Different views of how CDM projects contribute to sustainable development

A study of stakeholder perspectives of two large-scale renewable energy projects in Southern India

Liv Balkmar

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Abstract
Climate change and sustainable development are interlinked in several ways. A global sustainable development with decreased emissions of greenhouse gases is seen as a prerequisite for mitigation of climate change. Simultaneously a changing climate will put restraints to development endeavours in developing countries. Yet, a sustainable pathway should include both mitigation and adaptation to climate change facilitating social development, economic growth and a stable environment in developing countries. The Clean Development Mechanism of the Kyoto Protocol (CDM) is combining reduced greenhouse gas emissions with sustainable development in the CDM project’s host country. This so called dual goal has turned out hard to fulfil, especially the local development objective.

This thesis studies how CDM projects contribute to local development and how this development is viewed differently by various stakeholders. This was made through qualitative interviews with actors connected to two CDM projects in Southern India. In addition, a literature review and a document study was made. The projects chosen are in the renewable energy sector, using biomass fuel. Renewable energy is regarded as an important factor to come to terms with increasing greenhouse gas emissions.

The results from the literature review and document study show that CDM projects’ expected contribution to local sustainable development is usually expressed in terms of employment, distribution of benefits, social infrastructure, access to energy and technology transfer. The environmental benefit is included in the reduction of greenhouse gas emissions. In the context of local development, stakeholder participation is brought up as an important factor. The results of the interviews present similar categories of development linked to CDM projects. However, differing views of actual local development assisted by the CDM project was discerned in the answers.

This study points to scale-related problems linked to the global benefit of mitigation of climate change in combination with local development. In conclusion, there is a need for monitoring and evaluation of CDM projects actual contribution to local sustainable development. To facilitate local sustainable benefits of CDM projects, enhanced stakeholder participation is necessary during the whole project activity period.

Keywords
Climate change, sustainable development, Clean Development Mechanism (CDM), India and renewable energy
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Liv Balkmar

Norrköping, 12 June 2008
ABSTRACT

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1. INTRODUCTION

Climate change poses a huge challenge to the international society. A changing climate affects the whole globe, but to various extent depending on location, exposure and adaptive capacity. Nations have unequal possibilities to respond to climate change, much depending on their level of development. Climate change has an overall effect on environmental concerns, such as ecosystem resilience. Consequently it has an impact on social and economic development and thus puts the focus on ethical and political issues. It is an inter-generational task since decisions and measures made today will impact the future (SEPA, 2002). An unstable climate will affect development endeavours and at the same time there are notions of sustainability being able to limit climate changing emissions and vulnerability to climate change (Swart et al., 2003; IPCC, 2007a).

As a way to understand the causes and effects of climate change the Intergovernmental Panel on Climate Change (IPCC) was established in 1988. The IPCC assessment reports have gradually evolved to include sustainable development questions (Najam et al., 2003). The United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 1992 (UNFCCC, 2008) as an attempt to join all nations for the climate change issue. The linkage between climate change and sustainable development was acknowledged in UNFCCC and later in the Kyoto Protocol (Najam et al., 2003).

The Clean Development Mechanism (CDM) of the Kyoto Protocol amalgamates the sustainable development objectives of a developing country in a CDM project with the greenhouse gas (GHG) emission reduction commitments of an industrialised country (Swart et al., 2003). These differing goals between the host party and the investing party are expected to lead to conflicts of interest when it comes to the selection of projects (Markandya and Halsnaes, 2002). There are examples of CDM projects where the goals have only been achieved to a low extent (Sutter and Parreño, 2005). There are doubts whether local sustainable development can be achieved with the help from a market based tool. According to the Marrakesh accords it is the prerogative right of the host country to decide the criteria for sustainable development. This gives the host country an opportunity to use the CDM as a strategy in the achievement of national, regional and local development objectives. However, a too stringent application of sustainability criteria may weaken the investor’s interest (Sutter and Parreño, 2005). There are also differing opinions what sustainable development actually stands for, depending on which interests are considered.

This master thesis explores the balance between CDM goals and different stakeholder views of sustainable development through two CDM projects in Southern India. Both projects are generating renewable energy from biomass sources. Renewable energy is regarded as an important measure in the control of climate change since it replaces energy from fossil fuel. India is both a major host of CDM projects and one of the most important developing countries in climate change discussions. For that reason, India was considered a suitable country to study when an international treaty, as the Kyoto Protocol, is put into practice and operationalised locally.

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1 The rules of the Kyoto protocol were outlined in Marrakesh 2001 (UNFCCC, 2008).
2 India’s share of the total CDM projects have decreased from hosting about 50% of the CDM projects in 2005 to about 25% in the beginning of 2008 (UNEP Risoe, 2008b). At the moment (May, 2008) China is the major host country.
1.2 PURPOSE AND RESEARCH QUESTIONS

The thesis is based on the overall objective of CDM i.e. to promote sustainable development in the host country, mitigate GHG emissions according to UNFCCC goals and to assist industrialised countries to fulfil their commitments to the Kyoto Protocol. The purpose is to investigate how CDM projects contribute to local sustainable development, viewed from different stakeholders. The hypothesis is that development is viewed differently depending on the stakeholders’ perspective.

The scope of the study is renewable energy CDM projects, one located in the Indian state of Karnataka and one in Tamil Nadu. One of the projects was a three year old biomass energy plant and one was an established sugar mill, where the cogeneration of electric power to the grid was the activity eligible to CDM. The Swedish investors involved in these projects are part of the study as one stakeholder. The stakeholders in India connected to the projects are the project managers, project developing consultants, villagers, local boards, environmental authorities, renewable energy promoters and Non Governmental Organisations (NGOs).

Addressing the purpose of the thesis the following questions will be investigated by interviews, a document study and a literature review:

1) Which are the driving forces for the host party as well as the investing party to establish a CDM project?

2) What kind of local or regional benefits in terms of sustainable development, are associated with the CDM projects?

3) What are the framings of sustainable development at the local and institutional level?

4) How is sustainable development defined by the different actors involved in the CDM projects?
2. METHOD

The method section describes how the study was conducted and which considerations were made. First the research design is presented, followed by the choice of respondents included in the study. The following paragraphs outline how the interviews were planned, conducted and analyzed. Further, the questions of reliability, validity and subjectivity are discussed and lastly a reflection of the study is made.

2.1 RESEARCH DESIGN

A literature review with relevant articles and policy documents in the field of CDM projects and development forms the background. The intention was to study the notion of sustainable development in the context of the projects through the perspective of the project hosting party, the investing party and other stakeholders. Therefore different stakeholders opinions related to the projects were important in order to discern any differences and similarities in the views and for this reason qualitative interviews were made. A document study on the project design documents (PDD) belonging to the chosen CDM projects was included.

The study was conducted in both India and Sweden. In India, two CDM projects were visited in a minor field study located in two southern Indian states: Karnataka and Tamil Nadu. The projects are in the renewable energy area, categorised as large-scale projects, and were selected for the reason of having Swedish investment interests. The selection was made from the UNFCCC web page (UNFCCC, 2007). Besides these two, all 17 CDM projects in India with Swedish investors are in the energy sector. One of the Swedish investors is involved in small-scale CDM projects in India, but to be able to compare two similar cases with differing investors, large-scale projects were chosen in both states.

The field study in India was made in September-October, 2007. Contacts with the project management were taken via e-mail from Sweden. However, it was only the project in Karnataka I managed to establish contact with in advance. Failure in contacting the Tamil Nadu project via e-mail and phone resulted in an unannounced visit at the plant together with my interpreter. Apart from interviews with representatives of the CDM projects, interviews were made with local people living in the village and town where the projects are located. The president of the Panchayat (elected board at local level) was also interviewed at both locations. For the interviews with the locals an interpreter with local knowledge was used. In order to get this local access, contact was taken with the NGO Svaraj/Oxfam in Bangalore and they directed me to people at local NGOs in the areas of the CDM projects.

Interviews were also made with representatives of the Pollution Control Board (PCB) in Tamil Nadu (Chennai) and Karnataka (Bangalore). The expected outcome of these interviews was to understand what is controlled (by the authorities) at the project plants. The regional PCBs, handling the specific projects in this study, were also contacted. Additional interviews were made with KREDL (Karnataka Renewable Energy Development Ltd) in Bangalore and TEDA (Tamil Nadu Energy Development Agency) in Chennai. To broaden the knowledge of the projects, contact was taken with the consultants involved in the development of the two projects. These consultants were involved in the preparation of the PDDs where the baseline of the project was determined and other information concerning the project was outlined.
The interviews with the Swedish investors in the two projects were conducted in December 2007 and January 2008. Contacts via e-mail and telephone were made in November to figure out who would be suitable to interview. Initially, the intention was to interview a member of the CDM Executive Board, but after e-mail contact it became clear that the CDM-EB was not involved in the assessment of the sustainable development requirement for the CDM projects. Therefore no interview was made. Additional to the respondents in Table 1 an interview was conducted at the Swedish Energy Agency (STEM) since they are the Designated National Authority (DNA) for CDM and Joint Implementation (JI) in Sweden. The DNA approves Swedish participation in CDM projects. As the nodal body for CDM and JI projects in Sweden, STEM has an expert role of Swedish CDM activities.

The literature review was made after the field study. The policy documents used were selected for its topicality to the area studied. The scientific articles were chosen for the relevance to my empirical results. Internet search using the words CDM, sustainable development and climate change in scientific databases (Science Direct and Scopus) resulted in some 50 matches and from that range, the most suitable articles were chosen. In the analysis, literature was searched for different categories of development in relation to CDM projects.

2.2 THE RESPONDENTS

The choice of interviewees should be made systematically to create a broad information basis of the material according to Holme and Solvang (1997). In the planning of the study I tried to foresee which stakeholders would be of importance for the study. There were also considerations of what would be possible to accomplish during the two months spent in India. It was expected that additional suggestions concerning people to interview would arise. The number of interviews depended upon whether a good understanding of different stakeholders’ positions appeared. The point of saturation was decided by the content of the interviews and not the number (Ryen, 2004, p.86). It was also a question of time and resources but the gathering of sufficient data and useful material was the main goal of the field study.

This thesis will analyse different views of sustainable development. In the context of the CDM projects there are perspectives of investors, consultants, business managers and employees at the projects, people in the immediate area of the projects and regional and state authorities.

Table 1 shows the different respondents and to which project they are related. The expressions: respondent, interviewee, spokesperson and representative are used as synonyms. The respondents were chosen to represent different stakeholders. At the local level, the respondents were not chosen by me, except for the Panchayat president. The interpreters chose the informants at local level based on accessibility, both in Karnataka and Tamil Nadu. The work of the interpreters was fully adequate and there was no reason to question the choice of local respondents.
Table 1: The respondents in the study. Note that the man and woman in the Tamil Nadu project were not workers at the project whereas the family in Karnataka contained two male members working at the project and a woman not working there. * means recorded interview and ^ indicates interview with interpreter.

<table>
<thead>
<tr>
<th>Respondents role in the study</th>
<th>Respondents related to CDM project in Tamil Nadu</th>
<th>Respondents related to CDM project in Karnataka</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local perspective</td>
<td>Woman living in village*^</td>
<td>Family living in town*^</td>
</tr>
<tr>
<td>Local perspective</td>
<td>Man living in village*^</td>
<td></td>
</tr>
<tr>
<td>Local council</td>
<td>Panchayat president*^</td>
<td>Panchayat president*^</td>
</tr>
<tr>
<td>Project management</td>
<td>Project director</td>
<td>Managing director*</td>
</tr>
<tr>
<td>Project management</td>
<td></td>
<td>Environmental engineer</td>
</tr>
<tr>
<td>State authority</td>
<td>Pollution Control Board (PCB), Chennai</td>
<td>Pollution Control Board (PCB), Bangalore*</td>
</tr>
<tr>
<td>Regional authority</td>
<td>Pollution Control Board, Virudhunagar*</td>
<td>Pollution Control Board, Belgaum</td>
</tr>
<tr>
<td>Renewable energy promoter</td>
<td>Tamil Nadu Energy Development Agency (TEDA)</td>
<td>Karnataka Renewable Energy Development Ltd (KREDL)</td>
</tr>
<tr>
<td>Project developing consultant</td>
<td>Zenith Corporate Services Ltd</td>
<td>Care Sustainability</td>
</tr>
<tr>
<td>Investor</td>
<td>Swedish investor 1*</td>
<td>Swedish investor 2*</td>
</tr>
<tr>
<td>NGO opinions of CDM and development</td>
<td>Several social activist and organic farming NGOs*^</td>
<td>Representative of sustainable development NGOs</td>
</tr>
</tbody>
</table>

2.3 PLANNING THE INTERVIEWS

Qualitative interviews were preferred since knowledge and views of chosen spokespersons were of interest. The flexibility in this method consists of the possibility to get additional information after the interview occasion (Holme and Solvang, 1997). In the qualitative interview, the researcher has an idea of what is important, and these points are covered by the interview guide (see Appendix 1). Since the study contains stakeholders representing different interests the knowledge of the respondents was expected to be different. Hence, the questions were adjusted to fit the respondents. According to Holme and Solvang (1997) views and ideas that deepen or go beyond the points in the interview guide may occur at the interview occasion. This is a way to deepen the knowledge and understanding of the researcher. The field work, analysis and interpretation are a circular process (Ryen, 2004; Trost, 2005) and the interview guide may be adjusted after the interviews have started. In reality, some questions were added as the subject was explored. Also, the resulting questions were refined but still the themes of the interview guide were covered.

Leading questions are traditionally considered as something to avoid to get accurate results. An interesting view about leading questions at interview occasions is that they are used too seldom (Kvale, 1996, p.158). Instead of being something to avoid, in order not to distort the results, leading questions could be used to test both the reliability of the answers and to verify the understanding of the interviewer. Some of my questions may be considered as leading, but the aim of many of the questions was to get both positive and negative aspects from of the specific question.

According to Bernard (2006, p.217-220) the best way to get good answers is by effective probing i.e. getting the respondent to give more information. There are several kinds of probing techniques and the most difficult one is perhaps the silent probe, where the interviewer stays quiet while waiting for the respondent to continue. I knew from earlier interviews that I rather use the uh-huh probe in combination with nodding. That kind of affirmation is considered as a neutral probe, and can be effective to encourage the respondent to continue.
2.4 CONDUCTING THE INTERVIEWS

At every interview occasion, the questions were adjusted to fit the situation and the respondent. Since I had no earlier experience of interviewing in India, it was important to behave accordingly in order to somehow fit in. However, I did not experience any severe difficulties during the interviews. Some of the interviews were recorded, and some were not (see Table 1). The reason not to record was in one case that the respondent wanted it to be just a conversation. In some of the other cases it was not suitable to bring up the recorder since the visit was unannounced and the situation was spontaneous. For the interviews that were not recorded, notes were taken and also memory notes were written down shortly after the interview occasion. All interviews conducted with an interpreter were recorded. The duration of the interviews varied between 20 minutes to about an hour.

One problem with interviewing is that the respondent for some reason is not speaking freely. Recording could affect the answers if, the respondents do not reveal their personal thoughts and stick to a more representative or public role (Arksey and Knight, 1999). My questions were not controversial and therefore not a major problem. The interview with the Panchayat president in Karnataka was conducted at a train station which was not optimal considering confidentiality. This respondent, however, was talking freely even though curious people were gathering around us. Some of the interview situations were not optimal, but the choice was between not getting an interview or to get one with lower quality. Kvale (1996, p.255) means that an interview study seldom is conducted through formal procedures but with a great deal of improvisation and intuition.

The interview with the project developing consultant in Tamil Nadu was conducted by e-mail. The results of the study could have been affected by the fact that some interviews were not recorded. The material is less extensive on these occasions and the answers given under the recorded interviews are in some cases more expansive. This could have resulted in giving more space to the views presented in the recorded interviews but at a comparison it appeared not to be the case.

2.5 INTERVIEWING IN A FOREIGN LANGUAGE

The fact that I am not part of the culture that I was studying may have caused some obstacles. On the occasion of the interviews I was expecting some difficulties for the respondents in understanding who I was and what my intentions were. To most of the respondents I presented my letters of introduction, one from the funding entity Swedish International Development Cooperation Agency (SIDA) and one from my university department. I also informed respondents about my study and how the material would be used. At interviews where interpreters were involved, I was introduced by them.

To give the accurate picture of what was observed and a good understanding of the answers is perhaps more difficult in a foreign culture. There may have been customary behaviour that I did not know of or missed. The largest problem in my case was the language. There were some misunderstandings and problems in finding the right words. When using an interpreter, additional problems may occur, but it could also be beneficial to discuss the questions with the interpreter. In order not to miss information, the interpreter should repeat frequently to the interviewer (Jentsch, 1998). At the interviews in the village and the town, where I used interpreter there was a risk that the interpreter constructed my questions differently from what I meant. The respondent could also have construed the question different from what was
intended and thus answered to something else. These kinds of misunderstandings may also have occurred when I, as the interviewer, interpreted the answers. However, to minimise this type of misunderstandings the interviews were transcribed as soon as possible and the answers, when unclear, discussed with the interpreter.

The ethical aspect of interviewing must be considered, even though many of the things the method books write about ethics are common sense. I do not think that my questions were very provocative or sensible. However, I think that what Bernard (2006, p.223) writes about the responsibilities interviewers have are important reminders: I, as an interviewer, am responsible for the information and how it is used as well as for protecting respondents from being burdened by the fact that they have talked to me.

2.6 ANALYSING THE INTERVIEWS

Before conducting the empirical field study, theoretical preparation was made in order to gather information useful for the practical part. At the interview occasions, no summarising should be made according to Trost (2005). Analyses and interpretations should be made with a certain distance to the interviews. After transcription, the different interviews should be structured similarly to facilitate analysis. It is advisable that the structure of all material fits the interview guide (Trost, 2005). The analysis was planned to be carried out in order to find central themes that would be interesting to illuminate. Among these themes, similarities and differences in the interview answers were expected to be found.

According to Ryen (2004) a thematical analysis is a way to condense the material. The categorisation of the material can be flexible and the sorting into themes can be amended. The names and content of the categories is the analyst’s own. It is important to bear in mind that this structuring of material is individual (Ryen, 2004).

After the interview period, the transcribed interviews were printed and read through several times. Since the questions were adjusted to fit every respondent, there was no possibility to compare the answers from all respondents in totally common themes. Instead a comparison between the answers from similar respondents of the two states was made. First the corresponding questions answered in the interviews were defined and listed. Then, a comparison with the interview guide was made to see if any questions had failed to be answered. It was stated that not all questions had detailed answers, but the answers still were to be found in the transcriptions.

The material was divided into themes which to a large extent corresponded to the themes of the interview guide (see Appendix 1). Hence, the thematical categorisation was created from the interview results with help from the interview guide used at the interview occasions:

- Important factors and driving forces for India, the host companies and investors.
- Meaning of sustainable development according to the actors.
- The CDM projects role in obtaining sustainable development in the region.

The result was presented with the help of the interview guide, the corresponding questions between the respondents and the transcriptions. Before writing the more elaborated results in free text, matrixes of important findings for the respondents with similar roles were made.
2.7 VALIDITY, RELIABILITY, AND SUBJECTIVITY

Even though validity and reliability traditionally are positivistic criteria of quality, qualitative researchers still have to relate to these criteria. Validity could be explained by the ability of a method to investigate what was intended (Kvale, 1996, p.244). This is connected to the theoretical understanding of what the study is about. One way of testing the validity of observed data is by triangulation (Ryen, 2004). Triangulation in this context is about approaching the empirical material from different perspectives (Arksey and Knight, 1999, p.23). It does not have to be in three different ways, but the purpose is to get versatility in the approach. Examples of different methods for material collecting are interviews, observations, archive material, reports and media material. It may also be a matter of using different theories on the same phenomenon. Another kind of triangulation is to use data that differs in respondents, time and places. This thesis represents a kind of triangulation when it comes to informants (at different scales) and locations (India-Sweden and two different locations in Southern India), and the material collection (interviews, literature review and document study).

Reliability could be explained by the ability to reproduce a project getting similar results (Ryen, 2004, p.139). This is not a very strange demand in analytical chemistry for example, where there are standard methods to use. In qualitative research, on the contrary, the reproducibility is almost impossible. However, if similar results are found in another project, the results are more convincing. To enhance the reliability of interview material they can be recorded which was done in the majority of the interviews. The transcripts of the interviews made with interpreters were checked by them. The transcripts of the interviews made in Sweden were sent to the respondents in order for them to check that the answers were correctly understood. Another way of increasing the reliability is to let someone else categorise the material and then make a comparison (Ryen, 2004). A comparison to relevant literature was made in order to control if the categorisation was reasonable.

The findings of this study should be interpreted in the delimitations of the conducted field study. The results are related to the choice of respondents, who are more or less connected to the chosen CDM projects. Using the same respondents and similar interview guide would probably give a similar result if replicated but there is always the individual choice of the researcher to emphasize different themes. The level of operationalisation of the empirical material is limited. The results are to be seen as the subjective notions of the interviewed person’s situation and interpreted in its context. However, comparison to other studies about CDM projects makes it possible to draw conclusions on a general level.

To become a neutral observer with no prejudices or biases is merely something we can aim for. Rosaldo (1994, p. 171) claims that social scientist researchers may never be able to be objective, which I agree to. The subjectivity exists at different degrees in all scientific studies. Furthermore, the influence a researcher has on the study varies at different stages of a study, and another researcher would have a slightly different affect (Arksey and Knight, 1999). In my thesis, I chose the projects to be examined and observations were made subject to my understanding of matters. What was considered important in the material was decided by me and hence influenced the results and the analysis. It is perhaps possible to get similar answers if different interviewers use the same respondent and interview guide, but what is considered important in the material, as well as the analysing is subjective. However, another conception of objectivity, given by Kvale (1996, p.64-66), is to give the right picture of what is studied or who is interviewed.
How is it possible not to sympathize with the views of the latest interviewed person? This issue may not be mentioned so much in the method text books, but is a phenomenon I experienced. After talking to a respondent there may be a notion of understanding for that person’s situation which is not bad, but may give a biased rather than a more balanced picture of the situation. It helps to have some distance to the interview occasion to be able to have a more critical view on the answers. I tried during the interviewing period not to analyse the answers in advance and not to draw any preconceived conclusions. My strategy was to have a generous time plan for the thesis work. It has helped to create distance to the interviews and to see the results in some perspective.

2.8 REFLECTION

There could be a risk that I was conducting the study too early to see any significant signs of local development at the CDM projects involved. Sustainable development is after all a long-term process. However, both projects had been running for a couple of years and it was possible to get opinions of the projects in focus. Besides, since I was there for the first time I had no previous situation to compare to.

All CDM projects that started before the first commitment period, 2008-2012, can be seen as pilot projects. As the CDM is an untried measure there is a need to learn along the process of implementation and make thorough evaluations of the results.
3. BACKGROUND

The study focuses on CDM projects and sustainable development. This section will briefly bring up the background of UNFCCC, the Kyoto Protocol and the flexible mechanisms, CDM regulations and the CDM process. This is followed by a discussion about the general and scientific concept of sustainable development. Sustainable development as framed in the context of CDM is handled more comprehensively in the result part, chapter 5.

3.1 CDM HISTORY, REGULATION AND PROCESS

As a way to understand the causes and effects of climate change the IPCC was established in 1988. The UNFCCC was adopted in 1992 (UNFCCC, 2008) and has up to April, 2008 been ratified by 192 countries. The principles that constitutes the policy framework of climate change is presented in Article 3 of the UNFCCC and involves equity, common but differentiated responsibilities, the special needs of developing countries, the precautionary principle, the right to sustainable development and supportive and open international economic systems (Ison et al., 2002, p.182). The expression special needs and specific circumstances of developing country parties of UNFCCC, is hard to define, but is still useful in climate negotiations (Ison et al., 2002, p.184). Included in this expression is sustainable economic growth, but what that means differs between different stakeholders and their interests. Decision-making of GHG policies is a matter of negotiations between different interests depending on if they represent the industrialised country, the developing country or an agency providing investment in GHG reduction projects (Halsnaes and Markandya, 2002, p.131).

It is stated in UNFCCC Article 4 (Hunter et al, 2007, p.673), about common but differentiated responsibilities, that developed countries shall take a lead in changing the trend of GHG emissions caused by anthropogenic activities. Further, it is said that the developing countries implementation of commitments under the UNFCCC is dependent of how effective the developed countries realization of their commitments are. The overriding priorities of the developing countries are socio-economic progress and poverty alleviation (Hunter et al, 2007, p.674). To give the industrialised countries more binding commitments the Kyoto Protocol was adopted in 1997 and came into force in 2005 (UNFCCC, 2008).

The flexible mechanisms (emissions trading, JI and CDM) were introduced to assist Annex I countries in achieving their commitments of emission reduction according to the Kyoto Protocol in a cost-efficient way. The CDM usually takes place between two parties of the protocol where the investing party has commitments to the Kyoto Protocol and the host country has not\(^3\). The purpose of CDM as stated in Article 12 of the Kyoto Protocol (Kyoto Protocol, 1998; Hunter et al, 2007, p.686) is to “assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the

\(^3\) Industrialised countries in Annex 1 of UNFCCC (and Annex B of the Kyoto Protocol) should decrease their GHG emissions on average at least 5 % below 1990 levels during the period 2008-2012. The GHGs included are: Carbon dioxide, methane, nitrous oxide, hydrofluorcarbons, perfluorcarbons and sulphur hexafluoride (Kyoto Protocol, 1998; Chadhury and Battacharya, 2007).

\(^4\) Unilateral projects are becoming more frequent where host country project developers register a CDM project without involving foreign investors (UNFCCC, 2008).
The ultimate objective of UNFCCC, stated in Article 2, is to limit the GHG concentration to a level where the climate system is not affected negatively. The stabilization of GHG concentration should be within a time-frame that will allow ecosystems to adapt to the climate change in order not to affect food production. (Ison et al., 2002, p.176).
dimensions of sustainable development, leaving out the social and environmental development. This way of measuring gives an unbalanced picture of local development and the distribution of wealth is not presented. Carelessly used, sustainable development may just mean business as usual (Elliot, 1998). This is a threat both to the environment and the development in poor countries as it will not lead to any changes.

One may argue that it is not possible to define sustainable development before the separate meanings of development and sustainability are stated. Sustainability may scientifically be divided into weak and strong sustainability (Faure and Skogh, 2003). Weak sustainability implies a strong belief in substitution of resources or capital and that humankind will be able to adapt to new conditions. Strong sustainability advocates that resources we have today would not be possible to substitute for future demand, i.e. man-made capital can only be exchanged to a very limited extent for natural capital. When it comes to defining development, dividing countries into developed and developing countries is not unprejudiced in the first place. It reflects a worldview, where all countries are following the same path with the same kind of goals (Sachs et al, 1996, p.9). Regardless of development goals, it is hard to see a development taking place without economic growth. Development seen as qualitative improvement is related to growth of welfare (Ekins, 1993, p.95) and is closely linked to economic growth. Production is a way to achieve welfare but production growth may cause environmental degradation and hence less welfare. It is in this context important to make a difference between production for basic needs and luxury consumption.

In the so called Brundtland report *Our common future* (WCED, 1987), that made sustainable development publicly known, there is a high degree of belief in the combination of economic growth and sustainability. This is partly the reason to why the industrialised world is so positive to the sustainable development concept. In the ecological modernisation theory (Mol, 2001), there is a tendency of relying on technical solutions to the environmental risks. This is also the case in the WCED report. In the context of CDM there are also high expectations in transfer of technology to developing countries through the cooperation that a CDM project involves.

Inter-generational responsibility is often mentioned in relation to the WCED (1987) report. Central to the concept is intra-generational equity which includes poverty-related issues. Nevertheless, WCED (1987) does not make a division of needs of developing countries in contrast to industrialised countries (Ekins, 1993). Of the environmental, social and economic dimensions it is usually the environmental aspect that gets most attention in the theoretical literature on the subject (UNEP, 2004). The analysis has mostly concerned natural and human resources and the maintenance and management of those resources. However, in a more practical perspective and with focus on the developing countries a more immediate development approach is needed.

Examples of expected contributions to sustainable development from CDM projects encompass employment, other income opportunities, better local environment and improved quality of life. It is hard to define and downright which criteria of development is achieved through certain measures since social, economic, environmental and also technological aspects are interlinked.
4. PROJECT DESCRIPTIONS

The CDM projects for this study were chosen to represent two different southern states in India. Both projects are classified as large-scale projects in the renewable energy area. They both use biomass for energy conversion. The Karnataka project is an established sugar mill using only the residues from sugarcane, bagasse, as biomass. The Tamil Nadu project has only been located there for three years and burns all kinds of biomass. Mostly Prosopis Juliflora is used which is a small bushy tree, growing in water scarce areas. Other agricultural waste products, such as cotton stalks, coconut shells, rice husks, paddy hay and bagasse, are used as fuel in this project. The following section will briefly inform about the Indian renewable power sector and explain some general matters related to the chosen projects. The information of the two projects originates from the project design documents (PDDs).

4.1 THE INDIAN RENEWABLE POWER SECTOR

Power generation consists to 70 % of coal thermal power plants in India (Markandya and Halsnaes, 2002). Renewable energy only stands for 2 % of power capacity. The oil-shock in the 1970s triggered the development of renewable energy technologies in India, but since there are great assets of domestic coal it is likely that coal will remain the main energy source. Of rural households, 60 % lack connection to electric power. The amount of urban households without electricity is 20 % (TFYP, 2002).

Cogeneration is defined as the combined production of heat and power. It is a combination of the extraction of steam (thermal energy) and electricity production. There are several advantages related to cogeneration replacing conventional power and heat production (Purohit and Michaelowa, 2007). Decreased and diversified fuel consumption leads to environmental benefits when compared to power from fossil fuels, for instance less particulates, SO₂, NOx and CO₂. Despite its moderate cost compared to conventional power systems, cogeneration on a large-scale may have financial barriers in the investment phase.

At sugar mills there is a possibility to utilise the remaining parts of the sugarcane. Bagasse (dried and chopped sugarcane stalk) can be used for biomass generated energy. India produces about 10 % of sugar globally, which makes it the second largest sugar producing country after Brazil (Purohit and Michaelowa, 2007). Only the cotton industry is larger within the agricultural sector. Hence, sugar production is an important factor for social and economic development in rural India. Even though cogeneration is associated with benefits, the
potential of cogeneration is not fully utilised in India. Bagasse based cogeneration could constitute a quarter of the power production in India. The common practice among sugar mills in India is to use bagasse for the internal needs for steam and power. However, only 20-30 % of the bagasse is utilised for this purpose, the rest is wasted. Purohit and Michaelowa (2007) estimated that bagasse cogeneration could reach its full potential in about twenty years. CDM could be an incentive in promoting this, since the export of electricity to the grid is not common practice of Indian sugar mills, which would generate carbon credits (CERs) according to CDM regulation.

4.2 THE TAMIL NADU PROJECT

The biomass power project is located in a rural area classified as underdeveloped. The closest village has 5000 inhabitants and most of the villagers are agricultural labourers. The village has bus connections on the main road to the closest regional centre. The agricultural season is six months. There is a river flowing through the area but it only contains water four months of a year. Rice is the main crop and cotton and groundnut are among the minor crops. The landscape is characterised by an undulating plain dominated by the shrubs of Prosopis Juliflora. These small trees were introduced to this water scarce area to attract rain. It is used for making charcoal and this is an important source of income in the area. Two thirds of the people are illiterate and many are very poor.

The biomass power project has been running since 2004 and generates 18 MW to the Tamil Nadu electricity board grid. The technology used is direct combustion of biomass in a boiler, which converts the energy available in fuels into thermal energy. The thermal energy is converted into mechanical energy in a steam turbine. The mechanical energy is converted into electrical power in an alternator unit. The turbine technology is according to the PDD the best
available and the conventional method in India for biomass. The air-cooled condenser used for cooling exhaust steam, is an innovation in the country.

![Sugarcane farmers waiting to deliver their crop in Karnataka.](image)

### 4.3 THE KARNATAKA PROJECT

The cogeneration project is located in a town with 30 000 inhabitants. The town is linked to the railway system. The inhabitants are mostly middle-class and the education level is high compared to inhabitants of the surrounding villages. Still, about 25% of the adults are unemployed. The sugar mill started in 1939. Distillation of molasses started in the 1960’s and in 1999 the production of power through cogeneration was established. This plant was one of the first projects accepted as CDM in India and the first in the sugar industry. The sugar production season is for six months.

The electricity produced is used in the sugar production process and the surplus is supplied to the Karnataka Electricity Board grid. There are today four boilers and three turbines with a total capacity of 44 MW power production. Until 2003 the capacity was 28 MW with an export of power to the electricity grid of 70 000 MWh. The power export to the grid, with the new cogeneration plant, is now about 110 000 MWh according to the project management. A bagasse dryer utilising the waste heat of flue gases is deployed for the first time in the sector and country. Other additions in the project activity are deployment of high pressure boilers and turbines, not common practise in the sector and region and a demineralisation water treatment system.

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6 Effect is measured in Watt (W) and energy sometimes in Watt hours (Wh). 1 000 MWh is the approximate energy consumption of 40 single family houses (Swedish) in a year (Ekbom et al., 1997).
5. RESULTS- CDM PROJECTS AND SUSTAINABLE DEVELOPMENT

This section presents the results from the interviews, the PDD study and the literature review. The literature material encompasses policy documents and recent articles discussing sustainable development in relation to CDM. The interpretation of sustainable development in connection to climate change issues is described first from a more general view, then in a developing country perspective and in a more specific Indian perspective. In the literature, emphasis is put on the socio-economic development. The environmental advantages discussed in the articles are mostly in terms of GHG reduction when exchanging fossil fuel with renewables but also local environmental improvements, such as better air quality. The literature review resulted in six main criteria addressed in relation to local development and CDM projects: employment, distribution of benefits, social infrastructure, access to energy, technology transfer and stakeholder participation as a facilitating factor. These criteria form the analytical categories where the interview results are presented.

5.1 CLIMATE CHANGE MITIGATION AND EQUAL SUSTAINABLE DEVELOPMENT

The mitigation of GHG emission may be seen as a constraint to development, but the IPCC Fourth assessment report (AR4) suggests that a sustainable pathway will improve the adaptive capacity to climate change (IPCC, 2007a). Resilience should be improved by including nations or regions ability to adapt to expected effects of a changing climate in sustainable development strategies. However, balancing between natural resources and ecosystems resilience on the one hand and human needs on the other hand is complicated (Chaudhury and Bhattacharya, 2007). In a developing country and in the context of climate change, the mitigation of GHG emissions is the goal of long-term sustainable development whereas poverty alleviation, employment, economic growth and health aspects are more pressing short-term goals (UNEP, 2004) which the interview results show.

Tension between environmental and economic goals may occur if following a conventional development path but this can be avoided (UNEP, 2004). A rapid economic growth is unsustainable if the consequences are social inequalities and degradation of the environment (Gadgil and Lélé, 2007). IPCC working group III proposes co-beneficial effects between adaptation and mitigation in for example forestry, land protection and management, energy efficiency and production of biomass (IPCC, 2007b). The design and selection of CDM projects may enhance local development according to UNEP (2004). The investor in Tamil Nadu thinks it is possible to see some CDM projects as a contribution to poverty alleviation. A long-term local development could be the effect of establishing projects in backward areas, hence opening up for future businesses, related activities and even new CDM projects. The investors can play a role in this by choosing to invest in projects in underdeveloped areas.

The driving forces for the two Swedish investors to participate in CDM projects had differing character. The main factors for the Tamil Nadu investor were to reduce GHG emissions and contribute to sustainable development in the host country. They were specifically looking for a renewable energy project since those projects were seen as suitable for CDM projects. This project may be viewed as a pilot or a demonstration project. The aim of the investment was to gain knowledge and experience and to participate in the development of the CDM. The investor in Karnataka first of all looked for renewable energy and energy efficiency projects. India was the focus when they started looking for projects because India was early in providing registered projects, now they are more interested in Chinese projects. The local co-benefits, that the project is solid and has a clear additional value locally are the most
important factors along with an approved methodology and additionality, according to the Karnataka investor. Other factors are of course the generation of CERs and their price.

In the interviews the question of CDM as a tool to reduce the economic inequality between developed and developing countries was discussed with a few respondents. The representative of the Karnataka NGO sees potential in the CDM concept to transfer means from the Western world to developing countries. The project developing consultant of Tamil Nadu does not see CDM as a complete solution for equal economic distribution but a step in the right direction. The project developing consultant of Karnataka does not consider the CDM concept as something more than mainly a business opportunity. The representatives of STEM, also think that CDM should be viewed as primarily a market mechanism. However, being a market mechanism offering flexibility to the Annex 1 countries in achieving their commitments have facilitated climate negotiations. In the same way is the principle of CDM paving the way for involving developing countries in the mitigation of GHGs. The CDM “have created the necessary conditions to talk about how the most advanced developing countries can be able to contribute”. At the moment CDM is just marginal but if it is allowed to expand to affect a majority of the investments in the energy sector it could make a difference in reducing fossil fuel based energy. That would improve air quality and contribute to energy security. If positive effects from these factors in terms of health and security are seen as reducing gaps between developed and developing countries then CDM could contribute to that.

5.2 CDM AND SUSTAINABLE DEVELOPMENT FROM A DEVELOPING COUNTRY PERSPECTIVE

Chaudhury and Bhattacharya (2007) describe CDM positively, suggesting that developing countries can benefit from it in many ways e.g. technology and investment transfers, environmentally adjusted energy conversion, energy security, less poverty through incomes and local environmental benefits. In addition, hosting CDM projects allows developing countries to be part in the attempt to curb the effects of global climate change without having to decrease the efforts to improve the standards of living according to the authors.

There are a number of voluntary standards for measuring or assessing sustainable development related to CDM projects introduced by NGOs. Examples of these are the Gold Standard and the CCB standards (Muller, 2007). The Gold Standard is an independent benchmark tool for CDM projects to ensure environmental benefits. It was initiated by World Wide Fund (WWF) and is supported by a network of environmental and development NGOs. The Gold Standard put more effort on stakeholder consultation, environmental impact assessment (EIA), sustainable development contribution and enhanced monitoring when required (The Gold Standard, 2006). It is following the conventional CDM cycle in order to keep transaction costs down. The CCB standards were introduced by an international group of research institutions, companies and environmental groups; Climate, community and biodiversity alliance (CCBA). It is mainly focusing on carbon mitigating land-use projects (CCBA, 2005). It is considered as a set of comprehensive standards in order to discern high quality land-use projects. The standards can be used by project developers, investors as well as a host country DNA.

5.3 INDIA’S ROLE AND AWARENESS IN THE CLIMATE CHANGE CONTEXT

With its population of 1.2 billion people and a progressive economy India is one of the parties that can really make a difference in the climate issue globally. According to the International Energy Agency (IEA, 2007) India is expected to become the third largest CO₂ emitter by
India stands for 3% of the global GHG emissions. Out of this 63% was emitted as CO2. The majority of the GHG emissions originate from the industrial sector (Sharma et al., 2006). There has been a growth rate of GHG emission of 4.2% in the period 1990-2000. Compared to the global average emissions per capita, India accounts for 38%.

According to Gadgil and Lélé (2007) there are four points that create a basis of consensus among analysts of the Indian response to climate change:

1) Developing countries have no historical responsibility for the emissions of GHGs.
2) Global emissions should be measured on a per capita basis.
3) There is a difference between energy use for basic human needs contra luxury or over consumption.
4) The disadvantages of climate change will affect developing countries most, due to lack of resources for adaptation and due to their location.

India has changed from being negative to the idea of CDM, to promoting it. The initial Indian criticism was addressed to the developed countries to take care of their own unsustainable emissions. The other criticism was the risk of giving the cheapest emissions reductions away. However, after the turn of the millennium India has had a positive attitude. The Kyoto Protocol was signed by India in 2002 and the Indian DNA was established in 2004 (Gadgil and Lélé, 2007). According to most of the interviewees, hosting CDM projects is beneficial for India at the national scale. There are both economical benefits from the investments and environmental advantages due to emission reductions.

India’s progress to a major CDM host country has been facilitated by well-working institutions, stakeholder awareness, a strong service sector, acceptable investment climate and of course a high mitigation potential (Sirohi, 2007; TERI, 2005). The Energy and Resource Institute (TERI) has together with support from Institute for Global Environmental Strategies (IGES) promoted CDM since 2004.

According to the state Pollution Control Board (PCB) in Tamil Nadu, the Ministry of Environment and Forestry is promoting industries to become CDM projects. In Karnataka the Karnataka Renewable Energy Development Ltd. (KREDL) is the nodal agency for CDM projects. They are involved in the starting phase of smaller projects, for example bundling small hydro plants to apply for CDM. Tamil Nadu Energy Development Agency (TEDA) gives subsidies to all renewable energy projects in Tamil Nadu including CDM projects. Their representative points to the fact that there are companies going for renewables just because of the CDM benefits. In both states the number of applications for CDM has increased largely the last couple of years. The project developing consultant of the project in Tamil Nadu claims that entrepreneurs “keep the CDM concept in mind while designing the project”. The awareness of CDM is increasing in India, especially among those that can benefit from it. However, it is not known at all among common people and the common people living in the vicinity of the CDM projects are not aware of the concept.

5.4 CRITERIA FOR SUSTAINABLE DEVELOPMENT IN INDIA

It is the prerogative right of the host country to decide which development goals a CDM project should fulfil. The DNA of India states four criteria of sustainable development that CDM projects must consider in the planning of the activity. A letter of approval (LoA) from
the DNA is needed along with the application for CDM registration (MoEF, 2007b). The project activity should lead to:

1) **Social well-being.** Including poverty alleviation through employment, social improvement and contribution to basic needs that gives a higher life quality.

2) **Economic well-being.** Implying enhanced economic investment compatible with peoples needs.

3) **Environmental well-being.** Description of the environmental impact on resources and biodiversity. Account of health impact and pollution level of activity.

4) **Technological well-being.** Implying that environmentally adjusted technology is used in the project. Transfer of technology can take place within the country, from other developing countries or from developed countries.

The evaluation of a CDM project application in India is made by a board of the National CDM Authority (NCA) representing different ministries. The project proponent presents the project at an NCA meeting where the members can require additional information. The whole process normally takes 60 days (TERI, 2005; MoEF, 2007b). Of the more than 700 projects approved by the Indian CDM DNA, 300 have been approved by the CDM Executive Board (IGES, 2007b). The Indian strategy is to use CDM as means to attain energy security and rural development. For CDM to make a difference on rural poverty Sirohi (2007) suggests stricter application of the sustainable development criteria. This would imply for project proponents to provide clearer development and social sustainability benefits in the project proposals, the public sector promoting CDM projects in areas with no private CDM activities and a promotion of agricultural CDM activities.

### 5.5 Goals of Development in India

In the Indian *Tenth five year plan* (TFYP) 2002-07 it is admitted that ecological issues not have been fully considered in the development strategy even though environmental degradation have been observed. A lack of resources and lack of adequate governance are the reasons for that. Using GDP as a measure of development is not enough for reflecting the human well-being as recognised in the TFYP. Therefore monitorable human development objectives are added to the 8% growth target. The constraint for the targeted growth is energy supply and the transport sector. It is said that without such barriers solved India cannot compete on the international market. The interviewed NGOs in southern Tamil Nadu are critical to foreign direct investment in general because resources are being used which is not favourable for the poorest people. Criticism is given to the state government for only favouring development of more transports and industries.

Agricultural development is a core issue in the strategy for social justice and equity. Of all urban households, 40% do not have access to drinking water in their homes (TFYP, 2002). The population growth in India is below 2% and declining. However, a growth in the working age is expected which would imply increased unemployment (TFYP, 2002). The high proportion of the population is dependent upon agriculture which complicates the desire to use more land for afforestation and for other purposes (TFYP, 2002). To meet the expected unemployment among agricultural workers, employment opportunities in other sectors would be necessary. Moreover, special programmes for the groups that do not directly benefit from the growth process are needed. Such programmes will to a greater extent than earlier be evaluated to estimate their efficiency (TFYP, 2002).
The Indian government, through the Ministry of Environment and Forest, presents the prime objectives of national policy namely poverty reduction and economic growth (MoEF, 2007a). Even though there is a growing middle-class in India there are an increasing number of people living in poverty. Hence, economic growth is not evenly distributed and income gaps are increasing (Gadgil and Lélé, 2007). According to the report *Addressing energy security and climate change* over 600 million people lack access to electricity in India. Access and supply of energy is therefore crucial in the development strategy. Both Chaudhury and Bhattacharya (2007) and Sirohi (2007) see potential in CDM to have synergistic effects in national goals of development through careful planning.

The management of the two projects studied had different reasons for why they have gone for CDM. The project in Karnataka is an old established sugar mill and distillery. The management has been aware of the benefits with cogeneration for a long time. The costs for investment in that equipment have been extensive so the company has been waiting for the Indian government to approve CDM. Sugar milling on its own is not giving any profit; hence the CDM investment to generate more energy was a way to survive. The Tamil Nadu project was started with the notion of India needing more energy power. Since biomass is cheap fuel and biomass is underused it was a business opportunity to start the project.

### 5.6 The relation between CDM and local sustainable development

In August 2006 there were 82 CDM projects registered in India. A study made by Sirohi (2007) examined all of these projects’ contribution to local sustainable development as stated in their PDDs. The aim of the study was to discern if CDM projects could make any difference to rural poor in India. She concluded that there was no notable contribution to poverty reduction from CDM projects. However, the renewable energy projects were not only in numeral majority of CDM projects in India, but the kind of projects that were most likely to contribute to some extent in rural development.

The socio-economic local development related to the grid-connected projects included in the Sirohi study (2007), as stated in their PDDs, includes: additional income to farmers through sell of agricultural residues, employment in the construction and maintenance of the plant, income from transportation of biomass, infrastructural development and employment generation from ancillary activities. These categories are similar to the interviewed investors’ answers to how the CDM project contributes to local development.

The investor representative in Karnataka has the notion of the project to contribute to a higher standard locally, involving infrastructure and new employment opportunities during construction and implementation. The person interviewed has not personally been visiting this project, but there are occasions when this investor company carries out spot checks. The Tamil Nadu investor has had representatives visiting their project in the implementation phase. The projects contribution to sustainable development is regional employment and electrification of the area, according to them. The infrastructure is now better, implying road improvements to facilitate transportations to the biomass plant. In addition, agriculture waste turns to an income source for the farmers.

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7 In April, 2008 there were 322 registered CDM projects, the majority of them in the energy sector (UNFCCC, 2008).
5.6.1 Employment

When it comes to employment, Sirohi (2007) shed light on the difference between temporary and seasonal employment for example during the construction of a facility on the one hand and a long-term employment on the other hand. She states that there is no measure taken in CDM to provide the poorest with jobs and still some projects claim in their PDDs that the project will involve employment opportunities for the poorer groups of society. With no specific measure to steer the jobs towards the poorest, CDM will not change chronic poverty. Another study of economic development pointed to the fact that projects have to be carefully designed to have any trickle-down effect on local, less-skilled employment (Persky, 2004). Sutter and Parreño (2005) concluded in their study of the first 16 CDM projects that CDM has had a small impact on employment generation; however their study showed that small-scale biomass energy projects have a high effect on employment. A study made on 54 energy efficiency projects showed that none of the large-scale projects have implied sustained employment to a great extent (Umamaheswaran and Michaelowa, 2006).

According to The Tamil Nadu PDD the jobs generated are in the transportation of biomass and work at the plant. Also, charcoal production involves additional income when the discarded pieces of Juliflora can be sold as biomass as well as other surplus agricultural residues. The Karnataka PDD does not say anything particular about employment but states that project activity empowers and builds capacity of “vulnerable sections” of the surrounding communities.

The project director in Tamil Nadu stresses the importance of employment and related activities facilitated by the power plant. There was no industrial activity in the area before. The project manager in Karnataka says the factors to development are employment at the factory but also income for the sugar cane farmers. The situation in Karnataka is in line with the possibility suggested by Sirohi (2007) of getting CER revenue from selling power to the grid, making sugar mills more economically feasible. This would facilitate the regular payment to the sugarcane farmers and consequently improve their livelihood. However, sugar production is seasonal hence farmers and workers need to find another source of income for half of the year.

The power plant implies some employment but according to the woman in the village in Tamil Nadu there is no work suitable for women. The work at the plant is physically hard and they are paid less than men. Only five persons from this village work at the very plant doing things such as filling the tank with firewood. People from surrounding villages also work there. Some are driving the vehicles with labourers and biomass to the plant. None from the area is working in the office. The power plant company is from Andra Pradesh, so the people in the office mostly come from there. The project director says that the power plant employs 140-150 persons. A minimum is permanently employed, since labour is easy to get in India. The casual workers are from the area. According to him, 10 000 people from the area are indirectly employed with for example cutting down the Juliflora.

In the Karnataka factory there are 800 permanent and 800 seasonal workers, according to the managing director at the plant. They live in town or come from neighbouring villages. Indirectly about 2000 people are working in the sugarcane fields, both men and women. At the plant only men work. The president of the Panchayat says that out of all those workers at the plant only one or two from the town hold the higher positions.
5.6.2 More equitable distribution of resources

There are problems of actually involving the poorest even in small-scale CDM projects, specifically designed to enhance rural community development (Sirohi, 2007). One example given is a project in Bihar state in India where 100 villages were provided with biomass gasifier power plants but where 95% of the rural households lack connection to the electricity grid. Another example is the biogas programme in Bagepalli in Karnataka where households are provided with biogas digesters of 2 m$^3$ which are fed with cow dung. The household needs on average four cows to feed the unit whereas in reality the households in this area own on average 1, 5 cows$^8$.

About half of the land in India is agricultural land and the majority of the populations’ livelihood is dependent on agricultural activities (Sirohi, 2007). Landless farmers will not get income from selling biomass to energy plants; they are mostly agricultural labourers with low wages. Their income is not likely to increase unless agricultural productivity is higher. The CDM is not designed for the agricultural sector and therefore no technology transfer has been seen to enhance production and hence income from agriculture. Instead of waiting for the trickle-down effect of CDM projects to the rural poor the CDM should develop to encompass monitoring and verification methodology for rural purposes, for instance the mitigation of nitrous oxide emission from the earth and reducing methane disposal from rice fields$^9$. The southern Tamil Nadu NGOs are not familiar with the CDM concept. They would like to see how CDM can be beneficial at grass root level, how it can be interacted to the people. “Maybe this CDM can give implements to promote agriculture as a solution to global warming”.

The Sutter and Parreño (2005) study indicated that it is only when a CDM project is locally owned that the revenues will benefit the poorest. This is in line with the Karnataka NGO representative’s statement that “development is about local people having control of the resources”. The Sirohi (2007) study showed effects on poverty reduction in a reforestation project in India. It is explained by the dependence of poor people’s livelihood on resources from forests.

In India it is not possible to talk about social development without mentioning the caste system. This is brought up by some of the respondents when it comes to how benefits related to CDM are distributed among social groups. Apparently it is common practise to get a job according to your caste. Hence, it is the high caste people who get the best jobs regardless of education. The people who get the well paid jobs benefit most, according to some people in the town of Karnataka. The Panchayat president does not want to say that people further down in the hierarchy are not benefiting but is not in the position to say to what degree.

The president of the Panchayat in Tamil Nadu means that it is the scheduled casts (dalits) and the so called backward community who benefit most, but this opinion is not shared by the other respondents in the village. The owner and the men labourers benefit most and also the Panchayat, according to them. The southern Tamil Nadu NGOs say it is the big companies and the government that benefit from CDM. The Karnataka NGO means that CDM is a bottom-up process since the baseline methodology has to be promoted by the project itself.

$^8$ At my visit in Bagepalli, I was informed by the project developer that it was only in the starting phase of the biogas unit that dung from four cows was needed. To run the unit, one cow was enough.

$^9$ There exist an agricultural CDM category but there is no methodology available (UNEP Risoe Centre, 2008a). Nine projects are registered in this sector in India but they all involve methane capturing for flaring or for energy conversion (UNFCCC, 2008).
5.6.3 Improved social infrastructure

According to UNDP (2006) India has ambitious goals for human development. But, the policy is to liberalise markets to facilitate for industries and counting on a trickle-down effect to come to terms with poverty (Gadgil and Lélé, 2007). The possible external effects of CDM, as noticed by Muller (2007), are the development benefits not being fulfilled. This is coupled to the dual goal of CDM where the investor can buy a well defined amount of CERs but what the project gives back in terms of development and sustainability is extremely hard to define. The nature of CERs are property rights but a contribution to local development is characterised by a common good (Muller, 2007). Community activities related to CDM projects are now made on a voluntary basis and are subject to negotiations at the individual location. This arbitrary procedure may be avoided if projects with a low contribution to sustainable development and high generation of CERs were bound to make substantial grants to local development activities.

There are community activities financed by the companies in both Tamil Nadu and Karnataka. This is made on a voluntary basis and is not part of the CDM requirements. In the village in Tamil Nadu the power plant is contributing to the school and donations have been made to a water facility and to the temple. The Panchayat president in Tamil Nadu informs that the power plant have contributed with money to upgrade the school to plus two standard. In the town in Karnataka the sugar company has started a college for girls. They also provide biogas for cooking in the homes of the employed.

The members of the family in Karnataka mean that things would be different if the factory was not there. They are able to live in a house and there is a college. The president of the Panchayat says that the education level is better than in surrounding villages, hence the literacy is higher but there are still problems to get work. The president says that despite the advantages such as employment, the temple contribution and the bus stand the factory is still not a benefit for the town. The smell and the fly ash are mentioned as disadvantages.

5.6.4 Access to energy

The importance of energy in local development is often emphasised as well as by the investors in the projects. Another view of sustainability is local energy resources being utilised. Sirohi (2007) illuminates that the improved electrification is not only utilised in households but in facilitating agriculture activities, such as irrigation. The availability to energy is hindered by physical access and affordability. Other infrastructure, such as roads, is equally important to improve rural development.

The Tamil Nadu PDD states that the main purposes are to assist in climate change mitigation and to supply regional electricity without negative environmental effects. Another project purpose is improved infrastructure. It presents a vision of more rural industries developing in the area leading to better infrastructure. Rural development would prevent urbanisation. According to the Karnataka PDD the new cogeneration unit increases the electricity generation capacity from 28 MW to 44 MW, which means a higher electricity supply to the grid. Hence, the electricity deficit in the region is tackled through improved availability.

The managing director in Karnataka says “nowadays there is no lack of power”. The villagers in Tamil Nadu also experience improved access to electricity. The current is there 24 hours according to them. This means power to agricultural motors and agricultural development.
5.6.5 Technology transfer

Umamaheswaran and Michaelowa (2006) noticed the lack of technology transfer from developed to developing countries which were expected to occur in CDM activities. Spill-over effects from copying of technology and competition can occur (Björk, 2005). However, spill-over from foreign technology transfer to businesses outside Indian renewable energy CDM projects is very limited since the technology used is domestic (Sirohi, 2007).

It is said in the Tamil Nadu PDD that the technological well-being is represented by the air-cooled condenser used at the power plant. This is an alternative to the conventionally used wet type cooling tower and hence adapted to the water scarcity in the area. The project manager in Tamil Nadu said it was not CDM revenues that facilitated the project but the consultant claimed CDM enabled the condenser. According to the Tamil Nadu investor this technical innovation was one of the reasons for choosing this project. The Karnataka investor thought that Swedish technology transfer may be facilitated by CDM.

5.6.6 Stakeholder participation

The Gold standard and the CCB standards have a higher demand on stakeholder consultation than the conventional CDM project cycle. Benefits of the local community and the early engagement of local stakeholders are stressed. A high community involvement is regarded as beneficial for communities and best practices include respect for local tradition, employment of local people, worker rights and safety (CCBA, 2005). There must be an initial stakeholder consultation with a careful identification of local people directly affected by the project (The Gold Standard, 2006). Their input must be considered and appropriate local stakeholder concerns should be included in the monitoring. Before validation a second stakeholder consultation is held. The awareness and handling of environmental problems is highly dependant on communication (Jönhill, 1997, p.401). Therefore communication channels between the local levels to decision-makers are important in environmental management.

There has to be stakeholder comments included in the PDD sent for approval. However, the selection of the stakeholders is in some project proposals not satisfactory according to Umamaheswaran and Michaelowa (2006). Of the 54 energy efficiency projects in their study, only few projects made a thorough stakeholder consultation, some did not perform a stakeholder consultation at all, only gathering the no objection certificates from regulatory bodies. In some cases it was just noted that the project proponent had good reputation and that the corporate social responsibility from the company’s side was satisfactory.

The local stakeholders as stated in the Karnataka PDD are the village Panchayat, Karnataka State Pollution Control Board, employees at the sugar mill, village representatives, consultants, advisors and local inhabitants. They were invited to a stakeholder meeting where doubts and concerns were clarified prior to the new cogeneration CDM project was being implemented. It was the consultant in cooperation with the company and local stakeholders that determined the projects contribution to sustainable development. According to the interviewed consultant the socio-economic status is determined in relation to the nature of employment. The stakeholder meeting was an occasion for opinions to be considered, according to the consultant. The Panchayat president in Karnataka said they, as the elected body of the village, were asked to give permission for the project. That is according to legislation. However, he means that it is two differing matters to give permission and to be asked for a point of view. According to him they were not contacted for giving an opinion.
According to the Tamil Nadu PDD, the identified stakeholders are the local populace represented by the village Panchayat, the Tamil Nadu Pollution Control Board, the Tamil Nadu Energy Development Agency, the Groundwater Department of the Government of Tamil Nadu and the Tamil Nadu Electricity Board who all approved the project. When the project in Tamil Nadu was being planned, the village Panchayat was contacted, as the representative of the local populace. The interviewed Panchayat president confirms that the former president was contacted for approval of the project. A no objection certificate was issued and a permission to implement the project.

5.7 DECREASED ATTRACTIVENESS DUE TO LOCAL SUSTAINABILITY CONSIDERATION?

Markandya and Halsnaes (2002) draw attention to different perspectives of investors and host country involved in a CDM project. India would be more interested in a project’s possibilities to assist in the development targets of the country. The investor would prioritise the feasibility, abatement costs and financial risks related to the project. Due to the fact that the sustainability demand is not monetised in the carbon market, development benefits included in a project plays a marginal role in directing investment according to Olsen (2007).

In the CDM projects included in the Sutter and Parreño (2005) study, the dual goal seems hard to achieve. None of those CDM projects were contributing to both goals simultaneously to a relevant extent. On the contrary, 40% of those CDM projects did not contribute to a higher degree in either additionality in mitigation of GHGs or in sustainability. The study indicated that emission reduction in a cost-efficient manner is dominating among the 16 projects in different sectors (9 small-scale and 7 large-scale). The divergent time aspect between the two goals is an obstacle to the sustainability commitment (Muller, 2007). Whereas the CERs are generated for seven or ten years, the development goal may not be possible to measure within that time-frame.

A proper assessment of sustainability criteria would increase transaction costs for a project (UNEP, 2004). There is a risk that host countries, competing for investors, will have a lower emphasis on sustainability impacts. The prerogative right of a host country to approve CDM projects according to their own criteria of sustainable development is a right for the country in focus to decide its own strategy in choosing projects. Higher transaction costs might not be such a significant cost compared to the benefits a project may generate in terms of improved fulfilment of development policies. Stricter regulations need to imply incentives for an emphasis on the local sustainability or it will be the resource-strong stakeholders who will set the rules for the carbon trade (Nelson and de Jong, 2003). Muller (2007) suggests a regulation change to CDM to decrease transaction costs.

Even though there is a simplified CDM process for small-scale projects, the transaction costs may still be a financial burden for this category (Pearson, 2007; Purohit and Michaelowa, 2007). There is even a risk that transaction costs exceed the income from CERs (Pearson, 2007). However, for improved public relations reasons, some investors will be willing to pay for projects with increased local development but according to Pearson those investments will just be a fraction of the carbon market.

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10 The projects running for ten years are not renewable while the seven years projects have a possibility to renew twice another seven years. For afforestation and reforestation projects the time-frame is 20 (renewable) years or 30 (not renewable) years (Muller, 2007).

11 Bundling of similar small projects is a possibility to decrease costs (Purohit and Michaelowa, 2007).
The investing party in Karnataka tells about the awareness among their customers, that some of them not just want any CERs, but CERs from projects with a more “green profile”. Some customers specifically ask for those kinds of projects, for instance energy generated from wind and small-scale water projects. The Tamil Nadu investor is also talking about an increasing social and environmental responsibility among companies, without claiming to what extent this tendency is applicable.

5.7.1 Monitoring of sustainable development

For future CDM to achieve the sustainable development commitment and not only carbon credits, the regulation must be reinforced (Pearson, 2007). To make sure that the focus is not solely on generation of CERs, the commitments of sustainable development should be monitored in a similar mode as the GHG emission reduction (Sirohi, 2007).

A need to better evaluate the local conditions among people would be a way to promote sustainable development in a future CDM concept, according to the Karnataka investor. The project director in Tamil Nadu says that once the benefits from CDM are there they could evaluate the sustainable development target. The Tamil Nadu consultant thinks the sustainability assessment should include forecasting. Periodical evaluation would increase transaction costs.

5.8 Uncertainties related to CDM

The uncertainty connected to the Kyoto Protocol’s fate after 2012 contributes to investments of a short-term character12 (Muller, 2007). Other reasons for hesitant investors are lack of experience and the time-consuming approval process. The limited time-frame is one of the reasons that CDM may be just a market-based mechanism with no other objective than to obtain emissions reductions to a low cost (Pearson, 2007). This circumstance would not be benefiting for renewable energy projects since they require more investment. Purohit and Michaelowa (2007) point to costly upfront investment as a possible barrier to the under-utilised bagasse cogeneration in India.

The representative of the Karnataka NGO suggests changes to the CDM concept. At the moment upfront financing is not usual (in India), a situation not beneficial for rural development. In small-scale village driven projects there is a need for financing in advance to be able to start a project at all. The Tamil Nadu investor also sees upfront investing as a way to enable projects. The investor party in Tamil Nadu sees several changes to a future CDM concept as necessary. The spectra of sectors involved in CDM will probably increase13. There could be very large-scale energy projects, for instance carbon capture and storage (CCS), as well as small-scale community level projects. In order not to have the different scales of projects competing with each other, a more diversified CDM is needed.

Another uncertainty in relation to CDM projects is the financial risk it involves. There are different modes in which CERs can be bought from a CDM project which is significant for the amount of financial risk for the participants in the project (Sirohi, 2007). Investors can for instance finance parts of the project, provide a loan or just buy CERs once they are generated.

12 In the Bangkok climate change talks at the end of March 2008, it was decided that emissions trading, CDM and JI will continue and be improved in the Kyoto Protocol’s second commitment period from 2012.
13 There are ongoing discussions and development of so called sectoral and programmatic CDM where several projects are bundled in one “umbrella CDM” (UNFCCC, 2008).
These different modes of financing involve different levels of risk for investor and host. This risk-taking could have negative effects on environment and development. The uncertainties related to CDM projects is an important factor in achieving CDM goals.

5.9 The Projects’ Contribution to Local Sustainable Development

Based on the results, an assessment of the chosen projects contribution to local development is made in this section. The environmental aspect has not been brought up earlier in the results since it was not discussed to a large extent in the literature. The following tables contain the key features of the actors’ views of development, for some in relation to the CDM project. Social and economic criteria of development are presented in a joint subsection since the outcome of those indicators is hard to separate.

5.9.1 Socio-economic well-being

*Table 2: Selected actors’ views of important factors for socio-economic development*

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Karnataka</th>
<th>Tamil Nadu</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Villagers</strong></td>
<td>Development towards a larger town</td>
<td>Work for women</td>
</tr>
<tr>
<td></td>
<td>Drainage</td>
<td>Higher education for women</td>
</tr>
<tr>
<td></td>
<td>Waste management</td>
<td>Establish hospital</td>
</tr>
<tr>
<td></td>
<td>Better roads</td>
<td>Improved water quality</td>
</tr>
<tr>
<td></td>
<td>Improved public transportation</td>
<td>Upgraded school</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scientific centre</td>
</tr>
<tr>
<td><strong>Panchayat</strong></td>
<td>Enhanced general development</td>
<td>Improved water quality</td>
</tr>
<tr>
<td></td>
<td>Water protection</td>
<td>Drainage system</td>
</tr>
<tr>
<td></td>
<td>Road maintenance</td>
<td>Upgraded school</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sanitation facilities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hospital</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Better roads</td>
</tr>
<tr>
<td><strong>NGO</strong></td>
<td>Local control of the resources</td>
<td>Organic farming</td>
</tr>
<tr>
<td></td>
<td>Reforestation</td>
<td>Empowerment of women</td>
</tr>
<tr>
<td></td>
<td>Education</td>
<td>Livelihood of small marginal farmers</td>
</tr>
<tr>
<td></td>
<td>Equity</td>
<td></td>
</tr>
<tr>
<td><strong>Project manager</strong></td>
<td>Business development</td>
<td>Business development</td>
</tr>
<tr>
<td></td>
<td>Access to energy power</td>
<td>Employment and related activities</td>
</tr>
<tr>
<td></td>
<td>Stable income for sugar cane</td>
<td>Corporate social responsibilities</td>
</tr>
<tr>
<td></td>
<td>farmers</td>
<td>meeting the welfare of the people</td>
</tr>
<tr>
<td><strong>Project developing consultant</strong></td>
<td>Business opportunities</td>
<td>Business opportunities combined with long-term development</td>
</tr>
<tr>
<td></td>
<td>Employment</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Investor</strong></td>
<td>Business based on social responsibility</td>
<td>Capacity building for a long-term development</td>
</tr>
<tr>
<td></td>
<td>Availability to electric power</td>
<td>Availability to electric power</td>
</tr>
<tr>
<td></td>
<td>Employment</td>
<td>Employment</td>
</tr>
<tr>
<td></td>
<td>Improved infrastructure</td>
<td>Utilising of local resources</td>
</tr>
</tbody>
</table>

Looking at the stakeholders at the local level there are differing views of development between the town in Karnataka and the village in Tamil Nadu (see Table 2). The villagers in Tamil Nadu talk about a need for an upgraded school, higher education and hospital. The locals in Karnataka however, already have hospitals and college. They are aiming for further development including waste management and roads with streetlights. Among the investors and the project developing consultants there is a belief that the projects will give spil-over effects in terms of employment not necessarily in direct connection to the plant but in other activities that may occur. This is especially the case in Tamil Nadu where no industry was
established in that particular region. In Karnataka that development has to some extent already happened since the sugar mill has been there since the 1940’s.

The stakeholders with no relation to the local scale seem to have a more long-term notion of development whereas the local stakeholders wish to see a more immediate development effect. An immediate effect of the CDM project has been a sufficient amount of electric power at both locations. The employment situation on the other hand, has not had a significant effect of many local people’s situation. Other studies show this weak correlation between large-scale CDM projects and sustained employment (Sutter and Parreño, 2005; Umamaheswaran and Michaelowa, 2006). The opportunity of selling biomass to the Tamil Nadu project and sugar cane to the Karnataka project may give a more reliable income to the farmers than before.

5.9.2 Environmental well-being

Table 3: Selected actors’ views of environmental effects of the CDM project

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Karnataka</th>
<th>Tamil Nadu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Villagers</td>
<td>Fly ash</td>
<td>Air and land pollution from carbon dust</td>
</tr>
<tr>
<td></td>
<td>Bad smell</td>
<td></td>
</tr>
<tr>
<td>Panchayat</td>
<td>Fly ash</td>
<td>Coal dust</td>
</tr>
<tr>
<td></td>
<td>Smell from molasses</td>
<td>Monitoring of health aspects is desired</td>
</tr>
<tr>
<td></td>
<td>Efforts to decrease ash and smell are desired</td>
<td></td>
</tr>
<tr>
<td>Project manager</td>
<td>No wastewater coming out since recycled</td>
<td>Green belt concept (trees surrounding the plant)</td>
</tr>
<tr>
<td></td>
<td>Not a very strong smell compared to other sugar mills</td>
<td>Any industry generate emissions No complaints= No environmental drawbacks</td>
</tr>
<tr>
<td>Project developing consultant</td>
<td>Environmental benefits from reduced GHGs locally</td>
<td></td>
</tr>
<tr>
<td>Renewable energy promoter</td>
<td>All renewable energy is environmentally sustainable</td>
<td>All renewable energy is environmentally sustainable</td>
</tr>
<tr>
<td>Pollution Control Board</td>
<td>Less emissions of GHGs is positive environmental development</td>
<td>Less emissions of GHGs is positive environmental development</td>
</tr>
<tr>
<td>Investor</td>
<td>The PDD says activity is small in size (but categorised as large-scale biomass) and do not have significant environmental impact.</td>
<td>Less use of fossil based energy Better to combust agricultural waste than leave to rot Better local air quality</td>
</tr>
</tbody>
</table>

The emission monitoring made by the Pollution Control Board (PCB) include water sample, stack sample and emission levels of NOx, SOx, CO₂, CH₄ and suspended particulate matter (SPM). This is made at both plants at least every year. Some parameters are easier to measure than others. For example water sample is uncomplicated, whereas stack sample needs a break in the production for several hours. For both plants it is the SPM parameter which is closest to the threshold value. All PCB representatives at both regional and state level saw only environmental benefits related to CDM projects (see Table 3). The project developing consultant in Karnataka also follows this conviction, because of the reduction of GHGs. Both TEDA and KREDL see all renewable energy as environmentally friendly. The project developing consultant in Tamil Nadu sees the risk of local environmental disadvantages related to any thermal power plant but at the project in point, measures are taken to mitigate the impacts. There are internal controls of the emissions made daily at both plants. The ash
left in the furnace is piled up and according to both company representatives farmers come and get it for using it as landfills and soil fertilizing. The project manager of the power plant in Tamil Nadu is pointing to the fact that for four years no complaints about the environment have been heard and interprets that as there are no environmental drawbacks.

However, in the village in Tamil Nadu people are complaining about the coal dust. The Panchayat president would want a close monitoring of the health aspects related to the dust. The man in the village blames the coal dust for affecting the crop in a negative way. In Karnataka the villagers are complaining about the fly ash. During the sugar cane season people keep their windows closed not to get the ash into the houses. The smell is another disadvantage caused by the molasses in the sugar production process. The family says there are health aspects connected to the smell and the ash, such as fever and even tuberculosis. The Panchayat president says the factory is taking measures to reduce the smell and the fly ash but more efforts would be welcomed.

According to the Tamil Nadu PDD the project is environmentally beneficial due to the utilisation of surplus biomass residues. These residues would otherwise either be burned in open air or left to decay. The project contributes to the mitigation of GHGs by using biomass instead of fossil fuel. No environmental impacts have been identified in the PDD. The Karnataka PDD describes the effective utilisation of bagasse leading to reduced GHG emissions. The water used for the sugar process is taken from the nearby river and demineralised in the internal water treatment plant. There is no sewage coming out of the plant since the water is recycled. None of the investors was aware of the villagers’ complaints about fly ash and coal dust. On the contrary they saw biomass energy as a way to improve air quality, also in the project area.

5.9.3 Technological well-being

The Indian criteria of sustainable development include technological well-being acknowledging that the transfer of technology could be either from industrialised countries, from developing countries or within the country. The investors represents differing views of technology transfer (see Table 4) where the Karnataka investor see CDM as a channel to introduce alternative technology whereas the Tamil Nadu investor see potential in adjusting nationally known technology.

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Karnataka</th>
<th>Tamil Nadu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project manager</td>
<td>Same technology as normally used in sugar mills</td>
<td>CDM benefits are just additional</td>
</tr>
<tr>
<td></td>
<td>The turbines are from Japan and Germany</td>
<td>Project would have started irrespective of CDM</td>
</tr>
<tr>
<td>Project developing consultant</td>
<td>The PDD says that a back pressure turbine for power generation is an</td>
<td>Project activity would not have occurred on its own</td>
</tr>
<tr>
<td></td>
<td>upgraded technology not used earlier in the region and sector.</td>
<td>Air-cooled condenser as alternative to conventional wet type cooling</td>
</tr>
<tr>
<td></td>
<td>The bagasse dryer using waste heat is a novelty in the country and sector.</td>
<td></td>
</tr>
<tr>
<td>Investor</td>
<td>CDM gives an opportunity for Sweden to deliver alternative technology.</td>
<td>Technology adjusted to the location was a strong reason to choose the project.</td>
</tr>
</tbody>
</table>
6. DISCUSSION

In previous chapters the issue of sustainable development in connection to CDM projects has been deployed. The literature draws on both general terms and more specific cases and creates a basis for how this issue is framed and construed. The empirical results show that local development is perceived and looked upon differently depending on which interest is represented. From my results, it was possible to see differences in the answers related to scale problems (Jönhill, 1997). For example it seems as though the relation between CDM projects and development is seen in a more positive way from a distance and in a more long-term perspective. This picture corresponds in the two projects included in the study. The specific results concerning employment and distribution of benefits found in the empirical material was related to the results of other studies and showed a corresponding picture. Access to energy on the other hand is nowadays not a problem as a result of the CDM project. Similar situations concerning social infrastructure and stakeholder consultation have been found both in the empirical material and the literature. Social infrastructure has taken place to different degrees at the project locations but not as part of CDM regulation.

The first section of this chapter contains the author’s conclusions of the actors’ trust in CDM and views of development. There are also suggestions to how socio-economic, environmental and technological sustainability can be enhanced in CDM projects. Other themes in the discussion are distribution of benefits, the need for monitoring of sustainable development and sustainable development as business opportunity.

6.1 PERSPECTIVES OF CDM AND SUSTAINABLE DEVELOPMENT

The framing of the projects contribution to sustainable development, identified by the investors, is mostly in accordance with the sustainable development promotion stated in the projects’ PDDs. The Pollution Control Board, both at state and regional level, seem to have a high trust in CDM projects, especially concerning environmental development. The renewable energy promoters follow the same line of thought. The project developing consultants, as well as the investors, see a high potential in CDM to assist to local sustainable development. The project managers also view the projects as beneficial for local development. There are no obvious links between the CDM projects and local development seen from the local and short-term perspective. The project managers, one of the investors and the consultants see CDM as mainly a business opportunity. As a way to better promote local development goals proposed by the villagers they could be pursued by the Panchayat, especially the goals that the Panchayat agree to. Enhanced cooperation between the CDM project and the villagers through the Panchayat could facilitate means to social infrastructure.

The inconvenience with aerosols is only experienced in the vicinity of the plants. What is generally regarded as environmentally friendly, in this case energy generation from biomass instead of fossil fuel, is not perceived locally. The project managers in both projects have the similar opinion that they are taking adequate environmental measures. The Karnataka consultant and the Tamil Nadu investor see only environmental benefits on the local scale whereas the Tamil Nadu consultant is aware that thermal power plants may give local environmental inconveniences. According to the PDD in Karnataka the local environmental impact is negligible. In this issue, we face a temporal scale problem (Young, 2002). The effect on the global climate system by mitigation of GHG emissions is not noticeable, at least not in the near future. It is more a matter of what can be avoided in terms of climatic changes. On the local scale on the other hand the combustion of biomass gives immediate effects on the
surroundings, being a visible problem. The only way to manage environmental consequences is by communication according to Jönhill (1997, p.401). The project manager (with an office elsewhere) is not aware of the local problems and regards non existent communication of complaints as non existing problems. Enhanced local influence in the CDM process is a way to facilitate a communication channel.

The use of air-cooled condenser instead of water-cooled as in the Tamil Nadu project will probably be copied by other projects in water scarce areas. Without this environmental consideration such a project would not have been possible, at least not in a sustainable way, considering the water scarcity. The Karnataka project is using turbines from abroad which were partly there before becoming a CDM project. It is the expansion to generate more energy power that is regarded as CDM project, along with the additional cogeneration equipment, the bagasse dryer and water treatment system. Technology spill-over within the sugar mill sector as suggested by Björk (2005), from for instance the waste heat driven bagasse dryer, is likely to occur as well as establishment of new biomass energy projects if economically advantageous.

6.2 DISTRIBUTION OF BENEFITS

In a CDM project it is only the emission reductions that generate money from selling CERs. Hence, there is no economic incentive to go for projects with clearer sustainability benefits, as indicated by Olsen (2007), unless the investor is interested in the presumed market advantages that a more responsible image can bring. Another way of looking at it, is that to get a project approved the project proposal has to show the sustainable development benefits and since it is the prerogative right of host countries to decide whether a project contributes or not, it probably will, at least for some stakeholders. Besides, those projects with a low contribution to sustainability, but with a modest contribution to decreasing GHG emissions could be viewed as they, in the long run, contribute to sustainable development as mitigation helps keeping GHGs at a controllable level which is important in a sustainable development perspective, both globally and nationally. The question is how the benefits of the CDM projects are distributed. The Panchayat president in Karnataka means that there could be people further down in the hierarchy who benefit from CDM but to what extent was difficult to say. This reasoning shows CDM as an activity largely counting on trickle-down effects, at least the large-scale CDM projects. Nevertheless, there will still be people who never will experience this effect, for instance landless farmers.

The problem of uneven distribution of benefits is noticed in the development goals of India where special programmes for groups not benefiting from the growth process is pursued (TFYP, 2002). In the Indian criteria for sustainable development in CDM projects it says there should be social improvement and contribution to basic needs leading to a higher life quality (MoEF, 2007b). In a CDM context these criteria could involve the community activities undertaken by the CDM projects in focus. The project manager in Tamil Nadu points out that the community activities undertaken by the company is on a voluntary basis and not part of the CDM requirement. In Karnataka contributions to the town was made before the sugar mill became a CDM project. In this connection the differing characters of the dual goal of CDM (Muller, 2007) can be addressed. Whereas the CERs generated by a CDM project and bought by the investor is a well defined amount of property rights, the amount of sustainable development the project is supposed to bring back hard to define. The contribution to local development has the character of a common good. If development goals are not fulfilled, it can be regarded as an external effect caused by CDM.
Gadgil and Lelé (2007) illuminate the growing income gaps between social groups in India. There is no built in driving force in CDM to equalise these kind of gaps, but theoretically it is possible for a host country to use CDM to decrease these gaps through the prerogative right to decide if a project fulfils the sustainable development criteria. The caste system is an obstacle for social equity in India as in any society with class differences. Seen as an equality tool CDM have not brought much so far but in the longer run there are possibilities especially if mechanism conditions are changed to fit diversified projects.

6.3 MONITORING OF SUSTAINABLE DEVELOPMENT

If the project in Tamil Nadu would have been a Gold standard project it is possible that the concerns of the local air quality addressed by the villagers would have become part of the monitoring programme. The investor party in Karnataka believes severe neglecting of statements in projects’ PDDs would probably be noticed by a DOE when the monitoring plan for the emission reductions is verified prior to CER issuance. Nevertheless, better evaluation could be a possible way to promote local sustainable development. The Tamil Nadu consultant on the other hand thinks periodical evaluation would increase the transaction costs. The need of feedback is addressed by UNEP (2004) and Chaudhury and Bhattacharya (2007). To better put forward the sustainability commitments involved in CDM activities the regulation of CDM should be enhanced according to Pearson (2007) and sustainable development should be monitored similar to the GHG emission reduction (Sirohi, 2007). One obstacle for this is the diverging time-frames on generation of CERs (seven or ten years) on the one hand and the development goal on the other hand (Muller, 2007). The time-scale related to development is sometimes a question of generations. There are still several reasons for regular monitoring of sustainable development that I want to point out: 1) When local development is evaluated it is possible to see trend indications of development, if there is a positive development or not. 2) The stakeholder consultation takes place in the beginning of the CDM process when locals may not be aware of the possible problems to come, therefore regular monitoring would handle upcoming concerns. 3) Another reason for regular monitoring of sustainable development is to avoid the externalities that CDM may cause namely non compliance to the sustainable development commitment.

6.4 SUSTAINABLE DEVELOPMENT AS BUSINESS OPPORTUNITY

From many actors point of view, CDM is a growing business opportunity. The project managers are mostly concerned with economic matters and have seen CDM as a possibility to increase the company’s viability. The Tamil Nadu investor and the Karnataka NGO see upfront payment as a way to facilitate CDM projects and reduce the financial risk for the host. This could be essential especially for small-scale community based projects to establish at all. The bagasse cogeneration in India is not fully utilised as a renewable energy source. Upfront CDM investment could speed up the use of this resource (Purohit and Michaelowa, 2007).

There may be a growing awareness and interest among businesses to make environmentally better and more responsible investments as both investor parties said. There are investors in CDM projects that are especially looking for a strong connection to sustainable development contribution. For India the promotion of agricultural projects would be benefitting, but it would need active investors willing to pay extra for improved public relations reasons (Pearson, 2007). None of the respondents saw CDM as a solution for equal economic distribution either globally or nationally but some as a step in the right direction.
7. CONCLUSION

Returning to the aim of the thesis to study whether CDM contributes to sustainable development in two Indian states, through the views of different stakeholders, it is possible to conclude that the findings were relevant for the research questions. Furthermore, the method to actually visit CDM projects and interview local people brings additional possibilities to assess and evaluate local sustainable development. Generally, CDM projects face difficulties achieving the local sustainable development goal, especially in large-scale projects. The renewable energy projects are the ones most expected to contribute to rural development and locally owned projects are most likely to improve the poverty situation.

In the two cases involved in the study it is possible to conclude that at the local level stakeholders do not to a great extent distinguish a relation between the CDM project and local development. However, the two chosen CDM projects’ contribution to local socio-economic well-being is happening to some extent for the ones permanently employed. At both locations there is access to energy, other infrastructure has been developed and local contribution to community activities has been made. Nevertheless, the social patterns remain. The local environmental well-being is not discerned by the locals, only by actors on other scales. The technological well-being is represented by the equipment adjusted to the circumstances used in the two projects. Actors on the regional level saw clear benefits at least environmentally. From a national perspective CDM is given a role to play in development strategies. The investing parties along with the consultant recognise several development opportunities related to the projects. It seems as though the trust in CDM to make a difference on local development increases with the distance to the actual project and seen in a longer perspective.

7.1 TURNING THE UNCERTAINTIES INTO PROSPECTS

Based on the material some general recommendations can be made in order to better emphasise the sustainability in the studied projects as well as CDM projects generally:

- **Enhanced local relation included in the CDM regulation.** The short term local needs could disregard the long term sustainability and the need for GHG mitigation as feared by Muller (2007). This could be hindered by a communication from the local level to the global level facilitated by more emphasis on the stakeholder participation at local level. The identification of local people being affected by the project is important and the consideration of their input. Local concerns should if appropriate be included in the monitoring plan of the project.

- **Monitoring of sustainable development should be included in the CDM cycle at a regular basis.** At the moment the CDM cycle only involves a judgement of sustainable development in the application phase. During the crediting period of usually ten years the sustainability requirement is not evaluated. The provision of feedback for assessing progress as suggested by Chaudhury and Bhattacharya (2007) would be achieved by a regular evaluation included in the monitoring plan. Monitorable Indian human development as recognised as necessary in the TFYP (2002) could be compared to the monitoring of sustainable development criteria connected to CDM. Employment status and the assessment of who benefits from CDM could be useful in the Indian development strategy.
• **Introduction of upfront payment in all investment in small-scale community driven projects to benefit rural development.** Also for larger projects, with clear local or regional development benefits, an early entrance of investment should be beneficial to the feasibility of the project. The financial risk that upfront investment involves should be decreased by the continued demand for emission reductions and improved CDM in the second commitment period after 2012.

• **Diversification of projects allowing both large-scale and small-scale projects benefit from CDM.** As a development of the mechanism, more categories of CDM projects will probably evolve. There are already discussions and development of sectoral and programmatic CDM. To ensure that all kinds of projects deliver benefits in terms of not only GHG reduction but also local development they have to be carefully evaluated.

### 7.2 Further Research

This study was only focusing on the village and town closest to the chosen CDM projects. To be able to make a more comprehensive assessment of the local development related to the CDM project, more villages should be involved. In order to make such an assessment a tool for measuring the development could be utilised. This tool should be adjusted to local conditions. Today, there is no monitoring of the sustainability criteria once the project is approved. One solution to this is to make the project management to fulfil certain criteria of development. If this tool for measuring development is prepared, it can be used for evaluation of sustainable development coupled to CDM projects regularly and external effects in terms of unachieved local development may be avoided.

Since this thesis had the main focus on large-scale renewable energy projects and their contribution to sustainable development, it would be of interest to investigate to what extent small-scale projects is beneficial for local sustainable development. Other empirical studies (Umamaheswaran and Micaelowa, 2006; Sutter and Parreño, 2005) indicate that it is the small-scale projects that would have an effect on development on the local scale. In order to make the dual goal of CDM a reality in all projects it is important to get feedback, evaluate and improve the mechanism regularly. For this reason research of development benefits in relation to CDM is of importance.

*On the road in Tamil Nadu*
SOURCES

Books


**PEER-REVIEWED ARTICLES**


Sutter, C. and Parreño, J.C. (2005) *Does the current clean development mechanism deliver its sustainable development claim?* Hamburg institute of international economics (HWWA), Hamburg, Germany


**REPORTS**

Gadgil, A. and Lélé, S. (2007) *India: Special role and responses*. Centre for interdisciplinary studies in environment and development (CISED), Bangalore, India


(Acc: 2008-01-29)

IPCC (Intergovernmental panel on climate change) (2007a) Summary for policymakers. Climate change 2007: Contribution of working group II to the Fourth assessment report of the intergovernmental panel on climate change. Cambridge university press, Cambridge, UK and New York, USA

IPCC (2007b) Summary for policymakers. Climate change 2007: Contribution of working group III to the Fourth assessment report of the intergovernmental panel on climate change. Cambridge university press, Cambridge, UK and New York, USA


MoEF (Ministry of Environment and Forests) (2007b) CDM India, Designated National Authority. Available at: >http://cdmindia.nic.in< (Acc: 2007-12-01)


INTERNET


UNEP Risoe Centre (2008a) Approved CDM methodologies. Available at: >http://cdmpipeline.org/cdm-methodologies.htm< (Acc: 2008-04-24)


Appendix 1

INTERVIEW GUIDE

The interview guide for the field study will answer questions such as:

- Which are the driving forces for India/Indian regions to host CDM projects? Which factors are important for the investors?
  - Have measures been made to attract investors?
  - In what way have the CDM concept helped the projects of the study?
  - How far has the awareness of CDM reached?
  - Which criteria are used to assess a CDM project’s contribution to sustainable development (SD)?

- What does SD mean according to the actors (related to the regions of the projects)?
  - Are the criteria for SD fulfilled in this region; socially, economically and environmentally?
  - What is needed to obtain sustainable development in the regions of the projects?
  - Are there differences or similarities in the actors’ definitions of SD?
  - Which aspect of SD is favoured, the social, economical or environmental?

- Which role does the CDM project play in obtaining sustainable development in the region?
  - Are there local or regional development benefits/drawbacks related to CDM projects?
  - Should the present handling of CDM projects be altered to better promote sustainable development in the region?
  - Does the project involve any environmentally adjusted technology transfer?
  - Is development related to CDM projects equally distributed among social groups?
Appendix 2

MAP OF INDIA

Map from www.indien.nu