

Local Government and Sustainable Development Efforts: A Case Study

Sarmistha R. Majumdar
Sam Houston State University

As a concept, sustainable development has great appeal to many local governments. One example, the city of Denton, Texas, has tried to incorporate sustainable principles in their local development efforts. Here, addressing a wide array of local problems without jeopardizing the scope for economic development, the local government has undertaken an innovative project that produces biodiesel from waste cooking oil. The technology provided by its private partner helps to make optimal utilization of resources in the production process. Much of the locally produced fuel is used in municipal garbage trucks and has helped to cut down harmful emissions. The project is not only an attempt at sustainable development, but also at energy independence.

The concept of sustainable development implies development without causing irreversible damage to the environment. The importance of this concept can be traced back to Malthus' (1798) famous essay, which was the first to draw the world's attention to overpopulation and the notion of scarcity as a constraint on economic growth (Caldari, 2004:527). Later, Leopold (1949), Marshall (1961), Carson (1965), Hardin (1968) and others echoed similar concerns (McEntire 2005, 107). However, it was not until 1987 when the World Commission on Environment and Development, also known as the Brundtland Commission, endorsed sustainable development practices as a requirement to meet the needs of the present without compromising the needs of future generations.

Global summits and numerous conferences have been organized to draw attention to the concept of sustainable development and provide the necessary stimulus for planning and implementation of such projects. Currently, governments at all levels are trying to incorporate its principles in their development efforts. In particular, local governments play an important role in sustainable development. Since they have greater control over the tools necessary to make the shift towards such development efforts, local governments can achieve the desired social change through implementation of sustainable projects (Baker et al 1997). But in the absence of basic guidelines for planning and operationalization of a sustainable development project, its implementation poses a serious challenge to many local governments. Only few entrepreneurial local governments venture to undertake such a project. The concept of sustainable

development provides them with the opportunity to innovate and introduce reforms necessary to bring about environmental and economic changes in the community.

All those local governments that are committed to the concept of sustainable development often tend to rely on their local governance structure in the delivery of social, economic and environmental benefits. By engaging political leaders and local residents in the project, they try to equitably distribute the many benefits of such a project without threatening the viability of the natural, built and the social systems (ICLEI 1993), upon which these benefits or services depend. Also, by allowing the public to participate, local governments try to minimize social risks like loss of public support for the project. Further, by coordinating various planning and policy mechanisms, they build consensus among multiple officials and local stakeholders with differing and conflicting values. Together, their shared commitments help local governments to achieve the long-term objectives of balanced growth in a sustainable development project (Rees 1988).

The Case Study

This case study focuses on the innovative efforts of the city of Denton to build a biodiesel plant in Texas to promote sustainable development. The potential impact of this plant's product has far reaching consequences for the local and global economy. Typical of any sustainable development project, the local government has undertaken a complex and long term process of negotiation and partnership building to address the social, economic and environmental issues of the local community (Brugman 1996).

Since its inception, the city's biodiesel facility has received a lot of publicity, not all of which is solely related to the production of biodiesel. Biodiesel technology has been in existence for several years. It helps to produce a biodegradable and non-toxic fuel and serves as an answer to many problems, ranging from health, economic and foreign energy dependence to environmental concerns over emissions, and performance in large and strong diesel engines (Hatcher 2004, 13). Many environmental enthusiasts and private companies manufacture biodiesel on a small scale to fuel a limited number of cars and trucks. Despite its multiple benefits, however, it had failed to receive adequate attention from any state or local governments until the city of Denton took the initiative to promote this alternative fuel.

In this study, using interviews as an important source of information, attempts have been made to understand what caused the local government to undertake such efforts, and to identify the outcomes of such a project.

Method

To collect information for this study, I interviewed both public and private officials who were responsible for conceptualization, implementation and management of the biodiesel project. Also, contents of reports issued by the city's media office and articles printed by the local newspaper were analyzed to obtain additional information on the biodiesel plant, for example, capacity of the plant, awards received and other statistical information. The interviews helped to gather factual information and pose relevant questions related to implementation of the project. A majority of the interviewees were involved in the project right from the beginning and they provided both specific and detailed information in this case study (Neuman 2004, 183). In fact, the

interviewees' direct involvement in the biodiesel project helped to minimize distortions to a certain extent in the information gathering process (Gorden 1987).

In selecting a sample for the interview, a non-probability sampling strategy was used (Babbie 2004, 183). It suited the purpose of this study (Babbie 2004, 183) and helped to obtain information from people with knowledge about the biodiesel project. Initially, the city's mayor, city manager and director of the solid waste department were interviewed. Their recommendations were used to select other individuals for interviews. Thus, the snowballing approach (Babbie 2004, 184) proved to be useful in the information gathering process. The interviewees were comprised of city officials, council and utility board members and officials from a private company that partnered with the city. See Table 1. Each interview session lasted for at least an hour and all interviews were taped and transcribed.

Table 1. Individuals participating in the interviews

Category	Type of Interviewees
City Officials	Mayor of Denton City Manager Director of Solid Waste Department
Public Utility Board (PUB) Members	Two appointed members
Council Members	Two elected members
Private Company Officials	One management staff One development analyst One technical personnel Two personnel in feedstock procurement division

Sample size(n) = 12

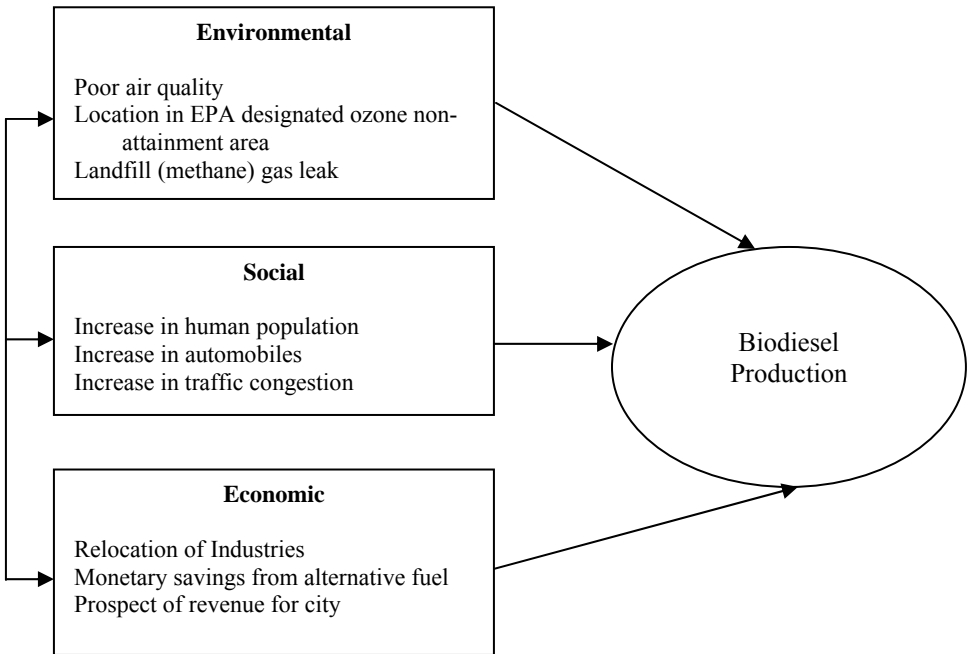
A total of thirteen individuals were recommended for interviewing purposes from a population of approximately twenty individuals, who were directly involved with the biodiesel project. All these individuals had assisted either in decision-making, implementation or management of the project. With the exception of one individual, every selected member consented to be interviewed. Thus, a total of twelve interviews were conducted for the study. The interviewees were asked both closed and open-ended questions. Many of these questions were time consuming. For example, interviewees were asked: What factors led to the decision to build a biodiesel plant in the city of Denton? Some questions required recollection of past events; participants in the study were asked: When was the proposal to build a biodiesel plant submitted to the city's council members? Other questions provided interviewees with ample scope to deliberate and express their opinions freely about this project. For example, what do you think about the prospect of this plant in the state of Texas and the nation? The information obtained from the respondents helped to frame the case for the study.

In addition to interviews, contents of reports from the city’s website and those published by its public information office were scrutinized to obtain more information. Also, newspaper articles reported in newspapers, such as The Denton Record Chronicle, The Dallas Morning News and others, were analyzed. Various journal articles on sustainable development were reviewed to obtain more information on principles of sustainable development. The latter helped to determine whether the city’s efforts were aligned with the concept of sustainable development and to detect the strengths and weaknesses of the biodiesel project in Denton.

What prompted the city to seek the path of sustainable development?

The city of Denton is one of the fastest growing communities in northern Texas. According to individuals interviewed for the study, recent efforts to revitalize its local economy have resulted in several companies relocating to Denton. This led to an increase in local population and in the number of automobiles. The increased flow of traffic has added to the existing problem of congestion on local streets and roadways as well as to noise and air pollution. Additionally, methane gas leaks from the city’s landfill and its location in an Environmental Protection Agency (EPA) designated non-attainment area for ozone has exacerbated the problem of poor air quality. See figure 1.

Figure 1. Indicators that Provided Impetus for a Sustainable Development Project in the city of Denton, Texas



To comply with federal and state regulations, the city's solid waste department, aided by researchers (students and faculty) at the University of North Texas's environmental science department, identified three alternatives as prospective solutions to the problem. They included: (a) collection of landfill gas and either flaring or burning it; (b) collection of landfill gas and using it in production of biodiesel; and (c) retrofitting or replacement of city vehicles with new catalytic converters and other equipment to reduce harmful and toxic emissions from city vehicles. Both options (a) and (b) required designing and construction of wells to capture methane gas – however, option (b) had the additional advantage of generating revenue for the city, which led to its prioritization over option (a). In a later comparison between options (b) and (c), a cost benefit analysis revealed that both would cost the same but the former's economic advantage over the latter that is, the prospect of revenue from the sale of excess biodiesel, helped to reinforce the department's choice of option (b).

Interviewees admitted that in such a process of rational decision-making, biodiesel's poor record in emissions of nitrogen oxides initially posed an obstacle. The combustion of a biodiesel blend (B20), which is 20 percent biodiesel and 80 percent petrodiesel leads to a two percent increase in nitrogen oxide emissions compared to regular petrodiesel, and that of pure biodiesel leads to a nine percent increase (EPA 2005). These facts served as a major deterrent in adoption of this fuel by many states. But city officials estimated that using the biodiesel blend would help to bring about an overall reduction of 12 tons of emitted criteria pollutants like carbon monoxide, sulfur dioxide, volatile organic components, and particulates. Also, production of this alternative fuel using an innovative technology that leads to optimal utilization of waste resources would help the city of Denton to assume a leadership position in production and promotion of biodiesel fuel. Together, these advantages helped to further validate the choice of option (b).

In building the biodiesel plant, the city's solid waste department initially proposed the plan to the city's Public Utility Board (PUB) at a meeting that was not open to the public. Members of this board (citizen appointees) quickly approved it based on the project's merit to address the dual concerns of the environment and the local economy. It was then presented to the city council where, following several debates over the project's economic feasibility and environmental benefits, council members voted unanimously in its favor. On approval of the plan, a search for a private partner was launched. The public was not involved in the search process. Biodiesel Industries, a California based engineering firm, agreed to collaborate with the city to produce biodiesel fuel. Under the contractual agreement, the city provided the land (leased to Biodiesel Industries) and capital funding (\$670,000 from bond funds) for the project. The company then built a 10,000 square foot modular plant in the periphery of the city's landfill site with potential for future expansion. The close proximity of this plant to its source of fuel at the landfill minimized transportation costs. Also, the plant's location adjacent to the garbage trucks' parking lot made fueling these trucks very convenient.

Currently, the plant has the capacity to produce 3 million gallons of pure biodiesel from waste cooking oil. The experimental plant can also process white and yellow grease along with other virgin oilseeds like soybeans, to produce biodiesel. The latter prospect has led the local farming community to reconsider the possibilities of growing fuel crops in their fallow land to reap the financial, environmental, and political benefits of a locally produced fuel (Majumdar 2005).

The city's efforts in constructing the first renewable biodiesel facility in the nation have been lauded both by the state of Texas and at the 109th U.S. Congressional meeting (Congressional Record 2005). Denton also received recognition from the International Council for Local Environmental Initiatives (ICLEI) for its local leadership in emissions reduction and commitment to clean air goals. Further, it has provided inspiration to the operation of a truck stop, BioWillie, which lies approximately 100 miles south of Denton. Here, biodiesel manufactured in Denton, and at private facilities in Fort Worth and other places south of Dallas from waste cooking oil and soybean oil and endorsed by the famous country singer, Willie Nelson, is sold to truckers. Since this fuel does not lead to a loss in fuel efficiency or require any expensive retrofitting to trucks, local truckers are increasingly using this fuel (Smiley 2005). Consequently, it provides an impetus for greater production of this alternative fuel and further enhances the prospect for local economic development.

The city's attempts to reduce dependence on imported crude oil through production and consumption of locally produced biodiesel fuel has helped the city to gain publicity nationwide. In USA Today's (May 2006) section on news from every state, Denton's biodiesel plant made up the bulk of the news from the state of Texas. In January 2006, Denton's biodiesel project received the Landfill Methane Outreach 2005 Project of the Year award from the Environmental Protection Agency (Annual Citizen Update 2006). According to the mayor of Denton, the city's model of renewable energy production is not only an attempt at sustainable development, but also at energy independence.

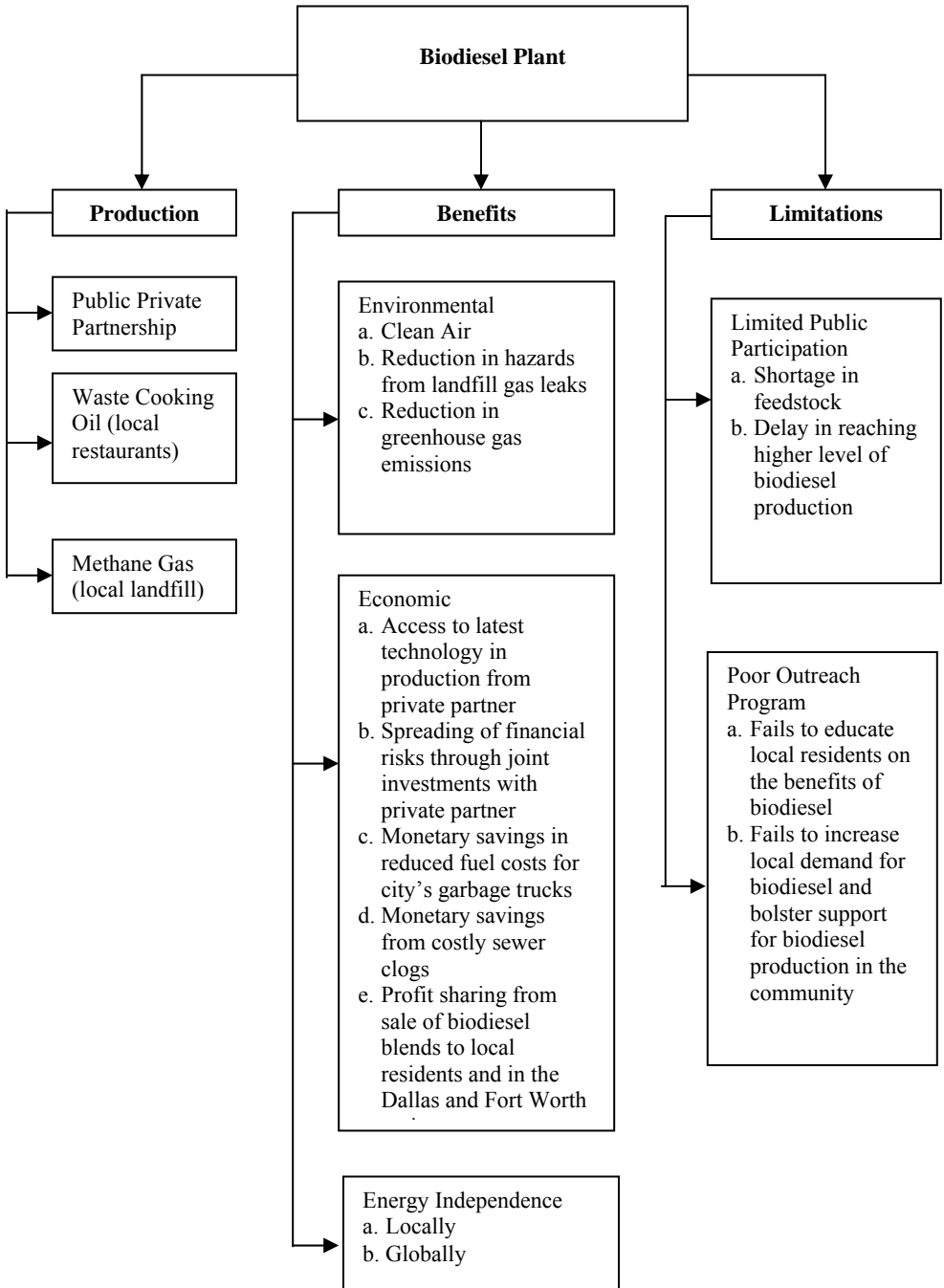
The Outcomes of the Biodiesel Project

The biodiesel plant completed its first year of operation in March 2006. The short-term environmental, economic and social outcomes of this project cannot be ignored. In this study, attempts have been made to understand whether the impacts of the outcomes are in conformity with the practice of sustainable development (Herkert et al 1996) and also to assess the strengths and weaknesses of the city's model of sustainable development. See figure 2.

First, in assessing the environmental outcomes of this project, numerous environmental benefits can be identified. Since methane gas from the local landfill is used in the production of biodiesel, it helps to address the problem of gas leakages and reduces hazards from gas leaks and greenhouse gas emissions. Further, use of biodiesel in the city's garbage trucks, which are the most polluting vehicles in its fleet, has helped to replace emissions of black noxious fumes with harmless white smoke. There exist future plans to use biodiesel in the city's public transit and school buses with the gradual increase in production capacity. Recently, the discovery of a unique additive to the alternative fuel by the partner company has helped to reduce emission of nitrogen oxides by 2.6 percent and meet the requirements of the Texas Low Emission Diesel (TxLED) program (TCEQ 2005). The expanded use of biodiesel would help to bring about a reduction of harmful emissions approximately by 4 tons annually from city vehicles. Thus, the city, through its various attempts at equitable distribution of clean air benefits, a public good, is gradually fulfilling the criterion of equity in sustainable development.

Second, the economic outcomes of the project are directly related to the many benefits of public private partnership. The partnership has helped the city to access the latest technology in production of biodiesel, combine the strengths of the private sector

Figure 2. Impacts of the city of Denton's Biodiesel Plant



(competitiveness and efficiency) with those of the public sector (responsibility and accountability), and spread the financial risks in the joint venture (Rosenau 1999, 12; Linder 1999, 37) through joint investments in this capital-intensive project. The city, by using its influence at the local and state level, has helped its private partner to overcome many of the early challenges in its operation through its timely interventions. This has enabled the city to gain the support and trust of its private partner and later, to coordinate and steer the actions of its private partner towards its desired goals of social, economic and environmental improvements. Achievement of such goals would mutually benefit both the partners - the city in attainment of its objectives and the private company from monetary gains and publicity.

Other economic benefits to the city include a subsidized price for biodiesel. As per the contractual agreements of the partnership, the city purchases 200,000 to 250,000 gallons of biodiesel blend at \$1.30 a gallon. The price has been fixed for a five-year period, or until the city recovers its investment from the project, whichever comes first. With the market price of petrodiesel at more than twice the price of the locally produced blend of biodiesel, the fixed price has resulted in substantial savings of \$55,000 to \$70,000 for the city in fuel costs (Majumdar 2005). Additional monetary savings are made through reduction in the number of costly sewer clean ups. Restaurants in the city alone generate approximately 300,000 gallons of waste cooking oil per year; with a large fraction of waste being collected from the restaurants, the city expects approximately a 10 to 20 percent reduction in sewer clogs from grease. Residents are also urged to drop off their waste cooking oil at the local landfill site for production of biodiesel.

Recently, biodiesel is being offered for sale through a local gasoline store at \$2.69 a gallon (Barbour 2006). Residents can buy the fuel only for those vehicles with diesel engines that require little or no modifications (Biodiesel Fact Sheet 2005). With further increases in production, the excess biodiesel will also be offered for sale in the Dallas and Fort Worth region through another private company that has partnered with the city of Denton and Biodiesel Industries (Allen 2004). Profits from biodiesel sales will be distributed between the city of Denton and Biodiesel Industries. The revenue earnings will help the city of Denton to partially recover its investment in the project.

The long-term sustenance of any sustainable development project requires public participation. Participation of people is necessary in bringing about social changes, like changes in people's attitude towards greater support for environmental friendly management practices. In Denton's case, public participation in the biodiesel project is weak. The city of Denton and its private partner have overlooked the need to actively engage citizens in the project. Even though several public meetings were held prior to finalization of the project plan, few people attended those meetings. Currently, public participants in the biodiesel project include few local merchants who provide the much-needed waste cooking oil or the feedstock for production of biodiesel. Such limited public participation does not help this project to fully meet the criterion of empowerment of local people to sustain the project in the long run as envisioned in the concept of sustainable development.

Analysis reveals that several factors are responsible for the lack of public participation. For instance, top down bureaucratic decision-making in city government has helped in the selection of a technology driven by a market reliant model of pollution control, yet it severely restricted the scope of public participation. Even though the decision to build the biodiesel plant was approved by council members who served as

representatives of constituents, direct input from local residents at public meetings was minimal. The editor of the local newspaper, *The Denton Chronicle*, received only one letter from a resident, who expressed concern about the city's partnership with a private company. Local residents' quiet acceptance of the city's decision may be partly attributed to the progressive outlook of the community.

Another obstacle to public participation has been the technical nature of the problem. Very few residents possess the scientific knowledge to deal with methane gas leaks or harmful emissions from vehicles and may have prevented them from participation in public meetings. However, this could have been overcome by education of residents through the distribution of fliers, local news broadcasts or articles in local newspapers (Darnall et al. 2004). Unfortunately, no such initiatives were undertaken at a scale to help educate local residents. Perhaps the fear that direct public involvement would prolong the decision-making process in the face of time constraints, contributed to the city's lackadaisical attitude towards public participation. Even the public private partnership had a role to play in limiting public involvement. The possibility of a disagreement between stakeholders and technical experts (Rosenbaum 1998) served as a disincentive to involve people. Further, Kamieniecki et al. (1999) argued that public partnerships in an environmental arena reduce the scope of public participation. When people lack knowledge about how to deal with serious environmental problems, "citizens have little choice but to stand by and be spectators in the process" (p. 111) while decision-making is made by individuals with expertise, power and wealth.

The limited public participation in the city's biodiesel project poses a threat to its long-term sustainability. In its first year of operation, the biodiesel plant produced 200,000 gallons of biodiesel fuel from waste cooking oil, but the plant has a capacity to produce 3 million gallons of biodiesel fuel. To increase production, more waste cooking oil needs to be collected, but not all local merchants support the biodiesel project. Their poor relationship with the city prevents them from donating their waste oil to the local facility; they donate it to other private collectors who also find a use for such waste resources. The problem needs to be recognized and addressed through a remedial plan. With greater involvement of local people, pride and ownership could be used to mobilize political, business and popular support for the biodiesel project (Freeman et al 1996). It would enable local merchants in their role as stakeholders to pledge their support and they could be held partly responsible for the project's success and sustainability in the long term.

As far as the social outcome of social learning is concerned, it is yet to be realized. Usually, "social learning" is achieved through the process of communication and dissemination of information about the social benefits of a chosen course of action (Stagl 2004). It helps to bring about a change in the social condition through popular awareness and by making individuals realize how their private interests are linked with that of fellow citizens in the society (Webler et al 1995). From such a perspective, a review of Denton's biodiesel project reveals that city officials and its private partner have made limited efforts to promote such a social process of learning through their outreach program. They continue to rely on the signs on garbage trucks to communicate to the residents the merits of biodiesel fuel and promote its use in the local community. The lack of publicity about the many benefits of biodiesel and failure to educate potential private customers about the fuel's compatibility in their cars and pick up trucks, serve as obstacles in bolstering the local demand for biodiesel. A well-designed outreach program

can help to offset such a trend and make public participation more meaningful. Local residents' involvement and contributions would help to foster adaptations and innovations in the biodiesel project, as observed in many other sustainable development projects throughout the world (Chambers 1997; Garrity 1999).

Finally, in determining the status of the city's model of sustainable development, the concept of a ladder of sustainable development can be applied. The ladder of sustainable development is "a heuristic device for situating and grouping the range of policy imperatives associated with the promotion and implementation of sustainable development policies" (Baker et al 1997, 1). This ladder has four rungs or alternative frameworks, each representing a different political scenario and policy implications. For example, the rungs from top to bottom represent an ideal model, strong model, weak model, and a treadmill model. In an *ideal* model, there exists the profound vision of a structural change in society and in the economic and the political system through a radical change in human attitude towards nature. The ideal model reflects a 'pure' idea of sustainable development with no overall growth in quantitative terms in the economy. Such a notion is based on the assumption that human beings live within the finite ecological constraints of the planet and put in as much as they take out. Here, growth is measured in qualitative terms, which leads to an emphasis on the quality of life rather than on the standard of living. More attention is paid to those work and production activities from non-profit organizations and community organizations (aimed at improving the quality of life and creating non-monetary wealth) and not those from the formal, economic system in the social economy. Moving down to the next rung of the ladder is the *strong* model of sustainable development. This model supports the idea that environmental protection is a precondition of economic development. As in the aforementioned model, here the emphasis is on qualitative rather than on the quantitative aspects of growth. The model's strong position on sustainable development calls for open ended dialog with environmental movements and encourages the use of different policy instruments, example, legal (regulations), fiscal (taxes and pollution charges) and landuse planning to maintain environmental assets and conserve those natural resources that are either depletable or renewable. Further, public participation is considered to be a prerequisite in the sustainable utilization of local environmental resources. Also, financial incentives like subsidies, deposit refund schemes, dissemination of information and publicity of the various initiatives undertaken to promote sustainable development, are considered important in bringing about desired changes in public behavior.

The third rung or the *weak* model of sustainable development model makes a subdued effort to integrate capitalist growth with environmental concerns. In this model, nature is viewed as the provider of both material and environmental wealth, which leads to an emphasis on environmental conservation. The latter is often equated with efficiency, that is, through reduction of waste. Also, environmental problems are reduced to managerial problems and there exists the propensity to address them through managerial and administrative tools like cost benefit analyses, environmental impact assessments and policy tools like taxes, fees and tradable permits. Further, the model calls for a sector driven approach with minimal changes in institutions to address local problems. It tends to rely on top down initiatives in decision-making and in adoption of market oriented technology to address environmental concerns. In contrast, the *treadmill* model calls for no changes in policy instruments. In this model, the focus is on monetary gains from economic activities with little or no regard to its negative impacts or the

spillover effects on the environment. Consequently, it leads to a very limited dialog with environmental movements and there is disregard towards the issue of equity in sustainable development (Baker et al 1997, 8).

Applying such a ladder to Denton's biodiesel project, the city's model seems to fit into the weak model of sustainable development. Many of the characteristics of the latter are evident in the city's model of sustainable development. For example, city officials in Denton reduced a local environmental problem into a managerial one and chose the tool of cost benefit analysis in selection of an option that was both environmentally and economically feasible. Other evidences include use of top down decision-making in conceptualization and implementation of the project and adoption of an advanced and market oriented technology that efficiently reduces waste from the local landfill and restaurants to produce a biofuel. All these evidences help to reconfirm the biodiesel project's status in the third rung of the ladder of sustainable development. The city's existing model of sustainable development has much scope for improvements. It can be elevated to a higher status through the remediation of its major deficiency, that is, lack of public participation and by making adaptations in its innovative technology.

Conclusion

The city's biodiesel project helps to address several environmental problems in the local community without jeopardizing the scope of economic development. Actually, Denton's efforts towards sustainable development are in alignment with The United Nation's Council on Environmental Development's (UNCED) expectations. At the United Nations' Earth Summit of 1992, UNCED called for cities to lead the way in sustainable development. Denton seems to have answered that call and with other global cities, has backed the Kyoto Protocol. The local leaders' decision to make optimal use of renewable energy in production of biodegradable fuel and its consumption has far reaching consequences for the local and global economies.

There still exists much scope for improvement of the city's biodiesel project. Such improvements call for the greater involvement of the local population. By providing the necessary conduits for public participation, the city of Denton can easily fulfill the criteria for sustainable development and also reach its targeted level of production. Further, public participation would strengthen the city's drive towards its clean air goals. Thus, in order to reap the full benefits of sustainable development, the issue of how to effectively involve local people in such a project needs to be further explored in the future.

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Sarmistha R. Majumdar is an assistant professor in the MPA program, Department of Political Science at Sam Houston State University, Huntsville, Texas. Her research interest lies in public policies mainly those related to the environment and transportation. She specializes in the analysis of public policies and evaluation of public programs. Email: majumdar@shsu.edu

References

- Allen, Margaret. 2004. Biodiesel Industries to Build Texas Plant. *Los Angeles Business Journal*, October 18.
- Annual Citizen Update. 2006. About the city of Denton. Produced by the *Public Information Office*, City of Denton, available at <http://www.cityofdenton.com>.
- Babbie, Earl. 2004. The logic of sampling. *The Practice of Social Research*, Belmont, California: Thompson and Wadsworth, 178-217.
- Baker, Susan, Kousis, Maria, Richardson, Dick and Young, Stephen. 1997. The theory and practice of sustainable development in EU perspective. *The Politics of Sustainable Development*, London:Routledge, 1-40.
- Barbour, Crystal. 2006. Safer, cleaner fuel now sold locally. *North Texas Daily*, April 20, 2006, 4.
- Biodiesel Fact Sheet. 2005. Solid Waste Department. *City of Denton*.
- Brugmann, Jeb. 1996. Planning for sustainability at the local government level. *Environmental Impact Assessment Review*, 16:363-379.
- Caldari, Katia. 2004. Alfred Marshall's idea of progress and sustainable development. *Journal of the History of Economic Thought*, 26(4):519-536.
- Chambers, R. 1997. Whose reality counts? Putting the first last. London: Intermediate Technology.
- Congressional Record. 2005. First biodiesel facility in the 26th district of Texas, *Proceedings and Debates of the 109th Congress*, first session, House of Representatives, United States of America.
- Darnall, Nicole and Jolley, Jason G. 2004. Involving the public: when are surveys and stakeholder interviews effective? *Review of Policy Research*, 21(4):581-593.
- Environmental Protection Agency. 2005. Accessed at <http://www.epa.gov/air/oaqps/greenbk/gnca.html#1921>
- Freeman, Claire, Littlewood, Stephen and Whitney, David. 1996. Local government and emerging models of participation in the local agenda 21 process. *Journal of Environmental Planning and Management*, 39(1):65-78.
- Garrity, D. P. 1999. Participatory approaches to catchment management: Some experiences to build upon. In A.R. Maglinao and R. Leslied edited, Site selection and characterization: Focus on biophysical and socioeconomic inventory. Proceedings of the Managing Soil Erosion Consortium Assembly, June 8-12, 1998, Hanoi, Vietnam. Bangkok: IBS-RAM.
- Gorden, R.L. 1987. *Interviewing: Strategy, Techniques, and Tactics*. Homewood, Illinois, Dorsey.
- Hatcher, Charles L. 2004. Biodiesel as a renewable energy source: a new direction? *Spectrum: Journal of State Government*, 13-16. Can be accessed at <http://www.csg.org>.
- Herkert, Joseph R., Farrell, Alex and Winebrake, James J. 1996. Technology choice for sustainable development. *IEEE Technology and Society Magazine*, 12-20.

- International Council for Local Environmental Initiatives 1993. *Guidelines for Local Agenda 21*. Toronto: ICLEI.
- Kamieniecki, Sheldon, Shafie, D., and Silvers, J. 1999. Forming partnerships in environmental policy. *American Behavioral Scientist*, 43(1):107-123.
- Linder, Stephen H. 1999. Coming to terms with the public private partnership. *American Behavioral Scientist*, 43(1):35-51.
- Majumdar, Sarmistha R. 2005. Innovative Texas partnership aims to attain clean air, *PA Times*, 28(10):1-2.
- McEntire, David A. 2005. The history, meaning and policy recommendations of sustainable development: a review essay. *International Journal and Sustainable Development*, 4(2):106- 118.
- Mog, Justin M. 2004. Struggling with sustainability – a comparative framework for evaluating sustainable development programs. *World Development*, 32(12): 2139-2160.
- Neuman, W. Lawrence 2004. Survey research. *Basics of Social Research*,. Boston, Massachusetts: Pearson, Allyn and Bacon, 161-192.
- Public Information Office. 2005. Denton: Growing with you, working for you. *Annual Citizen Update*.
- Rees, William E. 1988. Economics, ecology and the role of environmental assessment in achieving sustainable development. *Canadian Environmental Research Council*, Ottawa, Canada.
- Rosenau, Pauline V. 1999. Introduction: The strengths and weaknesses of public private policy partnerships. *American Behavioral Scientist*, 13(1):10-34.
- Smiley, Lauren. 2005. On the road again. *Dallas Morning News*, August 14, 2005, 1E and 10E
- Stagl, Sigrid. 2004. Multicriteria evaluation and public participation: the case of UK energy policy. *Land Use Policy*, 8(7):1-10.
- TCEQ. 2005. TexasLow Emission Diesel (TxLED) program. *Texas Commission on Environmental Quality (TCEQ)*, accessed at <http://www.tceq.state.tx.us/implementation/air/sip/cleandiesel.html> on September 9, 2005.
- United Nations Development Programme. 1998. *Public Private Partnerships*. Available at <http://www.undp.org:80/ppp/index.html>
- USA Today. 2006. Across the USA: News from every state, May 30, p9A.
- Webler, T., Kastenholz, H., Renn, O. 1995. Public participation in impact assessment: a social learning perspective. *Environmental Impact Assessment Review*, 15:443-463.
- World Commission on Environment and Development. 1987. *Our Common Future*, Oxford, UK, Oxford University Press.