that influence how market systems operate can have a significant impact on poverty alleviation. To this aim, the PISCES project organised training sessions for staff and sector actors in Nairobi, Kenya in November 2009, Kandy and Colombo, Sri Lanka in July 2008 and January 2009, respectively. Following positive reaction to the methodology and approach, PISCES then held full PMM workshops in Kenya in November 2009 and Sri Lanka in January 2009, bringing together the key bioenergy stakeholders to initiate a Participatory Market Systems Development (PMSD) approach to develop a deeper understanding of the respective bioenergy market systems.

This working brief considers the experiences and outcomes of the PMM in the two workshops as a tool for facilitating dialogue, trust and building confidence among market chain actors to eventually lead to collective gain. The two bioenergy industries considered are Sustainable Charcoal Production and Marketing in Kenya and Biomass Supply in Sri Lanka.

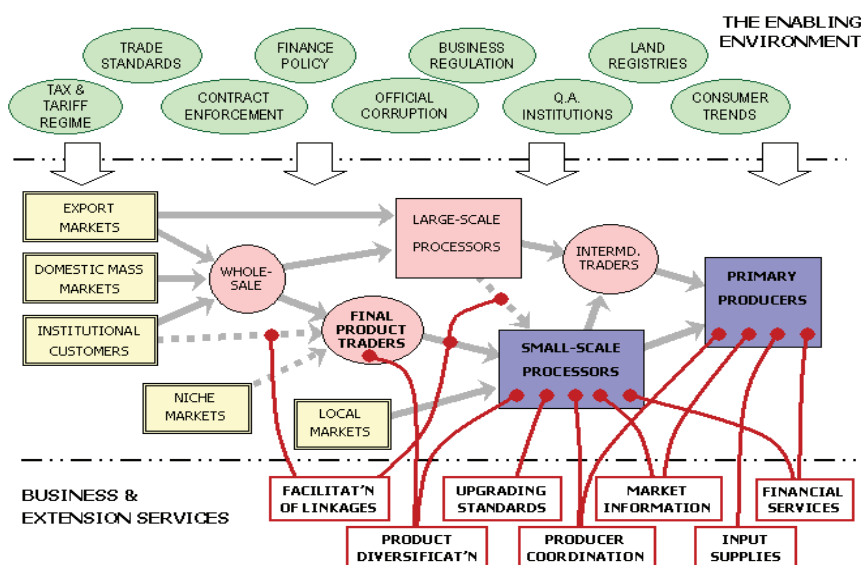
## Mapping the market

PMSD is an approach that involves different actors of the market chains joining together to generate group innovations based on a well-led and structured participatory process that gradually stimulates interest and collaboration among members of the market chain (Bernet et al, 2005). These innovations can be new products and processes, new technologies or new institutions.

A Market Map, as shown above, is a graphic representation of the market system value chain where the main actors, services and external factors are plotted. It serves an important role through encouraging market literacy, both for chain actors and facilitators in a participatory process where the different components of the chain are openly discussed. The central component charts the market chain and its principal competing market actors; the top component charts the business environment; and the bottom component charts the business services that support the market chain's overall functioning. Through participatory action, the market actors collectively identify all the important elements of each component (Albu & Griffith, 2005). The input of all these active stakeholders contributes to a market map that is accurate, and representing a wider range of knowledge than one created by a single analyst. Even more importantly, the process of producing the map, including the structured dialogue between actors from different areas of the market chain, is a learning and development process in its own right, for all participants.

PISCES is actively testing PMM as part of its action research programme; identifying key actors in each bioenergy market system and how they are linked. The process has already been applied in Kenya and Sri Lanka as a first step in an ongoing PMSD process, and will be applied in Tanzania and India before the end of the project. The workshops in Kenya and Sri Lanka successfully brought together the key market actors, helping them recognise the services, inputs and linkages that enable progress, as well as identifying key policies and regulations that can potentially constrain the growth of bioenergy market systems through presentations, group discussions, feedback, conclusions and recommendations.

### The Market Map complete



Example of a market map (Albu & Griffith, 2005)

## Promoting sustainable charcoal production and marketing in Kenya



### Background

The national energy consumption statistics in Kenya show that biomass is the most commonly consumed form of energy (about 68%), and charcoal provides energy for 82% of urban and 34% of rural households (Wa Gathui, 2010). Charcoal is a popular household cooking fuel in Kenya and is also used widely in schools and hospitals. Presidential decrees of the 1990s banned the production of charcoal due to alarming rates of deforestation, but as no alternative household fuels were identified, charcoal production was driven underground, becoming unregulated, and resulting in worse impacts. However, the Kenyan Government recently started to recognise the importance of charcoal as a form of household energy in the national economy, and developed policies to promote its sustainable production and marketing, including subsidiary legislation introduced in 2010 based on these policies. However, numerous gaps in the charcoal value chain have yet to be addressed to enable the true sustainable commercialisation of the industry.

The two-day workshop organised by Practical Action Consulting (PAC) East Africa, under the PISCES project, provided an opportunity to compare two existing local charcoal market systems from Kitui and Bondo Districts in the Eastern and Nyanza Provinces of Kenya, respectively. A field visit to a successful charcoal initiative in Kitengela Town, near the capital Nairobi, allowed the participants to draw lessons on how sustainable charcoal production and marketing can be used to improve livelihoods and at the same time improve energy access in both rural and urban Kenya.

The overall objective was to enable charcoal participants (producers, transporters, retailers, local level administrators and policy makers) to learn and share knowledge on sustainable charcoal production and marketing, with a view to identifying gaps in the charcoal value chain and devising strategies to address these gaps immediately following the workshop.

## Bondo case study: a successful case of community driven commercial afforestation

Bondo is located in Nyanza Province, western Kenya, near Lake Victoria. The district receives an average of 900-1,200mm of rainfall per annum and thus tree planting can be successfully carried out as an economic activity in the district. The project in Bondo District was initiated in 2002 by the Youth to Youth Action Group (YYAG) and Thuiya Enterprises Ltd., and focuses on sustainable on-farm growing of acacia trees for charcoal production as a means of earning income, to improve local livelihoods.

Efforts by YYAG showed that rural communities in Nyanza Province can successfully grow acacia trees for charcoal production, in particular *Acacia polyacantha*, which is indigenous to the area. Acacia trees are ideal for charcoal as they grow fast and produce charcoal of a desirably high density. The trees are grown on individual farms, initially intercropped with beans and ground nuts, and the entire process of seedling production, planting, managing, harvesting, transporting, processing and marketing is managed at the community level. Close collaboration with key stakeholders including local universities such as Moi University, research institutions such as the Kenya Forestry Research Institute (KEFRI), and other government agencies, including the



Ministry of Agriculture and Livestock Development and the Ministry of Energy, has contributed greatly to the success of the project, which has successfully completed a 6-year acacia growing cycle, producing good quality charcoal. During the tree growing cycle, farmers get revenue from short seasonal crops, honey from bee-keeping, poultry, and dairy goats.

There is a huge market for charcoal in Bondo and the surrounding Kisumu area (on the shores of Lake Victoria) but because of a lack of awareness of the current environmental policy, lack of charcoal standards, high transport costs and lack of access to credit, amongst other issues, there is limited participation of key market actors, including the private sector.

Despite these challenges the project has produced some very positive livelihood outcomes over the 6 years, including human capital (knowledge and skills); natural capital (240 ha of acacia trees planted over 7 years); social capital (growth of Community Based Organisations); and financial capital (approximately Ksh 600,000, roughly US\$ 7,500) (PISCES/FAO, 2009). Farmers participating in tree planting and charcoal production activities in Bondo District have acquired improved knowledge and skills on tree planting and harvesting and processing wood for charcoal production (including improved carbonization technologies such as the 'half orange' kilns installed on the site). The Bondo District project demonstrates that commercial on-farm tree growing for charcoal has a lot of potential for improving the livelihoods of the rural poor, and awareness needs to be increased for people to appreciate charcoal as a cash crop. It also highlights the need for a well-developed business environment to ensure high returns to market chain actors and better recognition of their roles in the market chain to increase producer income.



## Kitui case study: challenges of an unsustainable charcoal value chain

Kitui District, located in the Eastern Province, is part of Kenya's arid and semi arid lands. Average annual rainfall is 500-700mm and water scarcity is an on-going problem. It is therefore relatively more difficult to plant and grow trees for charcoal in this district compared to Bondo. Up to August 2009, the rate of cutting naturally-growing indigenous trees (targeting naturally growing acacia species) for charcoal production in Kitui was alarming and unsustainable (Mugova, 2009). Charcoal burners in the district view charcoal production as an activity that depends on solely harvesting existing woody resources, with tree-planting being of low priority. Communities are involved in charcoal production mainly to buy food and pay school fees and bills, and the activity is increased during periods of drought.

The current level of charcoal production in Kitui is unsustainable due to the lack of appropriate incentives to support commercial tree farming for charcoal, a lack of marketing structures for market chain actors, and a lack of information on the current stocking levels of various charcoal producing species. There has been little support for tree planting for sustainable charcoal production in Kitui district, unlike Bondo where external input from the Government and the private sector has helped the community reach its current level. The situation in Kitui is worsened by inefficient charcoal production methods due to the lack of knowledge on more efficient kilns, and their higher cost. The traditional local kilns have overall energy efficiencies of about 10%, resulting in massive wastage of woody resources and accelerating deforestation and environmental degradation. The stakeholders involved also identified other issues such as low charcoal prices, seasonal fluctuation of demand, and a lack of skills for tree valuation and sustainable tree management. Producers and transporters also incur significant losses when paying illegal levies during the transportation of charcoal, due to the lack of clarity on the types and number of official taxes to be paid to local authorities.

## Kitengela case study: a sustainable charcoal business

The Kitengela initiative is a private business on the outskirts of the capital city of Nairobi, that houses a 2.5 acre arboretum, including a total of 24 tree species adapted to dry land conditions such as those in Kitui District. It was started in 1996 with the aim of conducting research and developing a sustainable system for charcoal production in a semi-arid area.

The initiative focuses on innovative research on the production, management, and processing of wood and charcoal bioenergy resources, along with development and production of new and original designs of energy efficient technologies, including charcoal and wood-burning cook stoves for households and small businesses in different parts of the country. The Kitengela initiative is run as a self-sustaining business that grows and sells seeds of indigenous tree species, produces and sells fuel wood and charcoal made from acacia, and cookstoves and baking



ovens, amongst other products. In addition, it offers training in charcoal production and woodlot establishment services to communities and other interested customers. The initiative addresses the complete “seed to ash” cycle in a very innovative way.

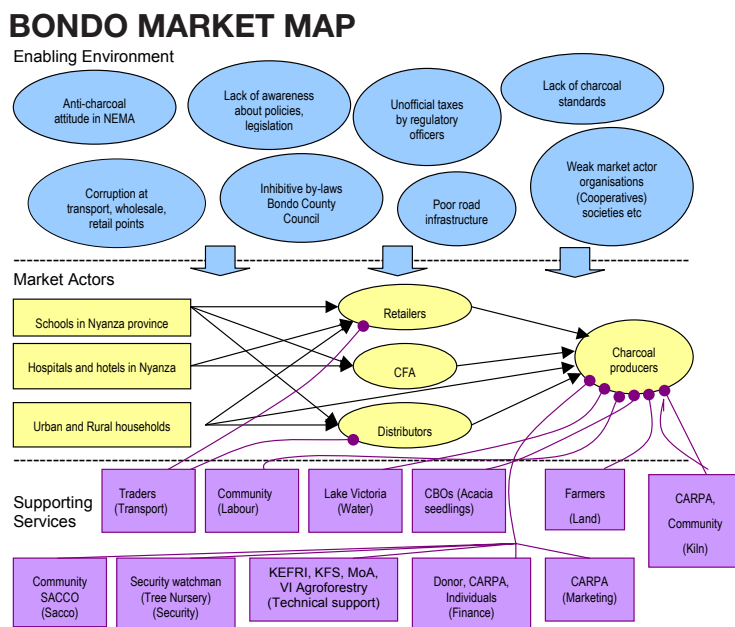
The field visit demonstrated to charcoal market actors from Kitui and Bondo that small trees can also produce charcoal, and therefore that agro-forestry can be successfully practised on relatively small areas of land. The lessons learnt include the encouragement of deliberate planting of indigenous tree species, the practice of pollarding, and a holistic approach of combining tree planting, charcoal production and manufacture of improved stoves. It also demonstrates the win-win concept of protecting the environment whilst using tree resources to produce charcoal for sale.

## Participatory market mapping for Bondo and Kitui



Preliminary maps based on research in Bondo and Kitui had already been developed by PAC East Africa office, and the PMM workshop offered an opportunity to assess these maps. The process involved the participation of actors in the market system to identify gaps in the market system, and to consider how the maps can be improved and used to effect change.

The Market Maps reveal how similar challenges are faced by charcoal producers and marketers in both Kitui and Bondo, including the limited knowledge and use of efficient production techniques. In particular, the transportation of wood from farms to kilns in Bondo is expensive, the costs of raising seedlings are high, and there is a general negative attitude towards charcoal farming due to its previous illegal status. In Kitui, some of the challenges being faced are low charcoal prices, seasonal price fluctuations, inadequate information on taxation, erratic implementation of taxation policies, and depletion of raw material sources.

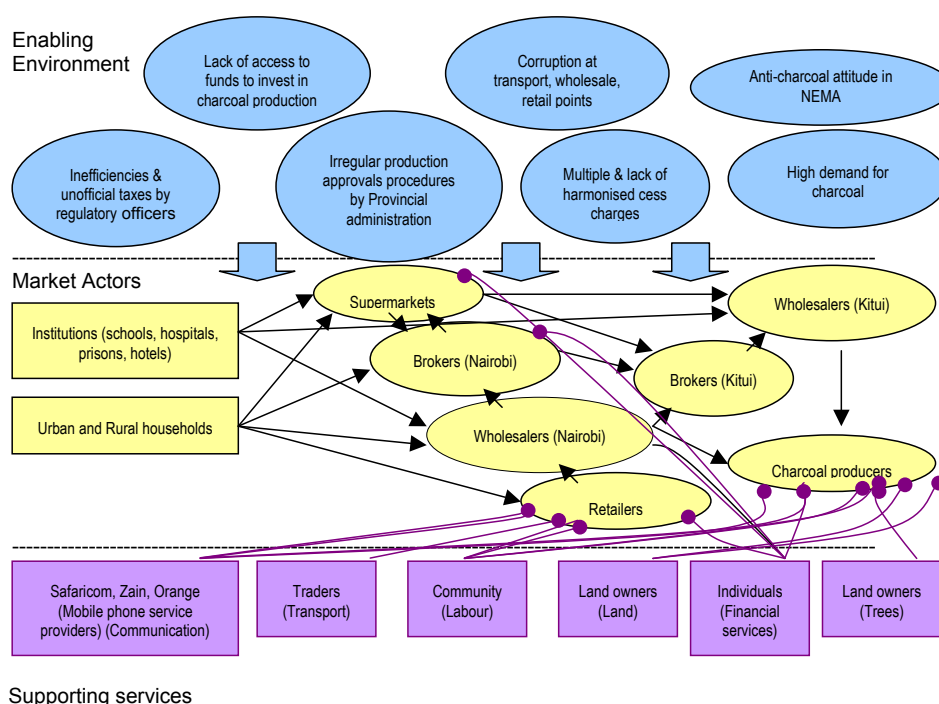


## Emerging issues: comparing the Bondo and Kitui charcoal market maps

The market map shows, graphically, the current status of the charcoal industry in the two areas, as well as identifying any current and future opportunities and constraints. For instance, the market map for Kitui indicates that traders are paying much more for trade licenses than they should be. Such hefty retail charges raise the question of whether the charcoal business is actually viable. Producers from both districts were able to understand how new regulations could make their business more profitable, particularly since a large proportion of urban dwellers in the nearby cities of Nairobi and Kisumu depend on charcoal from Kitui and Bondo, respectively, for their household and small business energy needs.

The regulations governing cess (money paid by charcoal transporters to local government) need to be harmonised to create a more positive enabling environment for producers. Standards for the weight of a bag of charcoal are needed to ensure a fair price for producers in both Kitui and Bondo. The market chain in Kitui is much more complex than in Bondo, and was described by the market chain actors as a cobweb. The presence of so many actors reduces the profit margin for producers and exposes them to exploitation by a complex range of market forces. However, only Bondo producers incur the additional cost of transporting wood to kilns. Both sets of producers suffer exploitation from retailers who buy the charcoal at very low prices - brokers are generally viewed negatively, especially in Kitui where they grossly underpay producers. Both producers and retailers anticipate that Community Forestry Associations (CFAs) will help eliminate brokers in Kitui District. CFAs have more than 6,000 members and consist of more than 100 Community Based Organizations (CBOs), which are local groups of producers. The CFAs act as umbrella institutions for the CBOs/user groups, mainly acting as forums for coordination, discussion and information sharing, while the CBOs/user groups continue their activities on the ground. This makes them a particularly useful vehicle for wide engagement amongst communities (UNEP, 2010).

### KITUI MARKET MAP



## Kenya workshop: conclusions and next steps

Following the review of the 3 charcoal models, market actors and players from all the areas recognised charcoal as a key industry and a very important source of energy for both urban and rural households in Kenya. Although the Government has recently led the development of legislation and policies to facilitate sustainable charcoal production and marketing, the industry remains affected by many challenges which impede the realisation of its policy objectives.

Market actors have limited awareness of these policies and legislation, largely due to the on-going perception of charcoal as an illegally-produced commodity. Additionally, the presence of numerous charcoal taxes, and the abundance of actors with unclear roles, reduces the profitability for the entrepreneurs and market actors. The exercise also revealed the limited information for determining the profitability of the charcoal industry, as well as undercapitalisation due to the minimal supply of credit to the sub-sector. The workshop successfully brought together key stakeholders to discuss a range of problems, including chiefs from central Uyoma, Bondo and central Kitui; members of local CBOs; senior forest officers; charcoal producers; charcoal transporters; charcoal brokers; charcoal retailers; a Commanding Police Officer; a Director from the Department of Renewable Energy; and a representative from the African Centre for Technology Studies (ACTS).

Participants reviewed the case studies and developed ideas for addressing the specific gaps in Kenya's charcoal market. It was suggested that PISCES should initiate the identification of key issues from the national energy and forestry policies and legislation, and develop a charcoal policy summary booklet for awareness of policy issues and of local authority fees. This would help Community Associations disseminate information to create awareness among



market actors on the updated charcoal policy and legislation, and help identify its weaknesses so that appropriate amendments can be recommended. Furthermore, PISCES and Community Associations could initiate the development of charcoal standards in collaboration with the Kenya Bureau of Standards (KEBS) and the Ministry of Energy.

Recommendations for improving the supporting services in the charcoal market system in Kenya include:

- developing a prototype brick drum kiln and evaluating its performance, to encourage small-scale production of charcoal (KEFRI is the ideal institution for this).
- the establishment of demonstration farms in Bondo and Kitui, to exhibit the management of natural tree species for charcoal production (best led by the Kenya Forest Service KFS).
- KEFRI could lead research to generate information on appropriate charcoal tree species for different ecological zones for the sustainable growing of wood for charcoal.

The recommendations for helping market actors include the formation and/or strengthening of the Community Charcoal Associations to coordinate the sustainable

production and marketing of charcoal. The KFS could facilitate the establishment of a collection centre in Kitui where members can sell their charcoal for a competitive price.

As well as the above recommendations, the workshop encouraged immediate actions, including the establishment of demonstration farms in Kitui District by the KFS and the Ministry of Energy. Charcoal producers in Bondo were also encouraged to adopt improved kilns such as small drum kilns to reduce the cost incurred in transporting wood to central kilns. The PISCES project, in collaboration with key stakeholders, is currently developing a wider action research initiative, to address key knowledge and practice gaps identified by the charcoal market mapping exercise, and is also exploring the possibility of initiating similar workshops with PISCES partners in Tanzania.

## Unblocking the biomass market system in Sri Lanka

Bioenergy has been Sri Lanka's primary energy source throughout its history, with recent figures suggesting that biomass has a 47.4% share of the national primary energy supply. Despite 70% of national bioenergy being consumed in the informal sector for domestic cooking and industrial purposes, it has still not been exploited on a large scale by the commercial sector. Firewood is Sri Lanka's main cooking fuel, despite electricity being available to 85% of households. Cooking accounts for 81% of total biomass consumption (Nissanka and Konaris, 2010).



Sri Lanka's PISCES country program focuses on the effective and sustainable utilisation of biomass for energy applications in different sectors, including households, institutional and industrial applications, small village electrification and power generation, all with an emphasis on ensuring energy access for the poor. A PISCES Biomass Policy Working Group (PWG) has been set up, allowing a group of professionals to engage with the biomass policies of Sri

Lanka. It is chaired by the Sri Lanka Sustainable Energy Authority (SLSEA), and has identified that the transformation of the biomass market system is key for promoting the efficient use of biomass as a versatile modern energy source. The PWG conducted a capacity building exercise in 2008 to understand the PMSD process, before carrying out a Participatory Market Mapping (PMM) workshop in January 2009. The PMM workshop was held to stimulate an in-depth analysis of two bioenergy market systems, to identify key issues and areas where policy interventions are required. PAC and SLSEA, who have long-term experience in the sector, selected two systems for analysis: biomass supply to the industrial sector; and commercial fuel wood supply to households and the service sector.

As in Kenya, the objective of the workshop was to identify market actors, their inter-links, external factors that affect the market chain, and service providers. It was also hoped to better understand the issues presently facing the sector and their effect on the three market system levels, and to develop policy interventions to promote more efficient and environmentally sustainable market systems, thereby maximising the benefits to energy access and livelihoods.

## Participatory market mapping for industry, service and household sectors

After a general discussion on bioenergy in Sri Lanka, workshop participants (including biomass producers, policy makers in the energy sector and service providers) were introduced to PMM as a tool of Participatory Market System Development. This allowed the market actors to appreciate the process and understand the techniques, through the analysis of the two market systems in parallel sessions.



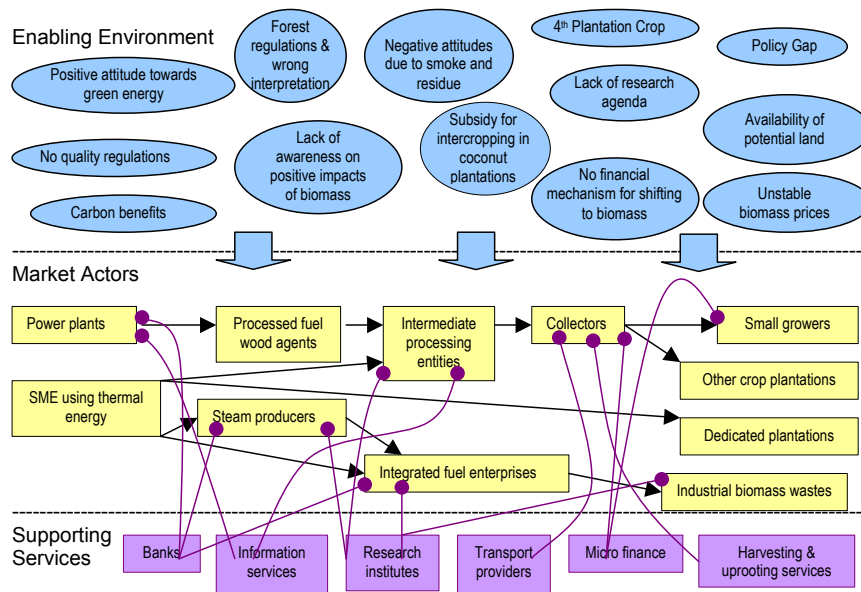
The workshop coincided with an unprecedented drop in world petroleum prices, which affected most of the market actors, since many industries, particularly tea factories, had started to switch to biomass from petroleum during the previous period of escalating global oil prices. This volatility of the energy market created an opportunity to debate the relevant issues in depth. The two market maps showed similar enabling environment factors and service providers, allowing a general analysis of the important issues, with a few specific issues from each chain being analysed separately. For example, in the industrial sector, project viability is strongly affected by global oil prices.

## Issues emerging from the market maps

### Enabling Environment

The market mapping exercise exposed a lack of strategies and action plans for taking advantage of the Government's recent announcement of *Gliricidia sepium* becoming the fourth national plantation crop (after tea, rubber and coconut) - thus creating a gap between policy-making and implementation. There are also difficulties in getting lands released for energy plantations, and a lack of support for R&D to address issues of biomass technology. Strict environmental and forestry regulations prevent the harvesting and transportation of certain tree species, so that industrialists are often reluctant to adopt biomass. There is also a major issue with the communication of the availability of subsidies for intercropping, and poor interpretation of the law by law enforcement authorities (including local police), leading to unfair restrictions on biomass transporters. The biggest factor affecting price stability has been petroleum prices, with the recent sudden decrease in price resulting in potential industrial users scrapping their biomass adoption plans. Additionally, carbon credits promised to biomass users haven't been delivered and financial institutions don't have special mechanisms for promoting bioenergy.

## SRI LANKA BIOMASS SUPPLY FOR INDUSTRIAL SECTOR MARKET MAP

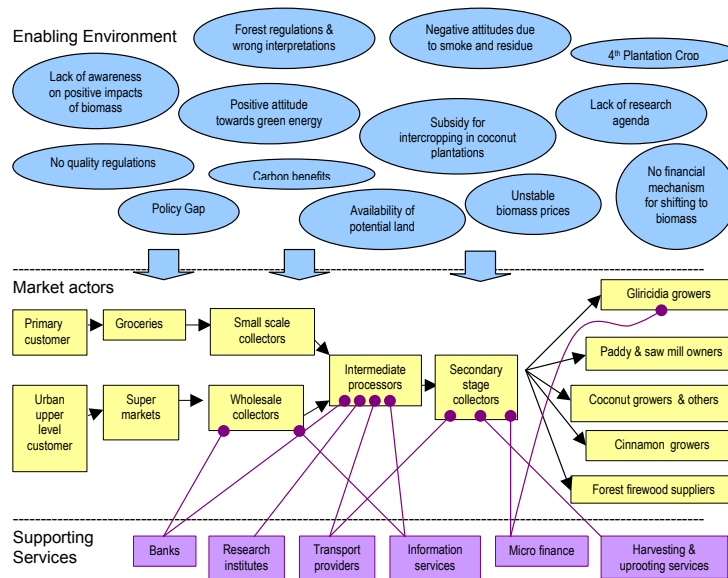


The household sector faces specific issues such as the impacts of indoor air pollution (IAP) and a lack of building codes that would promote the healthy use of biomass. There are also social pressures created by the view that firewood for cooking is socially inferior to liquid petroleum gas (LPG), which is considered as modern and “for the rich”.

### Supporting Services

Up front capital investment for industrial equipment is quite high in the Sri Lankan biomass industry (e.g. biomass gasifier stoves) and commercial banks do not offer mechanisms to take into account the biomass industry’s characteristics. If well-coordinated, efficient transport systems could play an important role in minimising associated costs and R&D services, and help develop solutions to meet the needs of the industry and households. In addition, economic and appropriate technologies are lacking, and R&D is required for biomass industry equipment and facilities. There is also a need for industry-related information to reach the intended markets effectively.

## SRI LANKA BIOMASS SUPPLY FOR HOUSEHOLD SECTOR MARKET MAP



## Market Chain Actors

**End Users:** Industrialists and power plants face difficulties in securing financing of the expensive capital equipment required for biomass power production. The amount of space required for fuel wood storage means they often face space restrictions. Other issues include unstable supply chains and prices, lack of standards for biomass (such as those governing moisture levels) and environmental problems associated with biomass (such as noise and smoke from processing facilities).

Household sector users are unaware of newly improved technologies (such as improved cook-stoves) and their associated benefits, and have difficulty finding good quality firewood in markets, especially small-sized firewood. As mentioned earlier, there is a social perception that cooking with biomass is inferior, and new houses in Sri Lanka are built without kitchen chimneys. This leaves many households with the more expensive, and often unaffordable, option of LPG or electricity.

**Intermediate Suppliers:** As with industrial power plants, intermediate suppliers require a lot of space (for collection, processing and storing), require new technologies as well as reliable and affordable equipment. In addition they face high transport costs and issues with law enforcement authorities during transportation, including unfair detention and cumbersome security checks. Another significant problem is the reluctance of end users in the industrial sector to pay pre-negotiated prices for biomass, triggered by fluctuations in petroleum prices.

**Growers:** Large energy plantations encounter difficulties in acquiring land since there is no clear procedure for this. Cutting trees on an energy plantation is very labour-intensive (and therefore expensive) and subsidies are available only when the entire plantation is ready for harvesting. There are government restrictions even during harvesting, particularly environmental laws that discourage growers from harvesting their trees. Large growers struggle to obtain good financing facilities and scientific information on growing energy plantations.



Small growers struggle to get a good price and so cannot consider it a main income stream. The situation is further worsened by ad-hoc fuelwood collections, resulting in payment uncertainties and a lack of means of transporting cut firewood to roadside collection points. They are also excluded from grants for planting, or are not aware of intercropping subsidy schemes.

## Sri Lanka workshop: conclusions and recommendations

The market mapping workshop was successful in identifying chain actors, enabling environment players, service providers and their inter-relationships, and, in particular, the issues facing them. However, the quantification of the flow of biomass along the chain was not successful, due to the immature nature of the chains with poorly constructed flow paths. Therefore, it is worthwhile for PISCES to address these issues to enable biomass to be promoted as a well established commercial commodity.

The proposed recommendations to address the enabling environment of the biomass market system in Sri Lanka include the establishment of an institution with the authority to implement a bioenergy sector policy framework; the formulation of biomass product specifications (e.g. moisture content and size) in consultation with the Sri Lanka Standards Institution; the development of a practical pricing mechanism for biomass; and a revolving fund for cushioning price fluctuations. The stakeholders also suggested a review of regulations relating to forestry products and timber transportation, and the possibility of using carbon credits and non-monetary benefits for end users, including “Green Labelling”. Additionally, incentive schemes would be useful to encourage private sector participation in the industry.



R&D policies and support structures were identified as requiring further work to ensure that more attention and funds are allocated to the biomass sector. R&D was also proposed for optimising distribution models, transport solutions, and suitable cooking equipment for domestic biomass use. An investigation into a failing 1MW thermal biomass power plant in Walapane, Nuwara Eliya, southern central Sri Lanka was also proposed. An

economic study of energy plantations could also be developed, incorporating the social, environmental and economic benefits. Market actors would benefit from the identification and mapping of available resources, and the current and future demand, to develop a clearer picture of the resource distribution. Another recommendation was the promotion of biomass usage amongst end users in order to create demand.

The PISCES Biomass PWG will follow up with involved institutions to implement recommended actions and monitor progress, with SLSEA chairing discussions and PISCES supporting research activities. In addition, market actors and other stakeholders will form a pressure group to ensure that action is taken and the momentum continues. They will also assist the policy makers and other institutions by providing industry-related information, enabling them to take informed decisions with regard to introducing new policies and/or amending existing ones.

## Comparing Kenya and Sri Lanka market mapping exercises

The conclusion of the two Participatory Market Mapping experiences in Kenya and Sri Lanka clearly shows that the overall objective of connecting market system stakeholders and sharing knowledge and information was achieved. Workshop participants and facilitators were able to identify market actors, important enabling environment players and service providers, as well as the inter-relationships and issues they face. This was achieved through the creation of accurate market maps drawn from the wide knowledge base of the market actors. In both cases the process built and improved dialogue between system actors who are often quite disconnected.

While the Kenyan workshop adopted a case study approach, focusing on two areas (Bondo and Kitui) to develop the appropriate market maps, the Sri Lankan workshop focused on the biomass market system at a national level; but both resulted in many similarities between the enabling environments and service providers factors of the market maps. Both market mapping exercises managed to expose the issues emerging from the market maps and develop recommendations for their respective market systems. However, the exercise in Kenya placed emphasis on the actions following the workshop, based on recommendations, while the Sri Lankan workshop provided a very detailed assessment of the issues affecting the market system.

### Lessons learnt

The interesting mix of characteristics from the Kenyan and Sri Lankan workshops provides a good set of lessons for future PMM exercises, including:

#### 1. Participatory Market Mapping is an intervention in its own right

A PMM workshop draws together the key market actors and facilitates identification and discussion of the different elements of the market map. This collaboration helps establish mutual understanding and trust among participants.

#### 2. Local system boundary versus national boundary

In the Kenyan case, where specific local market systems were mapped, it appears that more concrete outcomes were identified in terms of barriers faced and actions for specific actors at the meeting. Where the scope of the meeting was more national, as in the Sri Lanka process, then more general issues were discussed at the national policy level, but fewer concrete actions were developed to address larger problems directly.

#### 3. Comparison of multiple varying markets

Using several case studies of specific local market chains, as in Kenya, appears to support an analysis of the wider market system. By considering 3 specific towns or markets, facilitators and market actors from each gained a clearer understanding of common enabling environment factors and service providers, and also appeared to learn fresh ideas and recommendations from those in other similar chains but different locations.

#### 4. Detailed emerging issues

In order to generate feasible recommendations for enhancing a market system, it is very important to pinpoint the issues negatively affecting the market chain, or even those that are not affecting it positively enough. This can be achieved by considering separately the issues for each level in a market map, including the

enabling environment, market actors and supporting services. In Sri Lanka, the workshop was successful at identifying the issues affecting the market actors according to their position in the market chain: end users, intermediate suppliers and growers, bringing better recognition of the different roles of the market actors.

#### 5. Detailed follow-up actions

After agreeing on the issues emerging from the market maps, it is crucial to facilitate the development of a set of recommendations that specify which market actor, service provider or even which government institution or organisation will take each issue forward, and within what time period. Such a level of detail leads to less ambiguous strategies for the future and helps hold relevant stakeholders accountable for their contribution to market system improvements. For example, PISCES in Kenya has taken the responsibility to lead the identification of key issues from the national energy and forestry policies and legislation, and to develop a set of simplified knowledge and awareness materials. Such recommendations leave less room for confusion as to who does what once the market mapping workshop has been completed.

## Market system similarities

Though the Kenya workshop focused on charcoal and the Sri Lanka workshop on biomass, it is interesting to note that the market systems shared a number of issues:

#### 1. Lack of knowledge of Government legislation and policies

Kenyan market chain actors are still unaware of the legalisation of charcoal production and marketing. In Sri Lanka, few market chain actors are aware of the declaration of *Gliricidia* as the 4th plantation crop.

#### 2. Lack of appropriate financing facilities

Because it is still viewed negatively in Kenya, the charcoal subsector struggles to secure credit services and is therefore grossly undercapitalised. In Sri Lanka, the biomass sector lacks specific financial mechanisms to cater for the biomass industry characteristics.

#### 3. Lack of standards

No standards have been set for the weight of a bag of charcoal in Kenya; and although biomass supplies come in different moisture levels and sizes in Sri Lanka, no standards have been fixed there either. This situation means that producers in Kenya don't get a fair price for their charcoal, and power plants in Sri Lanka struggle to get consistent quality biomass supplies.

#### 4. Issues with officials during transportation

The profitability of the charcoal industry in Kenya is frequently threatened by numerous illegal "taxes" paid by charcoal transporters. Unfair detention and cumbersome security checks are the main issue faced by transporters of timber in Sri Lanka.

#### 5. Limited Research and Development

There is a great need for research to be conducted in Kenya to help determine appropriate tree species for charcoal; similarly in Sri Lanka, the Government needs to support R&D on biomass issues. These similarities mean that recommendations from the two countries can be shared, such as establishing demonstration farms for *Gliricidia* in Sri Lanka, as was proposed in Kenya for acacia trees; and the creation of materials to create awareness among market actors regarding changes in government legislation and policies in Sri Lanka.

## Conclusions

The workshops in Kenya and Sri Lanka both demonstrate how Participatory Market Mapping (PMM) can be used as a method of identifying the gaps in market systems and providing a platform for further Participatory Market Systems Development (PMSD). Bringing together a group of relevant but often disconnected stakeholders allows experiences to be shared and important issues to be recognised, as well as translating this learning into recommendations for action for the benefit of all market actors through “win-win” activities, which help build the sub-sectors. Such workshops can encourage powerful market actors to be aware of, and engage with, issues that negatively impact on their market chains. This can produce a greater impact when their collective influence is focused to help improve policies that can positively effect even the smallest of market actors.

In comparing the experiences from Kenya and Sri Lanka, similarities were noted in both market systems, advancing the knowledge-sharing aspect of the PISCES project. It was possible to see parallel blockages that were affecting the market systems in both countries. For example, the lack of standards for the weight of a bag of charcoal in Kenya and for biomass moisture levels in Sri Lanka has adversely affected the consistency of bioenergy supply. Such similarities allow recommendations to be shared between Kenya and Sri Lanka, a learning experience that can be replicated in other countries or regions.

From the outcomes of the workshops, there are clear lessons from both countries for future participatory exercises. The experiences from Kenya and Sri Lanka suggest that a blend of case studies, detailed emerging issues from market maps and specific recommendations should be integrated into the basic market mapping exercise. This was well-demonstrated by the Kitui and Bondo case studies in Kenya and by the clear breakdown of issues affecting biomass market systems in Sri Lanka. Recommendations, such as KEFRI addressing knowledge gaps around drum kilns in Kenya, should be the kind of outputs that PMM workshops target. PISCES can apply this approach in Kenya and Sri Lanka to further refine the methodology and determine a bioenergy model for PMSD, which can be replicated in India and Tanzania. Most importantly, the distinctiveness of each market system must be kept in mind to ensure participatory activities are relevant to the current situation, as in Sri Lanka where low global oil prices were affecting most market actors at the time of the workshop.

As PISCES continues to facilitate the enhancement of bioenergy market systems, participatory approaches can be highly relevant for promoting the commercialisation of these industries into well-established and regulated sectors that will ensure energy access for all, and improve livelihoods in developing nations such as Kenya and Sri Lanka.

## References

1. ESDA (2005), 'National Charcoal Survey: Exploring the potential for a sustainable charcoal industry in Kenya'
2. Gathui T. (2010), 'Promoting Sustainable Charcoal Production and Marketing in Kenya: A Comparative Analysis through Participatory Market Mapping' (Published Workshop Report for PAC Eastern Africa office).
3. Musafir N. (2010) 'Biomass Market Mapping Workshop' (Draft Workshop Report for PAC South Asia office).
4. Bernet T. et al (2005) 'Participatory market-chain approach', BeraterInnen News 1/2005, Lindau, Switzerland.
5. Albu & Griffith. (2005) 'Mapping the Market', Practical Action. (online: [http://practicalaction.org/markets-and-livelihoods/mapping\\_the\\_market](http://practicalaction.org/markets-and-livelihoods/mapping_the_market))
6. Naoki, T (2010) 'Promoting charcoal industry in Kenya for sustainable socio-economic development: perceived opportunities and barriers for small-scale CDM in Bondo/Rarieda district, Nyanza Province, Kenya', MSc Thesis, The University of Edinburgh.
7. Nissanka & Konaris. (2010), 'Bioenergy in Sri Lanka: Resources, Applications and Initiatives' (Working Paper for PISCES).
8. PISCES/FAO (2009), 'Small Scale Bioenergy Initiatives'.
9. Mugova, Alex (2009), 'Assessing livelihoods impact of charcoal production in Bondo and Kitui districts of Kenya: A Value Chain Analysis Approach.' Prepared by PAC for PISCES Charcoal Kenya Nov 2009 Workshop; Extracted from PAC report to UNDP Kenya on "Sustainable Charcoal Production in Four Districts in Kenya".
10. UNEP (2010), 'Rehabilitation of the Mau Forest Ecosystem', Prepared by the Interim Coordinating Secretariat, Office of the Prime Minister, on behalf of the Government of Kenya, with support from the United Nations Environment Programme
11. Muok B. O. (2008), 'Policies and Regulations Affecting Biofuel Development in Kenya' (Working Paper for PISCES).

## Glossary

CARPA	Christian Agricultural and Related Professionals Association
CBO	Community-Based Organisation
CFA	Community Forestry Association
FAO	Food and Agriculture Organisation
KEFRI	Kenya Forestry Research Institute
KFS	Kenya Forestry Service
MoA	Ministry of Agriculture
NEMA	National Environmental Management Authority
PISCES	Policy Innovation Systems for Clean Energy Security
PMMS	Participatory Market Mapping
PMSD	Participatory Market Systems Development
SACCO	Savings and Credit Co-operative
SLSEA	Sri Lanka Sustainable Energy Authority
SME	Small-Medium Enterprise
YYAG	Youth to Youth Action Group

## Executive summary

The PISCES project is developing new knowledge for the sustainable use of Bioenergy to improve energy access and livelihoods in South Asia and Eastern Africa. Enhancing bioenergy market systems through Participatory Market System Development (PMSD) offers the potential to improve efficiency and sustainability of such systems. Participatory Market Mapping (PMM) is a key tool in this approach which increases market knowledge and connections by engaging key market stakeholders in the generation of detailed market maps. Such processes have previously shown a strong impact on a variety of agricultural market chains, and the PISCES project has trialled the application of these techniques to bioenergy. Workshops were held in Kenya and Sri Lanka in 2009 aimed at identification of market chain actors, external factors affecting the market chains and sub-sector service providers. The workshop in Kenya developed comprehensive recommendations for sustainable charcoal production by comparing three local charcoal market systems; and the Sri Lankan workshop analysed issues affecting the national biomass market system. The lessons learnt from each experience show similarities in the challenges faced by both countries, and provide a model for blending market mapping approaches for future application to Bioenergy market system development.



For over 40 years, Practical Action Consulting has provided development consultancy services as the consulting arm of the international NGO, Practical Action, formerly the Intermediate Technology Development Group (ITDG). PAC provides high quality, independent and professional advice to governments, NGOs, aid agencies and the private sector. We work worldwide from regional offices in the UK, Eastern and Southern Africa, South Asia and Latin America. Long standing engagement in technology and developing countries has enabled us to develop a network of local partner organisations and international specialist associates. Practical Action uses technology to challenge poverty by building the capabilities of poor people, improving their access to technical options and knowledge, and working with them to influence social, economic and institutional systems for innovation and the use of technology. Our vision is of a sustainable world free of poverty and injustice in which technology is used for the benefit of all.

For more information visit <http://practicalactionconsulting.org> and <http://practicalaction.org/home>



Policy Innovation Systems for Clean Energy Security (PISCES) is a five-year research project funded by the Department for International Development of the United Kingdom (UK). Project implementation started in July 2007. The purpose of the project is to increase available knowledge and understanding of policy relevant trade-offs between energy, food and water security for livelihoods in relation to bioenergy. PISCES is a Research Programme Consortium (RPC) whose members include African Centre for Technology Studies (ACTS, lead) Kenya; Practical Action Consulting (PAC) UK, Eastern Africa, and Sri Lanka; University of Dar es Salaam (UDSM), Tanzania; M.S. Swaminathan Research Foundation (MSSRF), India; and the University of Edinburgh (UoE), UK.

For more information contact project manager Bernard O. Muok at [b.muok@acts.or.ke](mailto:b.muok@acts.or.ke) and visit <http://www.piscses.or.ke>