Social Concerns of Forest Bioenergy Development In South Africa: A Case Study Of Iswepe And Piet Retief Communities

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ABSTRACT

Integrated timber and bioenergy production system is being widely adopted in South Africa as one of the cost effective ‘carbon emission reduction mechanisms’. However, this approach creates issues of concern between companies and local communities. This study therefore seeks to understand the issues of concern around forest bioenergy development in South Africa by investigating social concerns associated with the use of tree plantation residue for pellets and bioelectricity production from industrial tree plantations in Piet Retief and Iswepe communities of Mpumalanga province, South Africa. The study found that concerns raised by rural communities over use of residue for bioelectricity production in the area are mostly on; non-availability of sufficient residue for household use, difficulty in obtaining access right for residue collection and use, and use of residue from plantation sites close to rural residents for bioenergy production. The study therefore concludes that improving communication link between communities and company and employing company-community partnership in decision making will be crucial in ensuring sustainability of forest bioenergy projects in the country.

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INTRODUCTION

The forestry sector is a significant part of the South African economy, contributing about 2% to the GDP. The South African forest industry provides direct and indirect employment to between 200,000 and 260,000 people (about 1.4% of a rural population of about 16 million) (Chamberlain et al., 2005 and Clarke, 2005). In addition, forest resources were estimated to generate another R15 billion to the South African economy through tourism, communal livestock grazing, and non-timber forest products (FES, 2012). The forest industry is therefore an integral part of the South African plan towards sustainable development (Mayers, 2006).

At the same time, Shackleton (2004) and Chamberlain et al. (2005) reported the historical dependency of South African population on forest resources. They observed that rural households are often involved in harvesting, collecting, processing, consuming and selling forest products either for subsistence use or to compliment outputs from agricultural activities. In the same vein Maduekwe (2008) and Mayers (2012) reported that forest resources provides a reserve of products upon which people can fall back on for subsistence and income in times of hardships; for example crop failure or unemployment.

However, despite the contribution of forestry to sustainable development in South Africa and the fact that most of the tree plantations in the country are well managed; over 80% of the plantation estate in the country is certified as being sustainably managed in terms of the Forestry Stewardship Council scheme (Kruger at al., 2008), forest management and development in the country is laden with controversy and issues of social concerns.

Tree plantation management and development in South Africa is often viewed by some groups as a threat to the country’s water resources. The sector is blamed for severe reductions in surface water runoff and ground water depletion (CSIR, 2010; DWAF, 2005; and Carrere, 1997). South African tree plantation sector is also blamed by some groups for loss of biodiversity in the country. The claim is that afforestation impacts biodiversity, since it replaces natural grasslands and other indigenous vegetation, thus reducing biodiversity (Kruger et al., 2005). Land tenure reform is also another significant issue of social concern confronting tree plantation management and development in the country. In South Africa today, some 125,061 hectares or 49% of the total forest estate owned by Mondi (A multinational forest company operating in South Africa) are subject
to 82 land claims (Mondi, 2011). Claims have been made on significant proportions of the country’s forest estate. State-owned tree plantations are also increasingly being privatized.

At the same time current debate centered on climate change and energy security is reshaping forest operations and management in the country. Although forest bioenergy projects will play an important role in South Africa’s climate change mitigation strategy and transitions toward sustainability, critical planning is however needed as the country’s tree plantation sector cannot afford any new trend of conflict or social concern (Mayaki, 2008 and Hall, 2002). However, the growing trend towards the use of tree plantation residue for pellets and bioelectricity production in response to climate change challenges is causing a new set of concerns and exacerbating the already existing social concerns affecting the already tensed industry.

This study therefore investigates key concerns commonly raised by rural communities about the socio-economic impacts of tree plantations based carbon offset projects such as bioelectricity production from plantation residues on their livelihood. This study presents results of a case study examining social concerns of tree plantation residue utilization for bioelectricity production in Piet Retief and Iswepe rural communities of Mpumalanga Province, South Africa.

**MATERIALS AND METHOD**

**Study area and questionnaire survey process:**

This study was carried out at Iswepe and Piet Retief communities. Both communities are located in Mkhondo Local Municipality of Mpumalanga province, South Africa (Mkhondo IDP, 2008). The communities consist of several thousands of hectares of tree plantations owned by several multinational forest companies such as Sappi, Mondi, and PG Bison. There are also plantations in the area owned by private individuals (MBP, 2007). Households in the twelve villages in these communities were randomly selected for sampling. Six villages were selected each from both Piet Retief and Iswepe communities. The villages are all similar in terms of infrastructure and facility. However, distribution of houses in the villages and the type of dominant livelihood (livelihood here refers to means of living especially of earning enough money. The dominant livelihood activities in the area are farming and livestock keeping) activity in the villages differs (Mkondo IDP, 2008). The name of the selected villages and associated total number of household per village is presented in Table 1 below.

<table>
<thead>
<tr>
<th>Community</th>
<th>Total Number of Household per Village</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piet Retief</td>
<td></td>
</tr>
<tr>
<td>Mooihoek</td>
<td>48</td>
</tr>
<tr>
<td>Belfast (old)</td>
<td>65</td>
</tr>
<tr>
<td>Welverdiend</td>
<td>39</td>
</tr>
<tr>
<td>Bon Esperence</td>
<td>34</td>
</tr>
<tr>
<td>Athalia</td>
<td>51</td>
</tr>
<tr>
<td>New Belfast</td>
<td>37</td>
</tr>
<tr>
<td>Iswepe</td>
<td></td>
</tr>
<tr>
<td>Zoar</td>
<td>32</td>
</tr>
<tr>
<td>Riverside</td>
<td>37</td>
</tr>
<tr>
<td>Watersmeet</td>
<td>142</td>
</tr>
<tr>
<td>The Bends Jabulani</td>
<td>30</td>
</tr>
<tr>
<td>New plaas Ingwempisi</td>
<td>45</td>
</tr>
<tr>
<td>Geluk</td>
<td>49</td>
</tr>
</tbody>
</table>

Source: MBP (2007)

Ten households were randomly selected per village for sampling, resulting in a total sampled population of 120 households. The structured questionnaires used for sampling in this study were designed in-line with guidelines for questionnaire design recommended by Babbie and Mouton (2008). The questionnaires were structured to contain both open-ended and close ended questions, the questions asked were clear and simple and void of double meanings. The questionnaire was pre-tested before administering it to the study population and restructured, and the corrected questionnaire was administered for the study.

Before the start of the survey, community representatives briefed residents in all the selected villages about the research study its aims and objectives. This approach has been successfully used successfully by Ham and Theron (2001) and was thus adopted for this study. The sampling procedure for this study was by means of, direct observation, face-to-face interview and administration of questionnaire forms. The survey was conducted over a two weeks period, covering one village per day.

**Data analysis:**

Microsoft Excel was used to capture the data and STATISTICA version 8 (www.statsoft.com.) was used to analyze the data. The data contained both continuous (interval) variables and categorical (nominal) variables (Keller and Warrack, 2003).
Summary statistics was used to describe the variables. Distributions of variables were presented with histograms and frequency tables. Medians/means were used as the measures of central location for ordinal and continuous responses and standard deviations and quartiles as indicators of spread (Keller and Warrack, 2003).

The relationships between continuous response variables and categorical input variables were analyzed using analysis of variance (ANOVA) (Keller and Warrack, 2003). Relations between nominal variables were investigated with contingency tables and likelihood ratio chi-square tests, as recommended by Keller and Warrack (2003) and Clewer and Scarisbrick (2006).

A p-value of p < 0.05 represented statistical significance in hypothesis testing and 95% confidence intervals were used to describe the estimation of unknown parameters (Clewer and Scarisbrick, 2006).

Results:

The findings from this study are presented below:

Concern over availability of harvest residue for livelihood activities:

Collection and utilization of plantation residue was identified as a major livelihood activity taking place in the study area (Plate 1). All household in the villages are involved in collection and utilization of harvest residues. The residues are mostly used as firewood, but are also used for construction of pens for livestock, fencing and house building. On average 740kg of residue is consumed per household per village on a monthly basis for agricultural purposes. 1,317kg of residue is consumed per household per village per month for house building, and 946kg of residue is consumed per household per month as firewood for cooking. The frequency of collection of residue for these purposes varies much. Residue collection for firewood is practiced on average four times per week per household, collection for agricultural purposes and for building purposes is each practised on average once per week per household.

Plate 1: Residue utilization: a) for house building.  b) For fencing

In trying to understand how much value the communities attached to harvest residues utilization, questions were asked on use of residues, its importance and utilization purposes. A total of 56% of the sample said the residues are very important to them, 43% said it is important, while 1% said the residues are not important to them. All the respondents said that they use the residues for their daily living. The major concerns of the rural people were thus centered on availability of enough residues for their daily living activity should the residues be used for bioelectricity production.

Constraint in obtaining permit for firewood collection:

Constraint in obtaining permits for fuel wood collection is one of the issues of concern expressed by the people. The nature of this constraint differs a lot from one household to the other even within the same village. The nature of these constraint include: long travel distance when firewood is to be collected from compartments far away from the village, bureaucratic delay in obtaining permit for firewood collection and difficulty in getting approval for use of vehicles in firewood collection. However it should be noted that the people did not express scarcity of firewood as one of the difficulty experienced in firewood collection.

Only 29% of the sampled population expressed their dissatisfaction with the firewood collection process in their locality. But the expression of dissatisfaction in firewood collection process is concentrated in villages in the Iswepe area. Thus it can be inferred that firewood collection process is more improved in some villages than in others. The question then remains, how will residue utilization for bioelectricity collection affect permitting process for firewood collection in these villages? The percentage of respondent per village expressing difficulty in firewood collection as an issue of concern is presented figure 1 below.
Constraint in obtaining house building permit:

Difficulties in getting permits either to rebuild dilapidated houses or build new ones are part of the dislikes and issue of concern expressed by the people living on the plantations areas. In some cases the people are unable to rebuild their broken-down house and this causes discomfort to them. The nature of this concern as expressed by the people ranges from difficulty in getting permit to collect building wood from the plantation to obtaining permit for house building in plantation.

The question then remains; to what extent is availability of residue affecting permitting process for house building? And how will these be impacted upon by residue utilization for bio-electricity production. Only 39% of the sampled population expressed their frustration at difficulty experienced in obtaining permits for house building or rebuilding. The statistical test also shows that the number of people expressing concern about difficulty in obtaining permit for house building do not differ significantly ($p=0.148$) from those that do not from one village to the other. This thus means that constraint in obtaining house building permit is not a major challenge across all the villages, but it’s an issue worth improving upon.

Poor communication between forest companies and local communities:

The respondents reported inadequate communication link between themselves and forest companies in their villages. Poor communication is considered a priority issue as it undermines the potential for good relations and governance for efficient management of tree plantation resource in the area. Poor communication can also undermine the social acceptability of any forest base bioelectricity production in the area.

Poor credibility/reputation of forest companies:

A number of the respondent reported that management does not always deliver on its commitments. These perceptions undermine trust and prevent the development of long-term relationships and cooperative partnerships. Linked to the issue of poor communication, there are perceptions among local stakeholders that residue for chips or bioelectricity production will be sourced from plantation compartments that are in close proximity to their villages which will in turn force them to source residue from distant sites. However, lack of communication on management strategy for bioelectricity project has resulted in strained community relations and distrust.

Discussion:

The use of plantation residue for pellets and bioelectricity production is a unique investment opportunity for job creation, value-adding, and carbon emission reduction especially for the South African energy sector. However, this investment opportunity needs to be carefully implemented so as to avert any negative social
impact on rural communities who are heavily dependent on these plantation resources. Evidence from literature suggests that social conflicts can have serious negative impact on tree plantation management and development. Kruger et al (2005) observed that social concern in tree plantation management and development in South Africa is already having negative impact on plantation development and is partly responsible for decline in afforestation programmes and shortage of timber and fibre supply.

Social concerns of bioelectricity production such as availability of plantation residue for rural consumption can be effectively taken care of through company-community partnership. Forest companies can engage the rural communities in making decision on plantation sites to be designated for pellet and bioelectricity production. Since the major issues raised on concern of availability of residue is centred on fears that plantation closest to the villages will be used for pellet/bioelectricity production as is often the case with charcoal production in the area. This trend will increase the difficulty of firewood and construction wood collection in these villages. It is therefore essential that regulations are put in place to ensure that residue for pellet and bioelectricity production are sourced from plantation sites that are not in close proximity to the villages. This will definitely promote social acceptability of the bioenergy projects.

Observed social concerns such as constraint in obtaining permit for firewood collection, constraint in obtaining house building permit, poor communication link between community and forest companies, and poor credibility of forest companies are critical issues that need attention. Poor communication and poor credibility of forest companies can be a major stumbling block to the takeoff of any bioelectricity project in the area. If the villagers are suspicious of the companies operating the bioelectricity project in their area, it can lead to acts of sabotage. It is therefore essential that efforts are geared towards restoring good company-community relationship. In places where communication is poor this can be improved through appointment of credible community representative to serve as mediators between communities and companies. If the communities are made to have a sense of involvement and ownership in company’s decisions in the operation of the bioelectricity project, the social acceptability and sustainability of this project will be ensured.

The issue of poor communication between management and local communities stresses the importance of improved and efficient forest resource governance in the area. Good communication link will help in promoting transparency and accountability in tree plantation management and development in the area. It is not just about improving practices, sustainable tree plantation management must also consider: rights, responsibilities and transparency and accountability in tree plantation management and development in the area. It is not just about improving and efficient forest resource governance in the area. Good communication link will help in promoting transparency and accountability in tree plantation management and development in the area. It is not just about improving practices, sustainable tree plantation management must also consider: rights, responsibilities and benefits. Improving communication link between local communities and forest companies is therefore a crucial step in ensuring that the local communities can hold management accountable for plantation resource management in the area (FAO, 2011).

Conclusions And Recommendations:

In a time where efficient consumption of forest resources has become a focal point, South Africa’s tree plantation industry need to be repositioned so as to embrace this paradigm shift. Tree plantations in Piet Retief and Iswepe areas are suitable case for promoting efficient utilization of forest resource consumption through the integrated timber and bioelectricity production approach. Given the right approach social concerns of integrated timber and bioelectricity production in this area can be managed in a manner that offers the best ‘win-win’ approach for all stakeholders.

While conflicts involving forest resources have increased and their devastating consequences have widened, interests have also expanded on how to ensure that forest resource endowments are used as instruments of peace, stability and development. Without a doubt managing the inflow of revenue from the management of forest resources in a manner that will benefit social and economic development is a great challenge facing South Africa today. Base on the findings of this study, the following recommendations are made in order to promote social acceptability and sustainability of integrated timber and bioelectricity production using harvest residues from the industrial tree plantations in South Africa:

- Review of permit application processes for firewood and construction wood collection in order to avoid unnecessary bureaucratic delay.
- Securing individual and group rights to land and resources, and ensuring effective and democratic local governance must remain top priorities for forest dependent communities.
- Integrated consultative approach with all stakeholders should be employed in addressing social concerns of bioelectricity projects in South African rural communities.
- Forest companies should periodically brief and enlighten rural communities on properties where they operate on developmental stages and status of its various community development programme in order to enable them to understand the status of each programme thereby promoting transparency.

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