

Production of Biofuels for transport in Colombia:

AN ASSESSMENT THROUGH
SUSTAINABILITY TOOLS

CARLOS ARIEL RAMÍREZ TRIANA

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REFERENCES

- “Plantas de etanol...”. (2010). Ethanol plants started to sink [Original in Spanish: Plantas de etanol ‘hacen agua’.] Retrieved from: <http://www.dinero.com/edicion-impres/a/investigacion/articulo/plantas-etanol-hacen-agua/I04313> Accessed 28/03/11. Dinero.
- ACCEFYN. (2003). Emission factors of Colombian Fuels (Original in Spanish: Factores de emisión de los combustibles colombianos) Bogota, Colombia: UPME.
- ACR. (2011). Biodiesel in Guatemala. [Original in Spanish: Biodiesel en Guatemala] Retrieved from: www.acrguatemala.com/biodiesel.shtml#biodieseG Accessed 11/12/12.
- Acuña, N. (2010). Colbiocel presented a project of a cellulosic ethanol plant. [Original in Spanish: Colbiocel presentó proyecto de planta de etanol celulósico]. Retrieved from: <http://www.vanguardia.com/historico/63193-colbiocel-presento-proyecto-de-planta-de-etanol-celulosico#sthash.D4GxvJzV.dpuf>, Vanguardia Liberal.
- Achten, W. M., Mathijs, E., Verchot, L., Singh, V. P., Aerts, R., & Muys, B. (2007). Jatropha biodiesel fueling sustainability? *Biofuels, Bioproducts and Biorefining*, 1(4), 283-291.
- Agrammon. (2009). Technical process description AGRAMMON - Draft.
- Ajila, V. H., & Chiliquinga, B. (2007). Biofuel legislation analysis in Latin America. [Original in Spanish: Análisis de legislación sobre biocombustibles en América Latina.] Retrieved from: <http://revistavirtual.redesma.org/vol4/pdf/legislacion/Analisis%20de%20la%20legislacion%20de%20Biocombustibles.pdf> Accessed 25/06/11. Revista Olade.
- Álvarez, M. (2001). Could peace be worse than war for Colombia’s forests? *The Environmentalist*, 21, 305-315.
- Anderson–Teixeira, K. J., Davis, S. C., Masters, M. D., & Delucia, E. H. (2009). Changes in soil organic carbon under biofuel crops. *Gcb Bioenergy*, 1(1), 75-96.
- Anderson, J., Fergusson, M., & Valsecchi, C. (2008). An overview Of Global Greenhouse Gas Emissions and emissions reduction scenarios for the future Retrieved from: www.ieep.eu/assets/428/overview_gge.pdf Accessed at: 13/12/12. Brussels: IEEP.
- Andrade, G. (2004). Forest without law. Conflict, drugs and globalization of deforestation in colombia. [Original in spanish: Selvas sin ley. Conflicto, drogas y globalización de la deforestación de Colombia]. Retrieved from: <http://library.fes.de/pdf-files/bueros/kolumbien/01993/05.pdf>. Bogotá. Foro Nacional Ambiental-CIFOR.
- Aquino, M. (2006). State of Biofuels in Paraguay. [Original in spanish: Situación de los biocombustibles en Paraguay] Retrieved from: <http://www.mag.gov.py/dgp/SITUACION%20DE%20BIOCOMBUSTIBLES%20EN%20PARAGUAY%202006.pdf> Accessed: 02/06/10. Asunción.

- Argentinian Congress. (2006). Regulation and promotion scheme for production and sustainable use of biofuels. [Original in Spanish: Régimen de Regulación y Promoción para la Producción y Uso Sustentables de Biocombustibles.] Retrieved from: www.bccba.com.ar/bcc/images/00001197_BIOCOMBUSTIBLES.pdf. Buenos Aires.
- Arriaza, J. M. (2011). Biofuels: Analysis on their contribution to the Chilean energy matrix. [Original in Spanish: Biocombustibles: Análisis sobre su aporte a la matriz energética de Chile.] Retrieved from: http://www.tesis.uchile.cl/tesis/uchile/2011/cf-arriaza_jh/pdfAmont/cf-arriaza_a_jh.pdf accessed 15/06/12. Universidad de Chile, Santiago de Chile.
- Asamblea constituyente de Ecuador. (2007). Organic Law for National oil resources recovery and distribution of the debt processes. [Original in Spanish Ley orgánica para la recuperación del uso de los recursos petroleros del estado y racionalización administrativa de los procesos de endeudamiento] Retrieved: http://constituyente.asambleanacional.gob.ec/documentos/ley_petroeros_2_%20informe_final.pdf Accessed 15/03/10. Quito.
- Asamblea nacional. (2011). Guidelines for National policy on biofuels and electricity generation from biomass within national territory. [Original in Spanish: Lineamientos para la política nacional sobre biocombustibles y energía eléctrica a partir de biomasa en el territorio nacional.] Retrieved from: http://www.energiarenovablepanama.com/wp-content/uploads/2011/09/Ley-42_Biocombustibles.pdf Accessed: 18/03/12. Panama.
- Asman, W. (1992). Ammonia emission in Europe: updated emission and emission variations. Roskilde, Denmark: National Institute of Public Health and Environmental Protection.
- Asocaña. (2009). History of the sugar sector [Historia del sector azucarero (in Spanish)] Retrieved 30/07/10, 2010, from <http://www.asocana.org/publico/info.aspx?Cid=8>
- Asocaña. (2010). Annual report 2009-2010 (Original in Spanish: Informe anual 2009-2010). Cali: Asocaña.
- Asocaña. (2011). Annual report 2010-2011 (Original in Spanish: Informe anual 2010-2011). Cali: Asocaña.
- Asocaña. (2012). Balance del sector Azucarero Colombiano 2000-2012 (In Spanish) Balance of the sugar industry in Colombia 2000-2002. <http://www.asocana.org/modules/documentos/5528.aspx> Accessed 05/11/12. Cali, Colombia: Asocaña.
- Asocaña. (2013). Balance azucarero colombiano Asocaña 2000 - 2013 (en tmvc). [In Spanish: Sugar sector balance Asocaña 2000-2013] Retrieved from: www.asocana.org/modules/documentos/3/194.aspx Accessed at: 13/12/13.

- Asocaña. (2014). Sugar sector balance Asocaña 2000-2014 [In Spanish: Balance azucarero colombiano Asocaña 2000–2014 (en toneladas).] Retrieved from: www.asocana.org/modules/documentos/5528.aspx Accessed at: 25/08/14.
- Assessment, M. E. (2005). *Ecosystems and human well-being* (Vol. 5): Island Press Washington, DC.
- Asubel, J. H. (2000). The great reversal: nature's chance to restore land and sea. *Technology in Society*, 22(3), 289-301.
- Azizi, B., Zulkifli, H., & Kasim, M. (1995). Indoor air pollution and asthma in hospitalized children in a tropical environment. *Journal of Asthma*, 32(6), 413-418.
- Badgley, C., Moghtader, J., Quintero, E., Zakem, E., Chappell, M. J., Aviles-Vazquez, K., Perfecto, I. (2007). Organic agriculture and the global food supply. *Renewable agriculture and food systems*, 22(2), 86-108.
- Balasundram, S. K., Robert, P. C., Mulla, D. J., & Allan, D. L. (2006). Relationship between Oil Palm Yield and Soil Fertility as Affected by Topography in an Indonesian Plantation. *Communications in Soil Science and Plant Analysis*, 37(9-10), 1321-1337. doi: 10.1080/00103620600626817
- Barros, S. (2012). Brazil biofuel anual report http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Biofuels%20Annual_Sao%20Paulo%20ATO_Brazil_8-21-2012.pdf In USDA (Ed.).
- Basiron, Y. (2007). Palm oil production through sustainable plantations. *European Journal of Lipid Science and Technology*, 109(4), 289-295.
- Batidzirai, B., Smeets, E., & Faaij, A. (2012). Harmonising bioenergy resource potentials – Methodological lessons from review of state of the art bioenergy potential assessments. *Renewable and Sustainable Energy Reviews*, 16(9), 6598-6630.
- Batjes, N. (2010). IPCC default soil classes derived from the Harmonized World Soil Data Base. Retrieved 12/06/11, 2011
- Bergkamp, G., Orlando, B., & Burton, I. (2003). *Adaptation of water management to climate change.*: Gland & Cambridge: International Union for Conservation of Nature (IUNC).
- Berndes, G. (2008a). Future biomass energy supply: The consumptive water use perspective. *Water Resources Development*, 24(2), 235-245.
- Berndes, G. (2008b). Water demand for global bioenergy production: trends, risks and opportunities. *Journal of Cleaner Production*, 15(18), 1778-1786.
- Besosa, R. (2005). Organic Matter in the Soils of Cauva Valley region [Original in Spanish: Materia Orgánica de los suelos del Valle del Cauca]. Presentation: Ingenio Providencia. Procaña Seminar .

- BioPact. (2007). A quick look at 'fourth generation' biofuels. Website: www.google.com.co/search?sourceid=navclient&ie=UTF-8&rlz=IT4WZPA_enCO207CO208&q=Heverlee Accessed: 05/04/2010.
- Bittencourt, G., & Reig, N. (2009). Biofuel industry in Uruguay: Current situation and perspectives [Original in Spanish: La industria de biocombustibles en Uruguay: situación actual y perspectivas] Retrieved from: <http://www.fcs.edu.uy/archivos/II09.pdf> Accessed: 12/05/11 Departamento de economía, : Universidad de la República.
- BMI. (2008). Colombia Power Report Q4 2008: Business Monitor International.
- Bolivian National Congress. (2005). Law 3152. [Original in Spanish: Law 3152] Retrieved from: [http://revistavirtual.redesma.org/vol4/pdf/legislacion/Bolivia-Biocombustibles%20\(Ley%203152\).pdf](http://revistavirtual.redesma.org/vol4/pdf/legislacion/Bolivia-Biocombustibles%20(Ley%203152).pdf) Accessed 02/12/12. La Paz. Bolivia.
- Bongiovanni, R., & Lowenberg-DeBoer, J. (2004). Precision agriculture and sustainability. *Precision Agriculture*, 5(4), 359-387.
- Briceno, C. (2006). Disposition of vinasses produced in sugar processing distilleries in Colombia. (Original in spanish: Disposición de las vinazas producidas en las destilerías del sector azucarero colombiano.). Paper presented at the Taller combustibles, energía y el medio ambiente a partir de la caña de azúcar y otras biomásas., Santa Lucía, Guatemala.
- Brooks, T., De silva, N., Foster, N., Hoffmann, M., & Knox, D. (2008). Biodiversity hotspots. Retrieved from: www.biodiversityhotspots.org Accessed 10/02/09: Conservation international.
- Brugman, A. (2004). Design of an economic instruments Porogram for managing and Controlling Urban atmospheric pollution in Colombia. Consultant report. Bogota, Colombia: MAVDT.
- Buchanan, E. (1975). The introduction of a relative cane payment system in the South African Sugar Industry. *South African Sugar Year Book*, 45, 11-14.
- Buitrago, A. C., Correa Roldán, D., & Palacios Botero, F. A. (2007). Agri-industrial potential in Antioquia, colombia (Original in Spanish: Potencial Agroindustrial Antioqueño). Medellin, Colombia.
- Calixto, D., & Díaz, A. (1995). Economic Valuation of the enviromental impact of air quality on population undet 5 years old. [Original in Spanish: Valoración económica del impacto ambiental del aire sobre la salud de los habitantes menores de 5 años en Bogotá.]. Unievridad Javeriana, Bogota. Colombia.
- Cámara de Diputados. (2008). Law of Promotion of Bioenergy products. [Original in Spanish: Ley de promoción y desarrollo de los bioenergéticos] Retrieved from:

- <http://www.diputados.gob.mx/LeyesBiblio/pdf/LPDB.pdf> Accessed from: 18/03/11. Ciudad de México.
- Cámara de Senadores. (2005). [Original in Spanish: Ley n° 2.748.- de fomento de los biocombustibles.] Retrieved from: www.bvsde.paho.org/bvsacd/cd38/Paraguay/L2748-05.pdf Accessed: 15/06/11. Asunción.
- Camastra, N. D. (2008). National Security and Development: How Blocking the U.S.-Colombia Free Trade Agreement will Protect Colombians and the U.S. Retrieved 03/08/2009, from <http://www.foodfirst.org/en/node/2110>
- Campuzano, L. F. (2011). Platform Jatropha Colombia: Myth or True [Original in Spanish: Plataforma Jatropha Colombia: Mito o Realidad] Retrieved from: www.minagricultura.gov.co/archivos/plataforma_jatropha_colombia.pdf Accessed 12/05/12. Bogotá, Colombia: Corpoica.
- CARB. (2009). Californian Low Carbon Fuel Standard. Resolution 09-31. Sacramento, California.
- Cardona Alzate, C. A. (2009). Perspectives of Biofuels Production in Colombia: Latinamerican and World Contexts [Original in Spanish: Perspectivas de la producción de biocombustibles en Colombia: contextos latinoamericano y mundial] Retrieved from: <https://revistaing.uniandes.edu.co/pdf/AI2%2029.pdf>. Revista de Ingeniería(29), 109-120.
- Cardona, C. A., C.E., O., Sanchez, C. A., & Rincón, L. E. (2007). Rapeseed biodiesel: an Alternative of rural development. [Original in spanish: Biodiesel de higuerrilla: una alternativa de desarrollo rural] Retrieved from: <http://corpomail.corpoica.org.co/BACFILES/BACDIGITAL/55173/19.pdf> Accessed at: 25/04/14. Manizales: Universidad Nacional de Colombia.
- Carnoval, M. (2009). Free Markets? - A Look Into the US Colombia FTA
- Carpenter, S. R., Mooney, H. A., Agard, J., Capistrano, D., DeFries, R. S., Diaz, S., Pereira, H. M. (2009). Science for managing ecosystem services: Beyond the Millennium Ecosystem Assessment. *Proceedings of the National Academy of Sciences*, 106(5), 1305-1312.
- Cassalett, C., Torres, J. S., & Isaacs, C. (1995). Sugarcane cultivation in the sugar production zone of colombia. (Original in Spanish: El cultivo de la caña en la zona azucarera de Colombia) Retrieved from: http://www.cenicana.org/publicaciones/libro_cana/libro_cana.php Accessed 15/07/11. Cali.
- Cassman, K. G., Dobermann, A., Walters, D. T., & Yang, H. (2003). Meeting cereal demand while protecting natural resources and improving environmental quality. *Annual Review of Environment and Resources*, 28(1), 315-358.

- Castiblanco, C., & Hortúa, S. (2012). Colombiano Biofuels' energetic paradigm and its implications [Original in Spanish: El paradigma energético de los biocombustibles y sus implicaciones: panorama mundial y el caso] *Gestion y Ambiente*, 15(3), 5-26.
- Castillo, E. F. (2009). Cogeneration in the Colombian sugar sector. (Original in Spanish: Cogeneración en el sector azucarero colombiano) Retrieved from <http://www.acolgen.org.co/jornadas2gen/CenicanaCogeneracion.pdf> 12/05/10. Bogota: Alcogen.
- Cazal, g., & Cáceres, O. (2006). Biofuels in Paraguay. [Original in Spanish: Biocombustibles en Paraguay] Retrieved from: <http://www.olade.org/biocombustibles/Documents/PDF-22-8%20Paraguay.pdf> Accessed: 02/06/12. Paper presented at the Seminario Internacional "BIOCOMBUSTIBLES", Brasilia, Brazil.
- CEET. (2009, 31/03/2009). 'Upaquizaron el precio del etanol' advierte ex codirector del Emisor, Salomón Kalmanovitz (Manipulation on ethanol prices warns Central Bank ex-bydirector, Salomon Kamanovitz) http://www.portafolio.com.co/economia/economiahoy/2009-04-01/ARTICULO-WEB-NOTA_INTERIOR_PORTA-4929267.html, Portafolio.
- CEN. (2009). CEN/TC 383 Sustainably produced biomass for energy applications Retrieved from <http://www.cen.eu/cen/Sectors/Sectors/UtilitiesAndEnergy/Fuels/Pages/Sustainability.aspx> Accessed at 15/06/10.
- Cenicaña. (2010). Water savings and applied volumes with the use of irrigation technologies (Original in Spanish: Ahorros de agua y volúmenes aplicados con el uso de tecnologías de riego). Florida, Colombia: Cenicaña.
- CENICANA. (2011). Historic dates of the sugar agroindustry in Colombia http://www.cenicana.org/quienes_somos/agroindustria/historia_eng.php.
- Cenicaña. (2012). Annual report 2012. [Original in Spanish: Informe anual 2012] Retrieved from http://www.cenicana.org/pdf/informe_anual/ia_2012/ia_2012.pdf. Accessed at 25/08/14. Cali, Colombia: Cenicaña.
- Cenipalma. (2000). Palm oil plagues in Colombia [Original in Spanish: Plagas de la palma de aceite en Colombia]: Fedepalma-Cenipalma Santafe de Bogota.
- Cepeda, V. (2007). Incentives laws to Renewable energies and their special schemes of application: law 57-07. Components and potentials. [Original in Spanish: Ley de Incentivos a las Energías Renovables y sus Regímenes Especiales. Ley 57- 07: Componentes y Potencialidades] Retrieved from: www.olade.org/biocombustibles2008/Documents/ponencias/d%C3%ADa3/Sesi%C3%B3n12-Dia%203/VirgilioCepeda.pdf Accessed: 05/06/11. El Salvador.

- Cerrato, M. (2011). Biofuels in El Salvador. [Original in Spanish: Biocombustibles en El Salvador] Retrieved from: www.cepal.org/drni/noticias/noticias/8/45098/ManuelCerrato.pdf Accessed 15/06/12. San Salvador.
- CNE. (2007). Curcular Number 30. [Original in Spanish: Circular N°30 Del 16 De Mayo Del 2007] Retrieved from: <http://www.sii.cl/documentos/circulares/2007/circu30.htm> accessed 12/12/11. Santiago.
- Coelho, S. (2005). Brazilian sugarcane ethanol: lesson learned. Paper presented at the Workshop & Business Forum on Sustainable Biomass Production for the World Market, São Paulo.
- Comisión nacional asesora (2007). Decree 109/2007 Biofuels. [Original in spanish: Decreto 109/2007] retrieved from http://www.ambiente.gov.ar/archivos/web/DNorAmb/File/Decreto_109%202007.pdf Accessed 15/09/12. Buenos Aires.
- Law 2 About forest economy of the Nation and preservation of renewable natural resources. (Original in Spanish: Ley 2 Sobre economía forestal de la Nación y conservación de recursos naturales renovables.) http://www.minambiente.gov.co/documentos/ley_0002_161259.pdf, (1959).
- Congreso de Ecuador. (2006). Law 2006-57. Organic Law of creation of the ecuadorian investment fund in Energy and hydrocarbon sectors. [Original in Spanish: Ley No. 2006-57. Ley orgánica de creación del fondo ecuatoriano de inversión en los sectores Energético e hidro-carburífero -FEISEH] Retrieved from: [http://revistavirtual.redesma.org/vol4/pdf/legislacion/Ecuador-Biocombustibles%20\(Ley%202006-57\).pdf](http://revistavirtual.redesma.org/vol4/pdf/legislacion/Ecuador-Biocombustibles%20(Ley%202006-57).pdf) Accessed 31/01/11. Quito.
- Congreso de la República. (2003). [Original in Spanish: Ley De Promoción Del Mercado De Biocombustibles] Retrieved from: <http://intranet2.minem.gob.pe/web/archivos/dgh/legislacion/128054.pdf> Accessed: 06/03/12. Lima, Peru.
- Congreso Nacional de Bolivia. (2005). Law N. 3279 of December 9th of 2005. Ley N° 3279 del 9 de Diciembre de 2005. Retrieved from: [http://revistavirtual.redesma.org/vol4/pdf/legislacion/Bolivia-Biocombustibles%20\(Ley%203279\).pdf](http://revistavirtual.redesma.org/vol4/pdf/legislacion/Bolivia-Biocombustibles%20(Ley%203279).pdf) Accessed 12/02/11. La paz.
- Congreso Nacional de la República Dominicana. (2007). Law 57-07: Incentives law to Renewable energies and their special schemes of application [Original in Spanish: Ley No. 5707 sobre Incentivo al Desarrollo de Fuentes Renovables de Energía y de sus Regímenes Especiales.] Retrieved from: http://www.phlaw.com/pubs/rejec/sp/Ley_Energia_Renovable.pdf Accessed: 22/05/11. Santo Domingo.

- Consejo de Ministros. (2007). [Original in Spanish: Reglamento para la comercialización de biocombustibles] Retrieved from: <http://www2.osinerg.gob.pe/MarcoLegal/docrev/DS-02I-2007-EM-CONCORDADO.pdf> Accessed: 03/010. Lima, Peru.
- Contexto Ganadero. (2014). Colombia, it is stuck in the Biofuels National program [Original in Spanish: Colombia, estancada en Programa Nacional de Biocombustibles] Retrieved from: <http://www.contextoganadero.com/agricultura/colombia-estancada-en-programa-nacional-de-biocombustibles> accessed 12/05/2014 Contexto Ganadero.
- Contreras, C., & Rodríguez, M. (2006). Foundations and current use of ethanol anhydro as oxygenant of regular fuels in Costa Rica. [Original in Spanish: Fundamentos y situación actual del uso de etanol anhidro como oxigenante de gasolinas en Costa Rica] Retrieved from: http://www.mopt.go.cr/planificacion/centrotransferencia/RTM_06/Etanol.pdf Accessed 23/02/11. San José.
- Corley, R. H. V., & Tinker, P. (2007). Care and Maintenance of Oil Palms *The Oil Palm* (pp. 287-325): Blackwell Science Ltd.
- Corley, R. H. V., & Tinker, P. (2007). The Origin and Development of the Oil Palm Industry *The Oil Palm* (pp. 1-26): Blackwell Science Ltd.
- Corley, R. H. V., & Tinker, P. (2008). *The oil palm*: Wiley-Blackwell.
- Corpoica. (2011). Castor oil: productive energy and agroindustria alternative for Colombia. [Original in Spanish: Higuerrilla, Aternativa productiva, Energetica, y agroindustrial para Colombia] Retrieved from: http://www.minagricultura.gov.co/archivos/presentacion_higuerrilla_navas.pdf Accessed: 12/05/12. Bogota, Colombia: Corpoica, MADR.
- Corzo, G., Londoño-Murcia, M. C., Fonseca, C., Ramírez, W., Salamanca, B., Alcázar, C., Lasso, C. A. (2008). Identification of priority areas for preservation in situ of biodiversity. (Original in Spanish: Identificación de áreas prioritarias para la conservación in situ de la biodiversidad.). In Corzo German et al. (Ed.), *Environmental planning for the preservations of biodiversity in the operative areas of Ecopetrol located in Magdalena Medio and the Llanos orientales of Colombia* (Original in Spanish: Planeación ambiental para la conservación de la biodiversidad en las áreas operativas de Ecopetrol localizadas en el Magdalena Medio y los Llanos Orientales de Colombia). Bogotá, Colombia: Instituto Alexander von Humboldt and Ecopetrol S.A.
- Čuček, L., Klemeš, J. J., & Kravanja, Z. (2012). A Review of Footprint analysis tools for monitoring impacts on sustainability. *Journal of Cleaner Production*, 34(0), 9-20. doi: <http://dx.doi.org/10.1016/j.jclepro.2012.02.036>

- Chacón , J., & Gutiérrez , R. (2008, 20/12/2008). Controversia por precio de etanol (Controversy for ethanol price) <http://www.elespectador.com/impreso/negocios/articuloimpresoI00690-controversia-precio-de-etanol>, El espectador.
- Chartres, C. (1981). Land resources assessment for sugar-cane cultivation in Papua New Guinea. *Applied Geography*, 1(4), 259-271.
- Cherubini, F., Bird, N. D., Cowie, A., Jungmeier, G., Schlamadinger, B., & Woess-Gallasch, S. (2009). Energy-and greenhouse gas-based LCA of biofuel and bioenergy systems: Key issues, ranges and recommendations. *Resources, Conservation and Recycling*, 53(8), 434-447.
- Cherubini, F., & Strömman, A. H. (2011). Life cycle assessment of bioenergy systems: State of the art and future challenges. *Bioresource Technology*, 102(2), 437-451. doi: <http://dx.doi.org/10.1016/j.biortech.2010.08.010>
- Christodoulidis, N. (2011). International Governance Options for the Sustainable Production of Biofuels. THE UNIVERSITY OF NEW SOUTH WALES - INSTITUTE OF ENVIRONMENTAL STUDIES, Sydney.
- Chum, H., Faaij, A., Moreira, J., Berndes, G., Dhamija, P., Dong, H., & Others. (2011). Bioenergy IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation ed O Edenhofer et al: Cambridge: Cambridge University Press.
- Dale, B. E., Allen, M. S., Laser, M., & Lynd, L. R. (2009). Protein feeds coproduction in biomass conversion to fuels and chemicals. *Biofuels, Bioproducts and Biorefining*, 3(2), 219-230.
- DAMA. (2004). Atmospheric emissions of Bogotá Savannah. [Original in Spanish: Emisiones atmosféricas de la sabana de Bogotá]. . Bogota, Colombia: Departamento Administrativo del Medio Ambiente (DAMA).
- DANE. (2005). National census 2005 [Original in Spanish: Censo nacional 2005]. Bogota, Colombia: Departamento Nacional de Estadística (DANE).
- DANE. (2009). Principales indicadores del mercado laboral: Febrero 2009 (Main Indicators of Labor Market: February 2009). Bogota: DANE, Departamento Administrativo Nacional de Estadística. (National Administrative Department of Statistics).
- Dangond, I. (2013). Biofuels, without rules of the game . [Original in Spanish: Biocombustibles sin reglas de juego] Retrieved from: <http://contextogadero.com/columna/biocombustibles-sin-reglas-de-juego> accessed at 13/12/13, Contexto Ganadero.
- de Fraiture, C., & Berndes, G. (2009). Biofuels and water Biofuels: Environmental consequences and interactions with changin land use.

- De Klein, C., Novoa, R. S., Ogle, S., Smith, K., Rochette, P., Wirth, T., Walsh, M. (2006). N₂O emissions from managed soils, and CO₂ emissions from lime and urea application. IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme, 4.
- Demirbas, A. (2007). Importance of biodiesel as transportation fuel. *Energy Policy*, 35(9), 4661-4670.
- Demirbas, M. F. (2011). Biofuels from algae for sustainable development. *Applied Energy*, 88(10), 3473-3480.
- DENC-SEIC. (2009). Biofuel in dominican Republic [Original in Spanish: Los biocombustibles en República Dominicana] Retrieved from: <http://www.seic.gov.do/media/135701/marco%20legal%20de%20los%20biocombustibles.pdf> Accessed: 12/06/12.
- Department of Conservation. (2010). Annual Reports of the State Oil & Gas Supervisor, 2009-2000. . California, USA: Department of conservation.
- Dickey, E. C., Shelton, D. P., Jasa, P. J., & Peterson, T. R. (1985). Soil erosion from tillage systems used in soybean and corn residues. *TRANS. AM. SOC. AGRIC. ENG.*, 28(4), 1124-1129.
- Dilek, F. B., Yetis, U., & Gökçay, C. F. (2003). Water savings and sludge minimization in a beet-sugar factory through re-design of the wastewater treatment facility. *Journal of Cleaner Production*, 11(3), 327-331. doi: 10.1016/S0959-6526(02)00029-X
- Dincer, I., & Rosen, M. A. (1999). Energy, environment and sustainable development. *Applied Energy*, 64(1), 427-440.
- Division of Oil & Gas. (2012). Lessee's Acreage Summary. Retrieved from http://dog.dnr.alaska.gov/Leasing/Documents/LeaseReports/Acreage_by_Owner_Summary.pdf. Alaska, USA: Department of Natural Resources.
- DLD. (1992). Land Evaluation for Economic Crops Manual. Bangkok, Thailand: Department of Land Development.
- DNP. (2005). CONPES 3343 Lineamientos y estrategias de desarrollo sostenible para los sectores de agua, ambiente y desarrollo territorial (in Spanish) [Policy guidelines and sustainable development strategies for water, environment and territorial development]. (Conpes Document 3510). Bogotá: MAVDT, DNP, MHCP.
- DNP. (2007). Vision Colombia 2019: Creating an environmental management framework to promote sustainable development. Proposal for discussion [Original in Spanish: Vision Colombia 2019: Consolidar una gestion ambiental que promueva el desarrollo sostenible - Propuesta para discusion]. Bogota: Departamento Nacional de Planeacion.

- DNP Departamento Nacional de Planeación [National Economic Planning Bureau]. (2008). Lineamientos de política para promover la producción sostenible de Biocombustibles en Colombia (in Spanish) [Policy guidelines to Promote Sustainable Biofuels Production in Colombia]. (Conpes Document 3510). Bogotá.
- DNV. (2010). Biofuels 2020. A policy driven logistics and business challenge Retrieved from: http://www.dnv.com/binaries/biofuels%202020%20position%20paper_tcm4-434417.pdf Accessed at 19/12/13. Høvik, Norway.
- Doherty, S., & Rydberg, T. (2002). Ecosystem properties and principles of living systems as foundation for sustainable agriculture – Critical reviews of environmental assessment tools, key findings and questions from a course process. *Ekologist lantbruk*, 32.
- Dufey, A. (2006). Biofuels production, trade and sustainable development: emerging issues: Iied.
- EC. (2003a). CAP reform. [Original in Spanish: Reforma de la PAC] Retrieved from: <http://www.viaganadera.com/aseava/reformaPAC/articulos/29.pdf> accessed 18/06/10. Madrid, Spain.
- EC. (2003b). Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity. Retrieved from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:283:0051:0070:EN:PDF> accessed 12/05/11. Luxembourg.
- EC. (2003c). Directive 2003/17/EC of the European Parliament and of the Council of 3 March 2003 amending Directive 98/70/EC relating to the quality of petrol and diesel fuels Retrieved from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32003L0017:en:NOT> Accessed 15/03/10. Brussels.
- EC. (2003d). Directive 2003/30/ec of the European Parliament and of the Council of 8 may 2003 on the promotion of the use of biofuels or other renewable fuels for transport. Retrieved from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:123:0042:0042:EN:PDF> accessed 13/05/11. Brussels.
- EC. (2008). Directive of the European parliament and of the council on the promotion of the use of energy from renewable sources Brussels, Belgium: Official Journal of the European Union.
- EC. (2009). Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC. Strasbourg.: European Commission.

- Ecopetrol. (2009). Refining and Petrochemistry Annual Report 2009 Retrieved from <http://ecopetrol.com.co/english/especiales/Corporate%20Management%20and%20Finances%202009/finan-down.htm> (05/08/10). Bogota: Ecopetrol.
- Ecopetrol. (2011). Evaluation of a Life cycle assessment of the Ecopetrol's fossil fuels (Original in Spanish: Evaluacion del Analisis del Ciclo de Vida de los combustibles fosiles de Ecopetrol). Bogota: Ecopetrol.
- EIA. (2009a). Colombia Energy Data, Statistics and Analysis - Oil, Gas, Electricity, Coal: EIA (Energy Information Administration).
- EIA. (2009b). Petroleum statistics - Colombia. Retrieved from <http://www.eia.gov/countries/country-data.cfm?fips=CO>. Accessed (05/10/10).
- EIA. (2012). Annual Energy Review 2011 Retrieved from: <http://www.eia.gov/totalenergy/data/annual/pdf/aer.pdf> Accessed 10/12/13. . Washington DC: EIA.
- El Pais Newspaper. (2009). El valle producira bioetanol con yuca (The valley will produce cassava-based ethanol), El Pais.
- Ellis, R., & Merry, R. (2007). Chapter five: Sugarcane agriculture Sugarcane, Second Edition (pp. 101-142).
- Eneas, G. (2006). Cassava, A biofuel, Tha Bahama Journal.
- EPA. (1996). Bagasse combustion in sugar mills. Retrieved from <http://www.epa.gov/ttn/chief/ap42/ch01/bgdocs/b01s08.pdf> Accessed at: 15/06/11. In EPA (Ed.), Clearinghouse for Inventories & Emissions Factors: EPA.
- EPA. (2010). Renewable Fuel Standard (RFS) Retrieved from: <http://www.epa.gov/otaq/fuels/renewablefuels/index.htm> Accessed 10/01/2010.
- EPFL. (2008). Roundtable on Sustainable Biofuels Global: Principles and criteria for sustainable biofuels production. Version Zero. Lausanne, Switzerland: EPFL - Energy center.
- Etter, A. (1993). General ecological characterization and human action in the amazon jungle. [Original in Spanish: Caracterizacion ecologica general y de la intervencion humana en la amazona colombiana] Amazonia colombiana, diversidad y conflicto [Original in spanish: Colombian amazon, diversidad y conflicto]. Bogota: Colciencias.
- EU-Comission. (2010). Communication from the Commission on the practical implementation of the EU biofuels and bioliquids sustainability scheme and on counting rules for biofuels. Retrieved from <http://www.efoa.eu/en/document/2010-I6002-communication-from-the-commission-on-the-practical-implementation-of-the-eu-biofuels-and-bioliquids-sustainability-scheme-and-on-counting-rules-for-biofuels.aspx> Accessed at 23/10/11. Official Journal of the European Union.

- Evans, G. (2007). *Liquid Transport Biofuels - Technology Status Report*. York: The National Non-Food Crops Centre, NNFCC.
- Faaij, A. (2007). *Biomass and Biofuels. Background Report for the Energy Council of the Netherlands*. See also: <http://www.energieraad.nl/Include/ElectosFileStreaming.asp>.
- Faaij, A. P. C., & Domac, J. (2006). Emerging international bio-energy markets and opportunities for socio-economic development. *Energy for Sustainable Development*, 10(1), 7-19.
- Fadul, M. (N.D.). Report: *Alliances for peace: The case of Indupalma*. (Original in Spanish: Informe alianzas por la paz: el modelo Indupalma) Retrieved from: www.indupalma.com/sites/default/files/gallery/Informe_Alianzas_por_la_Paz_fadul-esp.pdf Indupalma (Ed.) Retrieved from http://www.indupalma.com/sites/default/files/gallery/Informe_Alianzas_por_la_Paz_fadul-esp.pdf
- Fahrig, L. (2003). Effects of habitats fragmentation on Biodiversity. *Annual Review of Ecology, evolution and systematics*. ProQuest Ecology Journals, 487.
- Faist Emmenegger, M., Reinhard, J., & Zah, R. (2009). *SQCB - Sustainability Quick Check for Biofuels: Background Report*. Retrieved from http://rsb.epfl.ch/files/content/sites/rsb2/files/Biofuels/Working%20Groups/GHG%20EG/SQCB_Background_report_en.pdf Accessed at 21/11/11. Dübendorf, Switzerland: EMPA.
- FAO. (1981). *A framework for land evaluation* (Retrieved 12/05/09) (Vol. 32). <http://www.fao.org/docrep/X5310E/x5310e00.htm>: FAO.
- FAO. (2008). *The State of Food and Agriculture. Biofuels: Prospects, risk and opportunities*. Rome, Italy: FAO.
- FAO and IIASA. (2007). *Mapping biophysical factors that influence agricultural production and rural vulnerability*. Rome: FAO.
- FAOSTAT. (2009). *Land availability and use*. Retrieved from: <http://faostat.fao.org/site/377/default.aspx#ancor> Accessed: 05/07/09.
- FAOSTAT. (2010). *FAO Online Database: Crops production by country* <http://faostat.fao.org>. Retrieved 12/01/2010, from FAO Statistic Division
- FAOSTAT. (2011). *Food and Agricultural commodities production (Sugarcane, Palm and other commodities)* Retrieved from: <http://faostat.fao.org/site/339/default.aspx> Accessed at 02/09/11.
- FAOSTAT. (2014). *Fertilizers and pesticides* Retrieved form <http://faostat.fao.org/site/575/default.aspx#ancor> Accessed 05/01/14.
- Fargione, J., Hill, J., Tilman, D., Polasky, S., & Hawthorne, P. (2008). Land clearing and the biofuel carbon debt. *Science*, 319(5867), 1235-1238.

- Fedebiocombustibles. (2010a). Biofuels today Bulletin of the Biofuel Colombian Federation [Original in Spanish: Biocombustibles hoy] Retrieved from <http://www.fedebiocombustibles.com/files/boletinI9.pdf> Accessed: 12/11/11. In Fedebiocombustibles (Ed.), (Vol. 19). Bogota, Colombia.
- FEDEBIOCOMBUSTIBLES. (2010b). Ongoing ethanol processing plants [Plantas productoras de Etanol en funcionamiento (in Spanish)]. Retrieved 30/06/10, 2010, from www.fedebiocombustibles.com
- Fedepalma. (2000). Vision and strategy of the palm business in Colombia. [Original in Spanish: Visión y estrategias de la palmicultura colombiana: 2000-2020.]. Bogota, Colombia.
- Fedepalma. (2004). Le apostamos al ALCA pero con reglas de juego claras (We bet on FTAA but with clear game rules). *Palmas*, 24(1), Editorial.
- Fedepalma. (2006a). Fedepalma sectoral CDM Umbrella Project For methane capture, fossil fuel displacement and cogeneration of renewable energy—Project design document form (CDM PDD). Retrieved from [www.dnv.com/focus/climate_change/Upload/FEDEPALMA%20CDM%20PDD%20V2_13_03%2007%20\(2\).pdf](http://www.dnv.com/focus/climate_change/Upload/FEDEPALMA%20CDM%20PDD%20V2_13_03%2007%20(2).pdf) Accessed at 12/04/10: CDM Executive Board.
- Fedepalma. (2006b). The Oil Palm Agroindustry in Colombia. Bogota: FEDEPALMA.
- Fedepalma. (2009). Statistical Annual report 2009 - The palm oil agri-business in Colombia and the world (Original in Spanish: - Anuario estadístico 2009 - la agroindustria de la palma de aceite en Colombia y el mundo). Bogota: Fedepalma.
- Fedepalma, & MAVDT. (2011). Environmental guide for the Palm agribusiness industry in Colombia [Original in Spanish: Guía ambiental de la agroindustria de la palma de aceite en Colombia] Retrieved from http://portal.fedepalma.org/document/2011/Guia_Ambiental.pdf Accessed 14/03/12.
- Fehér, A., & Lúdia, K. (2005). An Analisis of Indicator for Sustainable Land use based on Research in Agricultural Landscape. In W. Leal Filho (Ed.), *Handbook of Sustainability Research* (Vol. 20, pp. 49-67): Peter Lang. Europäischer Verlag der Wissenchaften.
- Fernández Acosta, A. D. (Producer). (2009, 12/05/12). Biofuels National Policy (Original in Spanish: Política Nacional de Biocombustibles). Retrieved from www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&ved=0CCwQFjAA&url=http%3A%2F%2Fwww.minagricultura.gov.co%2Farchivos%2Fbiocombustibles_asamblea_bid_30_de_marzo_2009.ppt&ei=GmnHUOnLHoms9ASF14H4DA&usq=AFQjCNF_jlz2Pm-zcO6TS45utp2tWhVccw Accessed: 12-05-12.
- Finkbeiner, M. (2014). Indirect land use change—Help beyond the hype? *Biomass and Bioenergy*, 62, 218-221.

- Fischer, G., Shah, M., van Velthuisen, H., & Nachtergaele, F. O. (2001). Global agro-ecological assessment for agriculture in the 21st century.
- Forero, O. (2009). Sugarcane bagasse: Green oil of this century. [Original in Spanish: El bagazo de caña de azúcar, petróleo verde del siglo] Retrieved from: <http://www.dinero.com/Imprimir/82610> Accessed 15/05/14, Dinero.
- FPP. (2007). Promised land: Palm oil and land acquisition in Indonesia: Implications for local communities and indigenous peoples: Forest Peoples Programme (FPP).
- Franklin, M., Zeka, A., & Schwartz, J. (2006). Association between PM_{2.5} and all-cause and specific-cause mortality in 27 US communities. *Journal of Exposure Science and Environmental Epidemiology*, 17(3), 279-287.
- Freitas Vian, C. E. (2005-2007). Sugarcane Pre-production. Features, Climate. (Original in portuguese: Cana-de-açúcar, Pré-produção, Características, Clima.) Retrieved from: http://www.agencia.cnptia.embrapa.br/gestor/cana-de-acucar/arvore/CONTAG01_11_711200516716.html accessed at 15/01/12. Brasilia DF, Brasil: Embrapa.
- Frischknecht, R., Jungbluth, N., H, A., Doka, G., Heck, T., Hellweg, S., Wernet, G. (2007). Overview and Methodology - Data v2.0 Retrieved from: www.ecoinvent.org/fileadmin/documents/en/01_OverviewAndMethodology.pdf Accessed at 12/04/10 ecoinvent report No. 1. Dübendorf, Switzerland: Swiss Centre for Life Cycle Inventories.
- Garcez, C. A. G., & Vianna, J. N. d. S. (2009). Brazilian Biodiesel Policy: Social and environmental considerations of sustainability. *Energy*, In Press, Corrected Proof.
- García, M. L. (2008). Fondos de Estabilización de Precios, desde las normas de la competencia [Original in Spanish: Prices Stabilization Funds, from competition regulation perspective] Retrieved from: <http://www.portafolio.co/archivo/documento/CMS-4103218> Accessed 04/04/12, Portafolio.
- Garrido, A. (2007). Biofuel production in Peru. [Original in Spanish: La producción de Biodiesel en el Perú] Retrieved from: www.olade.org/biocombustibles2008/Documents/ponencias/d%C3%ADa3/Sesion%2010%20-%20Dia%203/AngieGarrido.pdf Accessed: 12/03/11. Paper presented at the II Seminario Latinoamericano y del Caribe de Biocombustibles, Lima, Peru.
- GBEP. (2009). The Global Bioenergy Partnership Common Methodological Framework for GHG Lifecycle Analysis of Bioenergy. Retrieved from www.globalbioenergy.org/fileadmin/user_upload/gbep/docs/2009_events/7th_SC_NY/GBEP_GHG_report_2306.pdf Accessed at 29/05/12. Rome, Italy: FAO.

- Gerbens-Leenes, P., & Nonhebel, S. (2002). Consumption patterns and their effects on land required for food. *Ecological Economics*, 42(1), 185-199.
- Germer, J., & Sauerborn, J. (2008). Estimation of the impact of oil palm plantation establishment on greenhouse gas balance. *Environment, Development and Sustainability*, 10(6), 697-716. doi: 10.1007/s10668-006-9080-1
- Gibson, L. (2010). RFS2 reduces 2010 cellulosic ethanol requirement Retrieved from: <http://www.biomassmagazine.com/articles/3474/rfs2-reduces-2010-cellulosic-ethanol-requirement/>. Biomass Magazine.
- Gilbert, C. L. (2008). Value chain analysis and market power in commodity processing with application to the cocoa and coffee sectors. *Commodity market review*, 5-34.
- Godfray, H. C. J., Beddington, J. R., Crute, I. R., Haddad, L., Lawrence, D., Muir, J. F., . . . Toulmin, C. (2010). Food security: the challenge of feeding 9 billion people. *Science*, 327(5967), 812-818.
- Goedkoop, M., & Spriensma, R. (2007). The Eco-indicator 99: a damage oriented method for life cycle impact assessment. Methodology Report. Amersfoort, Netherlands, 2000.
- Goh, K. J. (2000). Proceedings of the Seminar on Managing Oil Palm for High Yields : Agronomic Principles. Paper presented at the Seminar on Managing Oil Palm for High Yields, Malaysia.
- Goldemberg, J. (2007). Ethanol for a Sustainable Energy Future. *Science*, 315(5813), 808-810. doi: 10.1126/science.1137013
- Goldemberg, J., Coelho, S. T., & Guardabassi, P. (2008). The sustainability of ethanol production from sugarcane. *Energy Policy*, 36(6), 2086-2097.
- Goldemberg, J., Coelho, S. T., Nastari, P. M., & Lucon, O. (2004). Ethanol learning curve—the Brazilian experience. *Biomass and Bioenergy*, 26(3), 301-304. doi: 10.1016/s0961-9534(03)00125-9
- Gómez, E. A., Ríos, L. A., & Peña, J. D. (2012). Wood, Potencial Lignocelulosic Material for the Production of Biofuels in Colombia [Original in Spanish: Madera, un Potencial Material Lignocelulósico para la Producción de Biocombustibles en Colombia] retrieved from: <http://www.scielo.cl/pdf/infotec/v23n6/art09.pdf> Accessed 23/05/14. *Información tecnológica*, 23(6), 73-86.
- Gomez, F. (2010). Current state and perspectives of biofuels in Dominican Republic [Original in Spanish: Estado actual y perspectivas de los biocombustibles en Republica Dominicana] Retrieved from: www.olade.org/biocombustibles/Documents/Ponencias%20Chile/Sesion%207_F%20Gomez_CNE_%20Rep%20Dominicana.pdf Accessed: 12/05/11. Santo Domingo.

- Gonsalves, J. B. (2006). An assessment of the biofuels industry in India: UN.
- González, A. F., Jiménez, I. C., Susa, M. R., Restrepo, S., & Gómez, J. M. (2008). Second generation biofuels and biodiesel: A brief review of the Universidad de los Andes contribution [Original in Spanish: Biocombustibles de segunda generación y Biodiesel: Una mirada a la contribución de la Universidad de los Andes]. Retrieved from: <https://revistaing.uniandes.edu.co/pdf/a8%2028.pdf> Accessed 25/04/2014. *Revista de Ingeniería Universidad de los Andes*(28), 70-82.
- González, M. (2006). Biofuel formulation program. [Original in Spanish: Programa de formulación de biocombustibles.] Retrieved from: <http://www.olade.org/eficiencia/Documents/PDF-22.pdf> Accessed 15/03/12. Quito: Ministerio de Energía y minas,.
- Gressel, J. (2008). Transgenics are imperative for biofuel crops. *Plant Science*, 174, 246–263.
- Guinée, J. (2001). Handbook on life cycle assessment—operational guide to the ISO standards. *The international journal of life cycle assessment*, 6(5), 255-255.
- Guinee, J. B., Heijungs, R., Huppes, G., Zamagni, A., Masoni, P., Buonamici, R., . . . Rydberg, T. (2010). Life Cycle Assessment: Past, Present, and Future†. *Environmental Science & Technology*, 45(1), 90-96.
- Gunkel, G., Kosmol, J., Sobral, M., Rohn, H., Montenegro, S., & Aureliano, J. (2007). Sugar cane industry as a source of water pollution—Case study on the situation in Ipojuca River, Pernambuco, Brazil. *Water, Air, & Soil Pollution*, 180(1), 261-269.
- Gurjar, B., Butler, T., Lawrence, M., & Lelieveld, J. (2008). Evaluation of emissions and air quality in megacities. *Atmospheric Environment*, 42(7), 1593-1606.
- Guzman, J. L. (2009). En Colombia no modificarán el precio del etanol. "Ethanol price won't be modified in Colombia" <http://www.biodiesel.com.ar/?p=I300>. Retrieved 17/07/2009, from <http://www.biodiesel.com.ar/?p=I300>
- Haas, M. J., McAloon, A. J., Yee, W. C., & Foglia, T. A. (2006). A process model to estimate biodiesel production costs. *Bioresource Technology*, 97(4), 671-678.
- Habitat, U. (2008). State of the world's cities 2008/2009: Harmonious cities. Earthscan, London. 264pp.
- Hamelinck, C. N., & Faaij, A. P. C. (2006). Outlook for advanced biofuels. *Energy Policy*, 34(17), 3268-3283.
- Hampannavar, U., & Shivayogimath, C. (2010). Anaerobic treatment of sugar industry wastewater by Upflow anaerobic sludge blanket reactor at ambient temperature. *International Journal of Environmental Sciences*, 1(4), 631-639.
- Hartley, C. W. S. (1988). Oil palm (*Elaeis guineensis* Jacq.) (Third edition ed.). New York: Wiley.

- Hauschild, M., Jeswiet, J., & Alting, L. (2005). From Life Cycle Assessment to Sustainable Production: Status and Perspectives. *CIRP Annals - Manufacturing Technology*, 54(2), 1-21. doi: [http://dx.doi.org/10.1016/S0007-8506\(07\)60017-1](http://dx.doi.org/10.1016/S0007-8506(07)60017-1)
- Hebebrand, C., & Laney, K. (2007). An Examination of US and EU Government Support to Biofuels: Early Lessons. International Food & Agriculture Trade Policy Council.
- Heriansyah. (2008). Optimizing the use of oil palm by-product (EFB) as fertilizer Supplement for oil palm. PT. BW Plantation tbk. Jakarta, Indonesia.
- Hernandez, E. (2008). Comparative study of Biofuel legislation in Latin America. [Original in Spanish: Estudio Comparativo de La Legislación Latinoamericana sobre Biocombustibles] Retrieved from: http://www.snvla.org/mm/file/Estudio_Comparativo.pdf Accessed: 15/03/11. Tegucigalpa: SNV.
- Hill, J. (2007). Environmental costs and benefits of transportation biofuel production from food-and lignocellulose-based energy crops. A review. *Agronomy for Sustainable Development*, 27(1), 1-12.
- Hischier, R., Weidema, B., Althaus, H., Bauer, C., Doka, G., Dones, R., . . . Nemecek, T. (2010). Implementation of Life Cycle Impact Assessment Methods Retrieved from http://www.ecoinvent.org/fileadmin/documents/en/03_LCIA-Implementation-v2.2.pdf Accessed at 12/04/12 Ecoinvent report No. 3.
- Hoffmann, M. (2006). Advances of Panama in the use of Biofuels. [Original in Spanish: Avances de Panamá en el uso de biocombustibles] Retrieved from: <http://www.olade.org/eficiencia/Documents/PDF-22-7%20Panama.pdf> Accessed: 02/06/11. Panamá: Ministerio de Comercio e Industrias.
- Honty, G., & Gudynas, E. (2007). Agrocombustibles y Desarrollo Sostenible en América Latina y el Caribe (Agrofuels and sustainable Development in Latin America and Caribbean) (pp. 34). Montevideo: Observatorio de Desarrollo.
- Hopkins, S. (2008). Colombian FTA misses Biofuels., from <http://www.greenchipsestocks.com/articles/colombia-biofuels-investing/227>
- House of Representatives. (2002). Public Law 107-171. Farm Security And Rural Investment Act Of 2002 Retrieved from <http://www.gpo.gov/fdsys/pkg/PLAW-107publ171/pdf/PLAW-107publ171.pdf> Accessed 04/11/11.
- Huertas Greco, K., & Sánchez Medina, I. A. (2012). Obtención y caracterización de biodiesel a partir de aceite de semillas de *Ricinus communis*. (Higuerilla) modificadas genéticamente y cultivadas en el Eje Cafetero [Original in Spanish: Production and Characterization of biodiesel from oil from *Ricinus Communis* (repeaseed) seeds, genetically modified and grown within the Coffee region] Retrieved from:

<http://repositorio.utp.edu.co/dspace/bitstream/11059/3048/1/6626S211.pdf>
Accessed at: 23/05/14. UNIVERSIDAD TECNOLÓGICA DE PEREIRA, Pereira.

- Hurtado, M., & Hernández-Salazar, G. A. (2010). Local Profile and Palm Tree Agro-Industry: Exploring the case of San Alberto and San Martín (Cesar). *Cuad. Desarro. Rural*, 125-145.
- IDB, MME, MADR, MAVDT, & DNP. (2012). Strategies for Sustainable energy and biofuels in Colombia. [Original in Spanish: Estrategias de energía sostenible y biocombustibles para Colombia]. Medellín, Colombia.
- IDEAM. (2001a). Colombia: First communication before United Nations Framework Convention on Climate Change. [Original in Spanish: Colombia: Primera Comunicación Nacional ante la Convención Marco de las Naciones Unidas sobre el Cambio Climático] Retrieved from <http://unfccc.int/resource/docs/natc/colnc1.pdf> accessed 12/05/10. Bogotá, Colombia: IDEAM.
- IDEAM. (2001b). The natural environment in Colombia [Original in Spanish: El medio ambiente en Colombia]. Bogotá, Colombia: IDEAM.
- IDEAM. (2004). Annual report on the environment and renewable resources in Colombia. [Original in Spanish: Informe anual sobre el estado del medio ambiente y los recursos naturales renovables en Colombia.]: IDEAM.ç
- IDEAM (Cartographer). (2005a). Climate Atlas of Colombia . (Original in spanish: Atlas climatológico de Colombia).
- IDEAM. (2005b). Solar Radiation Atlas of Colombia. Atlas de Radiación Solar de Colombia.
- IDEAM (Cartographer). (2006). Wind and wind power Atlas of Colombia. (Original in spanish: Atlas de Vientos y Energía Eólica de Colombia).
- IDEAM. (2007). Forest Ecosystem in zone of forest reserves, based on database of IGAC. (Original in Spanish: Ecosistemas de bosque en las Zonas reserva Forestal de Ley 2 de 1959 con base de datos de IGAC) Bogotá: Ideam.
- IDEAM. (2009a). Final document of the ecologic component within the framework of construction of the suitability map of recommended areas for Palm oil cultivation. (Original in Spanish: Documento final del Componente ecologico en el marco de la construcción del mapa de aptitud de áreas aptas para cultivo de palma de aceite en Colombia.) Bogotá: Ideam.
- IDEAM. (2009b). Introduction of environmental criteria in the identification and characterization of suitable zones for palm oil cultivation. (Original in spanish: Incorporación de criterios ambientales en la identificación y caracterización de zonas aptas para el cultivo de palma de aceite programa de apoyo al SINA II). Bogotá: Ideam.

- IDEAM. (2009c). Socioeconomic and cultural component within the framework of the construction of a suitability map of the areas for palm oil cultivation. (Original in Spanish: Componente Socioeconómico y Cultural en el marco de la construcción del mapa de aptitud de áreas para el cultivo de palma de aceite en Colombia). Bogotá: Ideam.
- IDEAM. (2010). Water National Study (Original in Spanish: Estudio Nacional de l Agua) www.siac.gov.co/documentos/DOC_Portal/DOC_Agua/3_Estado/20120928_Estado_agua_ENA2010PrCap1y2.pdf Retrieved 12/03/11 Ideam (Ed.)
- IDEAM, & MAVDT. (2007). Annual report on the environment and renewable resources in Colombia: air quality. [Original in Spanish: Informe anual sobre el estado del medio ambiente y los recursos naturales renovables en Colombia: Calidad del aire.]. Bogotá: IDEAM
- IDEAM, & MAVDT. (2011). Analysis of the impact of "La Niña" 2010-2011 within the hydroclimatology of Colombia. [Original in Spanish: Análisis del Impacto del Fenómeno "La Niña" 2010-2011 en la Hidroclimatología del País] Retrieved from: <file:///C:/Users/Carlos/Downloads/Analisis%20impacto%20La%20Ni%C3%BIa.pdf> Accessed at 24/08/2014. Bogotá, Colombia.
- IEA. (2010). World Energy Outlook (pp. 736pp). Paris, France: OECD/IEA.
- IEA. (2011). Oil in Colombia in 2009 (Retrieved from: http://iea.org/stats/oildata.asp?COUNTRY_CODE=CO. accessed 21/11/12).
- IGAC. (2003). General study of soils 1:500.000 (Original in Spanish: Estudio General de suelos 1:500.000). Bogotá: IGAC.
- IGAC (Cartographer). (2005). Road Infrastructure Map (Original in Spanish: Vías terrestres).
- IGAC (Cartographer). (2010). Indigenous reserves and collective titles for black communities. (Original in Spanish: Resguardos indígenas y títulos colectivos de comunidades negras).
- IGAC and CORPOICA. (2002). Cover and current use of land in Colombia (Original in Spanish: Cobertura y uso actual de las tierras de Colombia).
- Infante, A. (2008). National biofuels program. An answer to the energy challenge. [Original in Spanish: El Programa Nacional De Biocombustibles. Una Respuesta al desafío Energético] retrieved from <http://www.colombiaprende.edu.co/html/directivos/1598/article-157195.html> Accessed at 6/05/14. Paper presented at the Seminario Internacional Sobre Políticas De Ciencia, Tecnología E Innovación, Bogotá.
- Infante, A., & Tobón, S. (2010). BIOENERGÍA PARA EL DESARROLLO SOSTENIBLE: Políticas Públicas sobre Biocombustibles y su relación con la seguridad alimentaria en Colombia [Original in Spanish: Bioenergy for Sustainable Development: Public policies on biofuels and their impact on food security in Colombia]: FAO.

- IPCC. (2006). Guidelines for National Greenhouse Gas Inventories - Volume 4 Agriculture, Forestry and Other Land Use. Retrieved from: <http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html>. 21/04/11 IPCC.
- ISO. (2006). ISO 14040:2006 Environmental management –Life cycle assessment– Principles and framework. Geneva, Switzerland.
- ISRIC-WSI. (2005). Development of a soil and terrain database for Latin America and the Caribbean (SOTERLAC) Retrieved from <http://www.isric.org/projects/soter-latin-america-and-caribbean-soterlac> Accessed at 15/05/10.
- James, G. L. (2007). An Introduction to Sugarcane Sugarcane (pp. 1-19): Blackwell Publishing Ltd.
- Jatzke, H. (1994). Possibilities and limits of tax concessions for bio-fuels. *Zeitschrift für Zölle und Verbrauchsteuern*, 70(4), 104-108.
- Johnson, F. X. (2011). Regional-global Linkages in the Energy-Climate-Development Policy Nexus: The Case of Biofuels in the EU Renewable Energy Directive. *Renewable Energy L. & Pol'y Rev.*, 91.
- Johnson, F. X., & Roman, M. (2008). Biofuels sustainability criteria: relevant issues to the proposed Directive on the promotion of the use of energy from renewable sources (COM (2008) 30 final).
- Johnson, F. X., & Rosillo-Calle, F. (2007). Biomass, livelihoods and international trade. Stockholm Environment Institute Climate and Energy Report, 1.
- Jonker, J., & Faaij, A. (2013). Techno-economic assessment of micro-algae as feedstock for renewable bio-energy production. *Applied Energy*, 102, 461-475.
- Jungbluth, N., Chudacoff, M., Dauriat, A., Dinkel, F., Doka, G., Faist Emmenegger, M., Sutter, J. (2007). Life Cycle Inventories of Bioenergy. Final report. Uster, Switzerland: Swiss Centre for Life Cycle Inventories.
- Kaplinsky, R., & Morris, M. (2001). A handbook for value chain research (Vol. 113): IDRC.
- Keerthipala, A., & Thomson, K. (1999). A cane payment formula for sugarcane small-holders in Sri Lanka. *Sugar Tech*, 1(1), 1-9.
- Khan, S. R., Khan, S. A., & Yusuf, M. (2007). Biofuels trade and sustainable development: The case of Pakistan. The Sustainable Development Policy Institute (SDPI), Working document.
- Khatiwada, D., Pacini, H., & Lönnqvist, T. (2010). Tailor-made solutions: Small-scale biofuels and trade. *Bridges Trade BioRes Review*, 4(4), 10-11.
- Khatiwada, D., Seabra, J., Silveira, S., & Walter, A. (2012). Accounting greenhouse gas emissions in the lifecycle of Brazilian sugarcane bioethanol: Methodological references in European and American regulations. *Energy Policy*, 47, 384-397.

- Kuppatawuttinan, P. (1998). A model of Land Suitability Evaluation for Economic Crops in Song Kram Watershed: An Application using Satellite Data and Geographic Information System. Master of Science Thesis in Soil Science, Graduate School, Khon Kaen University.[ISBN 974-676-039-4].
- La Rotta, S. (2009, 22 julio 2009). La bacteria verde (The green bacteria), *El espectador*.
- Lamers, P., Hamelinck, C., Junginger, M., & Faaij, A. (2011). International bioenergy trade—A review of past developments in the liquid biofuel market. *Renewable and Sustainable Energy Reviews*, 15(6), 2655-2676.
- Lamers, P., Junginger, M., Hamelinck, C., & Faaij, A. (2012). Developments in international solid biofuel trade—An analysis of volumes, policies, and market factors. *Renewable and Sustainable Energy Reviews*, 16(5), 3176-3199.
- Larsen, B. (2004). Cost of Environmental Damage: A Socio- Economic and Environmental Health Risk Assessment (Prepared for MAVDT). Bogota, Colombia: MAVDT.
- León, T., Valbuena, S., & Borrero, M. (2006). Palm oil, biodiversity and policy trends: the Colombian Orinoco case. [Original in Spanish: Palma de aceite, biodiversidad y tendencias de política: el caso de la Orinoquia colombiana]. In W. W. Fund (Ed.). Bogotá: Instituto de Investigaciones de Recursos Biológicos Alexander Von Humboldt.
- Londoño, L. (2012). General facts of the Colombian Sugar Business Industry 2011-2012. [Original in Spanish: Aspectos Generales del Sector Azucarero Colombiano 2011-2012] Retrieved from: <http://www.asocana.org/documentos/3152012-3e90e415-00ff00,000a000,878787,c3c3c3,0f0f0f,b4b4b4,ff00ff,2d2d2d,b9b9b9.pdf>. Accessed 15/09/12. Cali, Colombia.
- López, N. A. (2000). La palma de aceite: un caso exitoso de desarrollo empresarial en Colombia (In Spanish) [Palm oil: a successful case of entrepreneurship in Colombia] Retrieved from: http://portal.fedepalma.org/responsabilidad_social/palma_aceite_caso_exitoso.pdf Accessed at 17/10/11. Palmas, 21(2), 132-141.
- Lorenzo de Juárez, A. (2011). Current situation of Biofuels in Guatemala. [Original in Spanish: Situación Actual de los Biocombustibles en Guatemala] Retrieved from: www.corpoica.org.co/sitioweb/Documento/JatrophaContrataciones/GUATEMALA.pdf accessed 15/03/12. Guatemala.
- Lovera, L. (2010). Biofuel in Paraguay: Current State and perspectives. [Original in Spanish: Biocombustibles en el Paraguay Situación actual y perspectivas] Retrieved from: www.olade.org/biocombustibles/Documents/Ponencias%20Chile/Sesion%207_L%20Lovera_VMME_Paraguay.pdf Paper presented at the V Seminario Latinoamericano y del Caribe de Biocombustibles, Santiago, Chile.
- Lozano, N. (2003). Air pollution in Bogotá (Colombia): A concentration Response approach. Master Thesis., University of Maryland, Maryland.

- Lozano, N. (2004). Air Pollution in Bogotá, Colombia: A Concentration-Response Approach. *Desarrollo y Sociedad. (Development and Society) Universidad de los Andes CEDE*, 133-177.
- Lu, J., Sheahan, C., & Fu, P. (2011). Metabolic engineering of algae for fourth generation biofuels production. *Energy & Environmental Science*, 4(7), 2451-2466. doi: 10.1039/C0EE00593B
- Lubis, A., & Adiwiganda, R. (1996). Agronomic management practices of oil palm plantation in Indonesia based on land conditions. Paper presented at the Seminar on Agronomic Update in Oil Palm Management, Pekanbaru, Indonesia.
- Lytse, S. (2011). Out with the old, in with the new; bidding farewell to the corn ethanol tax credit.
- Macedo, I. C. (2010). Sustainable Biofuels: recent studies on land use and climate change. Sugarcane expansion and sustainability: land use, GHG emissions and technology. Tokyo, Nov 19 2010: NIPE/UNICAMP.
- Macedo, I. C., Seabra, J. E. A., & Silva, J. E. A. R. (2008). Green house gases emissions in the production and use of ethanol from sugarcane in Brazil: The 2005/2006 averages and a prediction for 2020. *Biomass and Bioenergy*, 32(7), 582-595.
- MADR. (2005). Vegetable oil chain in Colombia. Overview of its structure and dynamics 1991-2005. [Original in Spanish: La cadena de las oleaginosas en Colombia. Una mirada global de su estructura y dinámica 1991-2005] Retrieved from: www.agronet.gov.co/www/docs_agronet/2005112162648_caracterizacion_oleaginosas.pdf Accessed 20/02/10. Bogota: Ministerio de Agricultura y Desarrollo Rural,.
- MAG-MINAE. (2008). Biofuels National Program. [Original in Spanish: Programa Nacional de Biocombustibles.] Retrieved from www.dse.go.cr/es/03Publicaciones/01PoliticaEnerg/Programa%20Nacional%20de%20Biocombustibles.pdf Accessed: 09/03/11. San José de Costa Rica.
- Mannan, R. (2009). Intellectual property landscape and patenting opportunity in biofuels. *Journal of Commercial Biotechnology*, 16(1), 33-46.
- Manson, A. (2003). Colombia's Democratic Security Agenda: Public Order in the Security Tripod. *Security Dialogue*, 34, 391-409.
- MANUELITA WEBSITE. (2010). www.manuelita.com. Retrieved 18/01/2010, 2010
- Martines-Filho, J., Burnquist, H. L., & Vian, C. E. F. (2006). Bioenergy and the rise of sugarcane-based ethanol in Brazil. *Choices*, 21(2), 91-96.

- Martinez, H. (2009). Biofuels program in Colombia (public speech). [Original in Spanish: El programa de Biocombustibles en Colombia] Retrieved from: www.olade.org/biocombustibles2009/Documents/ponencias/ponencias%20pdf/2009-04-28-Discurso%20Ministro%20Colombia.pdf. Paper presented at the IV Seminario Latinoamericano Del Caribe De Biocombustibles, Cali.
- Martinez, H., Espinal, G., & Ortiz, L. (2005). The agribusiness Chain of Panela in Colombia, an overview on its structure and dynamics. [Original in Spanish: La cadena agroindustrial de la panela en Colombia, una mirada global de su estructura y dinámica, 1991 – 2005]. Retrieved from: <http://ebookbrowse.com/2005112163343-caracterizacion-panela-pdf-d55602836> Accessed 16/10/10 (Vol. 57). Bogota, Colombia: Ministerio de Ambiente y Desarrollo Rural.
- Masera, O., Rodríguez, N., Lazcano, I., & Horta, L. (2006). Potential and feasibility of Ethanol and Biodiesel use for transportation in Mexico. [Original in Spanish: Potenciales y Viabilidad del Uso de Bioetanol y Biodiesel para el Transporte en México] Retrieved from: http://www.sener.gob.mx/res/169/Biocombustibles_en_Mexico_Resumen_Ejecutivo.pdf Accessed: 15/03/12. Mexico D.F.: GTZ.
- Mathews, J. (2007a). Biofuels: What a Biopact between North and South could achieve. *Energy Policy*, 35, 3550-3570.
- Mathews, J. (2007b). Biofuels: What a Biopact between North and South could achieve. *Energy Policy*, 35(7), 3550-3570.
- Mathews, J. (2007c). Biofuels: What a Biopact between North and South could achieve. *Energy Policy*, 35, 3550-3570.
- Mathews, J. (2008a). Carbon-Negative Biofuels. *Energy Policy*, 36, 940-945.
- Mathews, J. (2008b). How carbon credits could drive the emergence of renewable energies. *Energy Policy*.
- Mathews, J. (2009). From the petroeconomy to bioeconomy: integrating bioenergy production with agricultural demands. *Biofuels, bioprod. bioref*, 3, 613-632.
- Mathews, J., & Goldsztein, H. (2008). Capturing latecomer advantages in the adoption of Biofuels: The case of Argentina. *Energy Policy*. doi: 10.1016/j.jpenpol.2008.07.022
- Mathews, J., & Tan, H. (2009a). Biofuels and indirect land change effects: the debate continues. Society of Chemical Industry John Wiley & Sons Ltd. *Biofuels, Bioprod, Bioref*. doi: 10.1002/bbb.147
- Mathews, J., & Tan, H. (2009b). Biofuels and indirect land use change effects: the debate continues. *Biofuels, Bioproducts and Biorefining*, 3(3), 305-317.
- Mathews, J. A. (2008). Biofuels, climate change and industrial development: can the tropical South build 2000 refineries in the next decade? *Biofuels, Bioproducts and Biorefining*, 2, 103-125. doi: 10.1002/bbb.63

- McBratney, A., Whelan, B., Ancev, T., & Bouma, J. (2005). Future directions of precision agriculture. *Precision Agriculture*, 6(1), 7-23.
- ME-BID. (2008). Pre-feasibility studies of Ethanol production by use of sugar cane. [Original in Spanish: Estudios de pre-factibilidad de la producción de etanol utilizando caña de azúcar.] Retrieved from : <http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=35237968>. accessed 04/09/12. San Salvador.
- Mejía, D., & Posada, C. E. (2008). Cocaine Production and Trafficking: What Do We Know? World Bank Policy Research Working Paper 4618.
- MEN. (2008). Support to research in Biofuels [Original in Spanish: Apoyo a la investigación en biocombustibles] Retrieved from: <http://www.mineducacion.gov.co/cvn/1665/articulo-152017.html> Accessed at: 05/01/14. Boletín digital.
- Meneses, K., & Valenciano, J. (2007). Fuel alternative sources in Costa Rica: General overview of the molasses-based ethanol and palm oil-based biofuels chains. [Original in Spanish: Fuentes alternativas de combustibles en Costa Rica: Una visión general de las cadenas de etanol a base de melaza, y de biodiésel a base de aceite de palma.] Retrieved from: http://biblioteca.icap.ac.cr/rcap/52_53/karla_meneses.pdf. Accessed 13/07/12. *Revista Centroamericana de Administración Pública*, 52-53, 97-140.
- Mesa-Dishington, J. (2007). Palm oil biodiesel, a fact in Colombia [Original in Spanish: Biodiésel de Palma, una Realidad en Colombia] Retrieved from: http://portal.fedepalma.org//documen/2007/Presentacion_Fedepalma.pdf. Paper presented at the Biofuels Americas Conference & Expo III, Cartagena, Colombia.
- Mesa Dishington, J. (2010). Reality and perspectives of the palm oil agroindustry. [Original in Spanish: Realidad y perspectivas de la agroindustria de la palma de aceite.] Retrieved from: http://www.indepaz.org.co/blogs/palma/wp-content/uploads/2012/09/municipios_palmeros.pdf. Accessed at 04/05/14. Paper presented at the PRIMER ENCUENTRO DE MUNICIPIOS PALMEROS, Bogota.
- Metzger, M., Rounsevell, M., Acosta-Michlik, L., Leemans, R., & Schröter, D. (2006). The vulnerability of ecosystem services to land use change. *Agriculture, ecosystems & environment*, 114(1), 69-85.
- MIDAS. (2010). De Las Alianzas Productivas a los Negocios Inclusivos: Guía de Mejores Prácticas para la implementación de Negocios Inclusivos en palma de aceite [Original in Spanish: From productive alliances to inclusive business: Guide for Better practices for Inclusive Business implementation in the palm oil sector] Retrieved from: http://www.mapeo-rse.info/sites/default/files/De_las_alianzas_productivas_a_los.pdf Accessed at 05/07/10 Fedepalma (Ed.)
- Mielke, I. (2008). Oil World Annual 2008. Hamburg: ISTA Mielke GmbH.

- Miller, A. S., Mintzer, I. M., & Hoagland, S. H. (1986). *Growing power: Bioenergy for Development and Industry*: World Resources Institute.
- Ministerio de Agricultura. (2007). *Oportunidades para la Equidad Rural: Alianzas productivas*. [Original in Spanish: Opportunities to reach rural equity: Productive Alliances] Retrieved from: http://www.minagricultura.gov.co/02componentes/08rur_04alianzas.aspx Accessed at 05/07/10.
- Ministerio de Agricultura. (2011). *Proyecto Apoyo alianzas productivas: Firma protocolaria de Alianzas Productivas en zonas emblemáticas del país* [Original in Spanish: Support to Productive Alliances: Protocolary signature of Productive Alliances in emblematic regions across the nation] Retrieved from: http://www.minagricultura.gov.co/archivos/presentacion_alianzas_productivas.pdf Accessed at 05/02/12. Bogota.
- Ministerio de Energía de Chile. (2012). *Biofuel National Directory* [Original in Spanish: Directorio Nacional de Biocombustibles] Retrieved from: <http://biocombustible.minenergia.cl/dhtml/cne/paginas/index.php>. Retrieved 12/01/13, 2013
- Ministerio de Energía y Minas. (2007). *Current situation and perspectives of biofuels industry in Peru*. [Original in Spanish: Situación Actual y Perspectivas de los Biocombustibles en el Perú] Retrieved from: http://www.comunidadandina.org/desarrollo/biocombustibles_peru.pdf Accessed: 02/11/11.
- Ministerio de Minas. (2005). *Regulation on the law of promotion of biofuels market*. [Original in Spanish: Reglamento de la ley de promoción del mercado de biocombustibles] Retrieved from: www.minem.gob.pe/minem/archivos/file/Hidrocarburos/normas_legales/ds013-2005.pdf Accessed: 02/03/10. Lima. Peru.
- Resolution I81232 of 2008 [Original in Spanish: RESOLUCION I81232 DE 2008] Retrieved from: faolex.fao.org/docs/texts/col83372.doc Accessed at 15/12/13 (2008).
- Ministry of Housing, & environment, S. p. a. t. (2000). *Eco-indicator 99 - Manual for designers. A damage oriented method for Life Cycle Impact Assessment*. Retrieved from http://www.pre-sustainability.com/download/manuals/EI99_Manual.pdf accessed at 14/03/11. The Netherlands.
- Mirón, d. (2010). *Ethanol biofuel in Guatemala*. [Original in Spanish: El biocombustible etanol en Guatemala] Retrieved from: www.oas.org/dsd/Energy/Documents/SimposioG/1%20Panel%201%20Etanol.pdf Accessed 15/03/12.

- Mondragón, H. (2007). The sugarcane industry in Colombia. Retrieved from <http://base.dph-h.info/en/fiches/dph/fiche-dph-7797.html> Accessed at 09/07/10.
- Monsalve Gil, J. F., Medina de Pérez, V. I., & Ruiz Colorado, Á. A. (2006). Ethano production of Banana shell and cassava starch. [Original in spanish: Producción de etanol a partir de la cáscara de banano y de almidón de yuca] Retrieved from: <http://www.bdigital.unal.edu.co/10960/1/johnfredymonsalvegil.2006.pdf> accessed 23/05%14. *Dyna*, 73(150), 21-27.
- Moor, G., & Wynne, A. (2001). Economic maximisation of grower and miller sugar cane profits: optimising the length of milling season at South African sugar factories. Paper presented at the International Society of Sugar Cane Technologists. Proceedings of the XXIV Congress, Brisbane, Australia, 17-21 September 2001. Volume I.
- Morton, O. (2008). *Eating the sun. How plants power the planet*: Harper.
- Mosquera Montoya, M., Bernal Hernández, P., & Silva Carreño, Á. (2009). Agenda Prospectiva de Investigación y desarrollo Tecnológico de la Oleína Roja [Original in Spanish: "Research and Technological Foresight Agenda for red palm oil"] Retrieved from: http://www.agronet.gov.co/www/docs_agronet/2009424103533_OLEINA.pdf accessed at 20/06/2011. Bogotá, D.C.: MADR, Universidad Nacional de Colombia, Cenipalma, Fedepalma.
- Mutert, E. (1999). Suitability of Soils for Oil Palm in Southeast Asia. *Better Crops International*, 13(1), 30-38.
- Netafim. (2011a). Crop Growth Phases http://www.sugarcane crops.com/crop_growth_phases/.
- Netafim. (2011b). Favourable climate conditions for sugarcane production (Original in portuguese: Clima favorável à produção de cana-de-açúcar) Retrieved from <http://www.sugarcane crops.com/p/climate/> Accesseed 12/04/12. Retrieved 05/06/10, 2011
- Neumann, K., Verburg, P. H., Stehfest, E., & Müller, C. (2010). The yield gap of global grain production: A spatial analysis. *Agricultural Systems*, 103(5), 316-326.
- Nicolella, A. C., & Belluzzo, W. (2011). Impact of reducing the pre harvest burning of sugarcane area on respiratory health in Brazil. Paper presented at the Anais do XXXVIII Encontro Nacional de Economia [Proceedings of the 38th Brazilian Economics Meeting].
- Norman, R., Cairncross, E., Witi, J., Bradshaw, D., & Collaboration, S. A. C. R. A. (2007). Estimating the burden of disease attributable to urban outdoor air pollution in South Africa in 2000. *South African Medical Journal*, 97(8), 782-790.
- Northoff, E. (2005). Cattle ranching is encroaching on forests in Latin America. Retrieved from: <http://www.fao.org/newsroom/en/news/2005/102924/index.html> Accessed at: 19/12/13. FAONewsroom.

- O'Brien, P.J. (1997). Global Processes and the Politics of Sustainable Development in Colombia and Costa Rica. In R. Auty & K. Brown (Eds.), *Approaches to Sustainable Development*: Pinter.
- Ogunkunle, A. O. (1993). Soil in land suitability evaluation: an example with oil palm in Nigeria. *Soil Use and Management*, 9(1), 35-39. doi: 10.1111/j.1475-2743.1993.tb00925.x
- Ojima, D., Galvin, K., & Turner, B. (1994). The global impact of land-use change. *BioScience*, 300-304.
- Omer, A. M. (2008). Energy, environment and sustainable development. *Renewable and Sustainable Energy Reviews*, 12(9), 2265-2300.
- Ortega, G., Cárdenas, C., Recalde, P., & Cazco, P. (2007). Biofuels. [Original in Spanish: Biocombustibles] Retrieved from: www.comunidadandina.org/desarrollo/biocombustibles_ecuador.pdf Accessed 12/03/11. Quito.
- Ospina, M. (Producer). (2008). Fluvial transport in colombia (Original in Spanish: La navegacion fluvial en Colombia) Retrieved from: www.google.com/url?sa=t&rcct=j&q=&esrc=s&source=web&cd=9&ved=0CFMQFjAI&url=http%3A%2F%2Fwww.oas.org%2Fcip%2Fdocs%2Fareas_tecnicas%2FII_des_puert_fluv_y_lacustres%2F10_la_nav_fluv_colombia.ppt&ei=0QLBUImyFoHO9QTctYGoAQ&usg=AFQjCNFmLJD0tvovQNXWPP9NIvMxI7Hflg&cad=rja Accessed 02/06/2011.
- Oxford Analytica. (2007, 02/02/2007). Bush Outlines '20 In 10' Energy Plan. *Forbes.com*.
- Paiboonsak, S., Chanket, U., Yommaraka, B., & Mongkolsawat, C. (2004). Land Suitability Evaluation For Sugarcane: GIS Application Centre of Geo-informatics, Northeast Thailand. Khon Kaen Province.
- Parques Nacionales Naturales de Colombia. (2011). What is the national system of protected areas? (Original in Spanish: ¿Qué es el Sistema Nacional de Áreas Protegidas?) Retrieved from: www.parquesnacionales.gov.co/PNN/portel/libreria/php/decide.php?patron=01.11 Accessed at 24/09/11. Bogota: MinAmbiente.
- Patiño, C. (2010). Microalgae, another option to produce biofuels [Original in Spanish: Microalgas, otra opción para producir biocombustible] Retrieved from www.unperiodico.unal.edu.co/dper/articulo/microalgas-otra-opcion-para-producir-biocombustible.html Accessed: 23/02/11, UN Periodico.
- Perez, M. (2007). International trade and environment in Colombia: review from Ecology economics [Original in Spanish: Comercio internacional y medio ambiente en Colombia: mirada desde la economía ecológica]. Cali, Colombia: Universidad del Valle.

- Perez, M., Rojas, J., & Ordoñez, C. (2010). Sustainable development, principles, applications and policy guidelines for Colombia. [Original in Spanish: Desarrollo Sostenible, principios, aplicaciones y lineamientos de política para Colombia]. Cali, Colombia.: Universidad del Valle.
- Pérez, M., Rojas, J., & Ordoñez, C. (2010). Sustainable development: Principles, applications and policy guidelines for Colombia [In Spanish: Desarrollo sostenible: principios, aplicaciones y lineamientos de política para Colombia] (1st ed.). Cali, Colombia: Universidad del Valle.
- Pfister, S., Koehler, A., & Hellweg, S. (2009). Assessing the environmental impacts of freshwater consumption in LCA. *Environmental Science & Technology*, 43(11), 4098-4104.
- Pimentel, D. (2003). Ethanol Fuels: Energy Balance, Economics, and Environmental Impacts Are Negative. *Natural Resources Research*, 12(2), 127-134. doi: 10.1023/a:1024214812527
- Pinzon, L. (2009). Colombian Sugar Market Outlook. Retrieved from www.thebioenergysite.com/articles/contents/colombia.pdf Accessed at 23/10/11 GAIN Report Number: CO9012: USDA.
- Piñeros, Y., Rincón, L., Bourdon, A., & Velásquez, M. (2009). Assessing ethanol production from palm wastes pretreated with NaOCl, using hydrolysis and fermentation simultaneously. [Original in Spanish: Evaluación de la producción de etanol a partir de residuos de palma pretratados con NaOCl, mediante hidrólisis y fermentación simultáneas] Retrieved from: www.smbb.com.mx/congresos%20smbb/acapulco09/TRABAJOS/AREA_IX/CIX-14.pdf Accessed: 25/04/2014. Paper presented at the XIII Congreso Nacional de Biotecnología y Bioingeniería. VII Simposio Internacional de Producción de Alcoholes y Levaduras.
- Prada Owen, T. (2004). Welfare Analysis of the implementation of the Sugar Price Stabilization Fund in Colombia. [Original in Spanish: Análisis del efecto en el bienestar de la incorporación del fondo de estabilización de precios del azúcar en Colombia.] Retrieved from: <http://fen.uahurtado.cl/wp-content/uploads/2010/07/invI58.pdf> Accessed : 16/12/13. Santiago, Chile.
- Prada, T. (2004). Analysis in the welfare effect through the incorporation of the Sugar Price Stabilization Fund in Colombia [Original in Spanish: Análisis del efecto en el bienestar de la incorporación del fondo de estabilización de precios del azúcar en Colombia] Retrieved from: <http://fen.uahurtado.cl/wp-content/uploads/2010/07/invI58.pdf> Accessed 13/08/09. Georgetown University, Georgetown.
- PRé Consultant. (2010). SimaPro 7.2.3 LCA software. Amersfoort, Netherlands.

- PROEXPORT. (2012). Biofuels sector in Colombia. [Original in Spanish: Sector de biocombustibles en Colombia] Retrieved from: http://www.inviertaencolombia.com.co/images/Perfil_Biocombustibles_2012.pdf. accessed at 15/12/13. Bogota.
- PROEXPORT. (2013). Investment in the Biofuel sector in Colombia [Original in Spanish: Inversión en el sector de Biocombustibles en Colombia] Retrieved from: <http://www.inviertaencolombia.com.co/sectores/agroindustria/biocombustibles.html> Accessed at 03/01/14.
- Publicaciones Semana. (2010). Ethanol plants sink [Original in Spanish: Plantas de etanol 'hacen agua'] Retrieved from: <http://www.dinero.com/edicion-impresa/investigacion/articulo/plantas-etanol-hacen-agua/104313> Accessed at: 15/05/14, Dinero.
- Ramírez-Villegas, J., Salazar, M., Jarvis, A., & Navarro-Racines, C. E. (2012). A way forward on adaptation to climate change in Colombian agriculture: perspectives towards 2050. *Climatic Change*, 115(3-4), 611-628.
- Ramírez Triana, C. A. (2010). Biocombustibles: seguridad energética y sostenibilidad. Conceptualización académica e implementación en Colombia [Biofuels: energy security and sustainability: Academic discussion and its implementation in Colombia]. *Punto de Vista*, 2, 43-79.
- Ramírez Triana, C. A. (2011). Energetics of Brazilian ethanol: Comparison between assessment approaches. *Energy Policy*, 39(8), 4605-4613.
- Ravindranath, N., Balachandra, P., Dasappa, S., & Usha Rao, K. (2006). Bioenergy technologies for carbon abatement. *Biomass and Bioenergy*, 30(10), 826-837.
- REDAIRE. (2003). Atmospheric emissions for Bucaramanga [Original in Spanish: Emisiones atmosféricas para Bucaramanga]. Retrieved from www.cdmb.gov.co/monitoreo.redaire.php.
- Rojas R, J. C. (2008). Colombian Plan for Research, development and innovation of Biofuel sector. [Original in Spanish: Plan Colombiano de Investigación, Desarrollo e Innovación en Biocombustibles] Retrieved from [www.corpoica.org.co/sitioweb/Documento/Jatropha Contrataciones/JCARLOSROJAS.pdf](http://www.corpoica.org.co/sitioweb/Documento/Jatropha_Contrataciones/JCARLOSROJAS.pdf) Accessed at 05/01/14. Paper presented at the Biocombustibles Colombia 2008, Bogota.
- Romero, M., Cabrera, E., & Ortiz, N. (2008). Report on the Biodiversity status in Colombia 2006-2007. [Original in Spanish: Informe sobre el estado de la Biodiversidad en Colombia 2006-2007.] Retrieved from www.humboldt.org.co/download/Informe_Nacional_biodiversidad_I.pdf. Bogota.: IIAvH.

- Romijn, H. A. (2011). Land clearing and greenhouse gas emissions from Jatropha biofuels on African Miombo Woodlands. *Energy Policy*, 39(10), 5751-5762.
- Rost, S., Gerten, D., Hoff, H., Lucht, W., Falkenmark, M., & Rockström, J. (2009). Global potential to increase crop production through water management in rainfed agriculture. *Environmental Research Letters*, 4(4), 044002.
- Rothkopf, G. (2007). *A Blueprint for Green Energy in the Americas. Strategic Analysis of Opportunities for Brazil and the Hemisphere*: IDB.
- Rutz, D., Janssen, R., Anton, H., Helm, P., Rogat, J., Hodes, K., & et al. (2008). Biofuels assesment on technical opportunities and research needs for Latin America: BioTop. Biofuels RTD-cooperation Latin America-Europe.
- Rutz, D., Thebaud, A., Janssen, R., Segura, S., Riegelhaupt, E., Ballesteros, M., Coelho, S. (2009). *Biofuel Policies and Legislation in Latin America*, BioTop Project. Seventh Framework Programme, European Commission.
- Ryan, D. (2006). Cuban Oil And Ethanol Could Prosper In Havana's Hunt For Energy Supplies. Retrieved from <http://www.coha.org/cuban-oil-and-ethanol-could-prosper-in-havana%E2%80%99s-hunt-for-energy-supplies/> Accessed 2010/12/15.
- SAGARPA. (2008). Law of Promotion and development of Bioenergy products. [Originalo in Spanish: Ley de Promoción y Desarrollo de los Bioenergéticos.] Retrieved from <http://www.bioenergeticos.gob.mx/index.php/programas/marco-legal.html> accessed: 15/06/2011. Ciudad de México.
- Saikkonen, L., Lankoski, J., & Ollikainen, M. (2012). Biofuels from alternative feedstocks under fiscal fuel taxation and actual EU biofuel policy or optimal emission taxes: The case of palm and rapeseed based renewable diesels from Finland's perspective when global greenhouse gas emissions are accounted for.
- Sánchez, L., & Cochrane, T. (1985). General description of the ecosystem, landscape soils and climate of the Eastern flatlands in Colombia [Original in Spanish: Descripción general del ecosistema, paisajes, suelos y clima de los Llanos Orientales de Colombia]. Bogota: CIAT (International Center for Tropical Agriculture).
- Schuck, S. (2006). Biomass as an energy source. *International journal of environmental studies*, 63(6), 823-835.
- Schuck, S. (2007). What Now and What Next for Global Biofuel Technologies? *BIOFUELS, ENERGY AND AGRICULTURE*, 14.
- Searchinger, T., Heimlich, R., Houghton, R. A., Dong, F., Elobeid, A., Fabiosa, J., Yu, T.-H. (2008). Use of U.S. Croplands for Biofuels Increases Greenhouse Gases Through Emissions from Land-Use Change. *Science*, 319(5867), 1238-1240. doi: 10.1126/science.1151861

- Secretaría de Energía. (2009). Guidelines for the Law of promotion and development of Bioenergy products. [Original in Spanish: Reglamento de la ley de promoción y desarrollo de los bioenergéticos] Retrieved from: <http://www.bioenergeticos.gob.mx/descargas/Reglamento-de-la-Ley-de-Bioenergeticos.pdf> Accessed 13/06/12. Ciudad de México.
- Secretaría de Nacional de Energía. (2012). Law of Biofuels. [Original in Spanish: Ley de biocombustibles] Retrieved from: <http://www.energia.gob.pa/Biocombustibles.html> Accessed: 15/06/12. Panama.
- Senado de Chile. (2007). Bulletin 4873. [Original in Spanish: Boletín N° 4.873-08] Retrieved from: http://www.bcn.cl/actualidad_legislativa/temas_portada.2007-01-29.7882319251/boletin_4873_actualidad.pdf. Accessed 23/06/11. Santiago.
- Senado de Uruguay. (2002). Law 17.567 alternative, renewable and substitute fuels of oil origin made out of national feedstock of animal or vegetal origin. [Original in Spanish: Ley 17.567 Combustibles alternativos, renovables y sustitutivos de los derivados del petróleo elaborados con materia prima nacional de origen animal o vegetal] Retrieved from: [www.ursea.gub.uy/web/mnormativo2.nsf/98FFB2517A61DBA0832579090068A320/\\$file/Ley%20N%C2%BA%2017567.pdf?OpenElement](http://www.ursea.gub.uy/web/mnormativo2.nsf/98FFB2517A61DBA0832579090068A320/$file/Ley%20N%C2%BA%2017567.pdf?OpenElement) Accessed: 15/16/12. Asunción.
- Senado de Uruguay. (2007). Law 18.195 Agrofuels. Promotion and standarization of production, comercialization and use. [Original in Spanish: Agrocombustibles:Fomento y regularizacion de su producción, comercilización y utilización] Retrieved from: <http://www0.parlamento.gub.uy/leyes/AccesoTextoLey.asp?Ley=18195&Anchor=> Accessed: 15/16/12. Asunción.
- Sheridan, M. (2006). California crude oil production and imports. California, USA: Fossil Fuels Office - Fuels and Transportation Division - California Energy Commission.
- SHL. (2010). Technical Parameter Model Agrammon (Original in german: Technische Parameter Modell Agrammon) Retrieved from: www.grammon.ch/assets/Downloads/Technische_Parameter_Modell_Agrammon_20100309.pdf Accessed 12/04/11. Bern, Switzerland: Swiss College of Agriculture (SHL).
- Singh, M. (2006). Economics of biofuels for the transport sector in South Africa. *Energy for Sustainable Development*, 10(2), 40-47.
doi: [http://dx.doi.org/10.1016/S0973-0826\(08\)60530-X](http://dx.doi.org/10.1016/S0973-0826(08)60530-X)
- Slaughter, J. C., Kim, E., Sheppard, L., Sullivan, J. H., Larson, T. V., & Claiborn, C. (2004). Association between particulate matter and emergency room visits, hospital admissions and mortality in Spokane, Washington. *Journal of Exposure Science and Environmental Epidemiology*, 15(2), 153-159.

- Smeets, E. (2008). Possibilities and limitations for sustainable bioenergy production systems. (PhD Thesis), Utrecht University.
- Smeets, E., Junginger, M., Faaij, A., Walter, A., & Dolzan, P. (2006). Sustainability of Brazilian bio-ethanol (Vol. NWS-E-2006-110). Utrecht, The Netherlands: Copernicus Institute–Department of Science, Technology and Society.
- Smil, V. (2002). Worldwide transformation of diets, burdens of meat production and opportunities for novel food proteins. *Enzyme and Microbial Technology*, 30(3), 305-311.
- Smith, J. P., Lawn, R. J., & Nable, R. O. (1999). Investigations into the root:shoot relationship of sugarcane, and some implications for crop productivity in the presence of sub-optimal soil conditions. Paper presented at the Australian Society of Sugar Cane Technologists.
- Smith, K. R., Uma, R., Kishore, V., Zhang, J., Joshi, V., & Khalil, M. (2000). Greenhouse implications of household stoves: an analysis for India. *Annual Review of Energy and the Environment*, 25(1), 741-763.
- Solomon, S., Qin, M., Manning, Z., Chen, M., Marquis, K. B., & Averyt, M. (2007). *Climate Change 2007: The Physical Science Basis*. Retrieved from: www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wgI_report_the_physical_science_basis.htm Accessed 30/06/11. United Kingdom and New York, NY, USA: IPCC.
- Stehfest, E., Bouwman, L., van Vuuren, D. P., den Elzen, M. G., Eickhout, B., & Kabat, P. (2009). Climate benefits of changing diet. *Climatic Change*, 95(1-2), 83-102.
- Stern, N. H., Peters, S., Bakhshi, V., Bowen, A., Cameron, C., Catovsky, S., Dietz, S. (2007). *Stern Review: The economics of climate change*. Retrieved from: http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/sternreview_index.htm Accessed: 03/07/11 (Vol. 30): HM treasury London.
- Subía Loayza , E. C., & Cueva Moya, J. J. (2005). Carbon fixation in two agricultural systems of the humid tropical region of Costa Rica (original in Spanish: Fijación de carbono en dos sistemas agrícolas del trópico húmedo de Costa Rica). (Agronomical Engineering), Universidad Earth, Guacimo, Costa Rica.
- sugarcane.org. (2014). Brazilian experience <http://sugarcane.org/sugarcane-products/ethanol>.
- Sumathi, S., Chai, S., & Mohamed, A. (2008). Utilization of oil palm as a source of renewable energy in Malaysia. *Renewable and Sustainable Energy Reviews*, 12(9), 2404-2421.
- Tilman, D., Cassman, K. G., Matson, P. A., Naylor, R., & Polasky, S. (2002). Agricultural sustainability and intensive production practices. *Nature*, 418(6898), 671-677.
- Toasa, J. (2009). Colombia: A New Ethanol Producer on the Rise? In WRS-0901 (Ed.): Economic Research Service USDA.

- Tokgoz, S., & Elobeid, A. (2006). Policy and competitiveness of US and Brazilian ethanol. *Iowa Ag Review*, 12(2), 6-7.
- Trenberth, K. E. (2012). Framing the way to relate climate extremes to climate change. *Climatic Change*, 115(2), 283-290.
- Trindade, S. (2005). Global Biofuels Trade. Paper presented at the XV International Symposium on Alcohol Fuels - ISAF "Alcohol Fuels' role in sustainable transportation", San Diego, California, USA.
- Trindade, S. C. (2010). Nanotech Biofuels and Fuel Additives <http://cdn.intechweb.org/pdfs/17478.pdf> Accessed 27/08/2013.
- Trindade, S. C., Cocchi, M., Onibon, A., & Grassi, G. (2012). BIOFUELS TECHNOLOGY CHANGE MANAGEMENT AND IMPLEMENTATION STRATEGIES. Bioenergy for Sustainable Development and International Competitiveness: The Role of Sugar Cane in Africa, 369.
- Tyner, W. E. (2008). The global impacts of US and EU biofuels policies. *Sugarcane ethanol*, 181.
- U.S. Congress. (2006). Biomass research and Development Act of 2000. Retrieved from http://www.usbiomassboard.gov/pdfs/biomass_rd_act_2000.pdf Accessed 25/05/10: U.S. Congress.
- U.S. Congress. (2005). Public Law 109-58. Energy policy act. Retrieved from <http://www.gpo.gov/fdsys/pkg/PLAW-109publ58/pdf/PLAW-109publ58.pdf> Accessed 26/02/12. Washington. D.C.
- UN-Energy. (2007). Sustainable Bioenergy: A Framework for Decision Makers: UN.
- UN. (2012). Millennium Development Goals indicators: Carbon dioxide emissions (CO₂), thousand metric tons of CO₂ (CDIAC). Retrieved from <http://mdgs.un.org/unsd/mdg/SeriesDetail.aspx?srid=749> Accessed 19/03/11
- UNEP. Biofuels Working Group, & Management, U. N. E. P. I. P. f. S. R. (2009). Towards sustainable production and use of resources: assessing biofuels: UNEP.
- UNFCCC. (2013). Greenhouse Gas Inventory Data. Retrieved from: http://unfccc.int/ghg_data/items/3800.php Accessed at: 13/12/13.
- UNODC. (2007). Illicit crops report Colombia. [Original in Spanish: Informe de cultivos ilícitos Colombia]. Bogota DC: Programa SIMCI de la UNODC.
- UNPD. (2014). Sustainable Energy (Retrieved from www.undp.org/content/undp/en/home/ourwork/environmentandenergy/focus_areas/sustainable-energy/) Accessed 01/04/2014.
- UPME. (2008). Energy demand forecast for the transportation sector. [Original in Spanish: Proyección de demanda de energía para el sector transporte]. Bogota, Colombia.

- UPME. (2009). Reference expansion plan Generation-Transmission 2010-2024. (Original in spanish: Plan de Expansión de Referencia Generación – Transmisión 2010-2024) Retrieved from http://www.upme.gov.co/Docs/Plan_Expansion/2010/Plan_Expansion_2010-2024_Preliminar_DEF3.pdf Accessed at 23/05/10. Bogotá, Colombia.
- USCO. (2012). Biofuel production does not pose a threat to food security, according to Fedebiocombustibles [Original in Spanish: La producción de biocombustibles aún no afecta la seguridad alimentaria en Colombia, según Fedebiocombustibles] Retrieved from <http://ingenieria.usco.edu.co/formacion/component/content/article/286-la-produccion-de-biocombustibles-an-no-afecta-la-seguridad-alimentaria-en-colombia-segn-fedebiocombustibles-wadfrfj> Accessed at: 05/01/14. Faculty of engineering, Universidad Surcolombiana.
- USGS. (2012). GTOPO30 30 Arc Second elevation data (1976 Version). Retrieved from http://eros.usgs.gov/#/Find_Data/Products_and_Data_Available/gtopo30_info Accessed 12/02/12.
- van Dam, J., Junginger, M., & Faaij, A. P. (2010). From the global efforts on certification of bioenergy towards an integrated approach based on sustainable land use planning. *Renewable and Sustainable Energy Reviews*, 14(9), 2445-2472.
- Van Den Wall Bake, J., Junginger, M., Faaij, A., Poot, T., & Walter, A. (2009). Explaining the experience curve: Cost reductions of Brazilian ethanol from sugarcane. *Biomass and Bioenergy*, 33(4), 644-658.
- Vargas, R. (2010). Alternative development in Colombia and Social engagement: Proposals towards a change of strategy. [Original in Spanish: Desarrollo Alternativo en Colombia y Participación Social: propuestas hacia un cambio de estrategia.]. Bogotá, Colombia: Diálogo Inter-Agencial en Colombia.
- Verdonk, M., Dieperink, C., & Faaij, A. (2007). Governance of the emerging bio-energy markets. *Energy Policy*, 35(7), 3909-3924.
- Vergara, W. (2010). Extensive ranching and the agricultural problem. Challenge for a sustainable rural development for Colombia. [Original in spanish: La ganadería extensiva y el problema agrario. El reto de un modelo de desarrollo rural sustentable para Colombia] Retrieved from: <http://revistas.lasalle.edu.co/index.php/ca/article/view/350> Accessed 19/12/13. *Ciencia Animal*, 3, 45-53.
- Vlek, P. L. G., Denich, M., Martius, C., Rodgers, C., & Giesen, N. v. d. (2005). The potential of oil palm and forest plantations for carbon sequestration on degraded land in Indonesia. *Ecology and Development Series*, 28.
- Von Braun, J., & Pachauri, R. (2006). The promises and challenges of biofuels for the poor in developing countries: Intl Food Policy Res Inst.

- WB. (2007). *Environmental Priorities and Poverty Reduction: A Country Environmental Analysis for Colombia (Directions in Development)*. Washington: World Bank.
- WCED. (1987). *Our Common Future: A report to the World Commission on Environmental and Development of the United Nations* Oxford University Press.
- Wicke, B., Sikkema, R., Dornburg, V., & Faaij, A. (2011). Exploring land use changes and the role of palm oil production in Indonesia and Malaysia. *Land Use Policy*, 28(1), 193-206.
- Wicke, B., Verweij, P., van Meijl, H., van Vuuren, D. P., & Faaij, A. P. (2012). Indirect land use change: review of existing models and strategies for mitigation. *Biofuels*, 3(1), 87-100.
- Wilhelm, W. W., Johnson, J. M., Karlen, D. L., & Lightle, D. T. (2007). Corn stover to sustain soil organic carbon further constrains biomass supply. *Agronomy journal*, 99(6), 1665-1667.
- Wirsenius, S. (2003). Efficiencies and biomass appropriation of food commodities on global and regional levels. *Agricultural Systems*, 77(3), 219-255.
- Wood, B. J., & Corley, R. H. V. (1991). The energy Balances of oil palm cultivation. . Paper presented at the PORIN International palm oil Conference, Kuala Lumpur, Malaysia.
- Worldwatch Institute. (2006). *Biofuels for transportation: Global potential and implications for sustainable agriculture and energy in the 21st century (Extended summary)* Washington D.C.: Worldwatch Institute.
- XM expertos (Ed.). (2010). *Neon Database. Colombia*. Retrieved from: <http://sv04.xm.com.co/neonweb/> accessed 12/12/11.
- Yáñez Angarita, E. E., Silva Lora, E. E., da Costa, R. E., & Torres, E. A. (2009). The energy balance in the palm oil-derived methyl ester (PME) life cycle for the cases in Brazil and Colombia. *Renewable Energy*, 34(12), 2905-2913.
- Yáñez, E. Y., Castillo, E. F., & Silva, E. (2011). Cogeneration in palm processing plants: An alternative for increasing competitiveness and reducing environmental impact. (Original in Spanish: *Cogeneración en plantas de beneficio: Una alternativa para el incremento en la competitividad y reducción del impacto ambiental*) Retrieved from: <http://galeon.com/separacionfrutos/cogeneracion.pdf> accessed 15/09/12: Cenipalma. UIS UIS-CEIAM. UNIFEI-NEST.
- Zah, R., Böni, H., Gauch, M., Hischer, R., Lehmann, M., & Wäger, P. (2007). *Life Cycle Assessment of Energy Products: Environmental Assessment of Biofuels*. Bern, Switzerland: Federal Office for Energy (BFE), the Federal Office for the Environment (BFE) and the Federal Office for Agriculture (BLW).
- Zúñiga, O., Osorio, J., & Cuero, R. (2009). *Alternatives in the sustainable managing of soils: a analytical and synthetic approach*. [Original in Spanish: *Alternativas en el manejo sostenible de los suelos un enfoque analítico y sintético*]. Cali, Colombia: Universidad del Valle.

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