# Renewable Energy: Local Benefits or Marginalisation?

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Water, energy, and food security are interdependent and crucial to supporting human welfare and livelihoods (Staupe-Delgado, 2019). Therefore, this paper aims to analyse small-scale rural renewable energy (SSRRE) project's potential in rural areas through the Water-Energy-Food security (WEF) nexus. To focus on local rural livelihoods through the WEF nexus, the Wayuu people, an indigenous tribe in La Guajira, will be used as a case study throughout the paper. Examining renewable energy's (RE) role within the WEF nexus and its potential impacts on rural livelihoods and poverty alleviation in La Guajira could further motivate more inclusive bottom-up RE initiatives (Madriz-Vargas, Bruce & Watt, 2018). Furthermore, to examine why SSRRE projects have not been implemented on a wider scale in La Guajira despite its potential, the discussion part of this paper will use the environmental conflict thesis from political ecology (Robbins, 2011) to examine how the power relations between the Wayuu people, corporations, and Colombian government hinders RE access for the local rural Wayuu people. The research questions for this paper are thus:

- *How can SSRRE projects improve the Wayuu people's livelihoods and liveability by ensuring energy, water, and food security?*
- *Why has SSRRE projects not been implemented on a large scale amongst Wayuu communities?*

**Background: Rural Development and RE**

A major driver of rural impoverishment is the lack of opportunities and basic services in rural areas, undermining people's ability to support their livelihoods (Bebbington, 1999), whereas the lack of clean and affordable energy is a major underpinning factor to such issues (Guta et al., 2019). Latin America has some of the world's best renewable energy (RE) conditions (IRENA). Still, 17 million people lack energy access due to living in rural off-grid locations in hard-to-reach areas and thus face energy, water, and food insecurity (Eras-Almeida et al., 2019). Increased energy for rural communities can enhance their access to clean water and irrigation for crops, which improves their ability to secure a stable food supply through agricultural activities (Guta et al., 2017. Furthermore, without clean and reliable energy, rural households tend to withdraw their children from school, suffer health hazards such as indoor pollution and be more prone to water and food insecurity (ibid; IEA, 2020).

**Case Study: La Guajira, the Wayuu People, and SSRRE Livelihood Improving Potential**

Moreover, if RE is managed through decentralised procedures and used where it is produced, it can provide increasing agency for rural people and counterbalance large centralised RE projects that often are involved in the corporate appropriation of land (Buechler et al., 2020). Small-scale rural renewable energy (SSRRE) is a decentralised energy system, through mini-grids and stand-alone energy system, that can provide easily accessible energy to rural households (ibid.). Current estimations suggest that SSRRE systems can provide more than 50 per cent of the additional electricity needed to reach universal energy access without adding any additional Greenhouse Gas (GHG) emissions (Madriz-Vargas, Bruce & Watt, 2018). SSRRE systems can solve the lack of energy in rural off-grid locations and could serve as a driving force for Latin American rural development by empowering communities to harvest the region's energy supply and create further agency due to the non-need to be connected to larger power grids (Eras-Almeida et al., 2019). Furthermore, renewable off-grid energy can provide a safety net for rural livelihoods in times of stress since it is independent of other energy grids and functions without outside support

(Zaman et al., 2021).

La Guajira is a coastal department located in the north of Colombia. Approximately half of the population in La Guajira belongs to the Wayuu indigenous tribe. Colombia recognizes the Wayuu people and their territory as an autonomous region within Colombia but without full political autonomy (Becerra, Salamanca & Perez, 2020; Silva et al., 2020). Above 53 per cent of La Guajira's population, mainly Wayuu people, live in poverty and suffers from food scarcity, water insecurity, and the lack of basic services (Schwartz, 2021). Furthermore, 85 per cent of the rural and indigenous households lack a connection to the electricity grid (ibid.). Despite having substantial amounts of natural resources, Wayuu territory suffers from very poor socio-economic and health conditions and increasing desertification (Carvajal-Romo et al., 2019). Before the Covid-19 pandemic started, the Interamerican Court declared Wayuu's situation to be a humanitarian crisis due to malnutrition, thirst, and lack of livelihood opportunities (Silva et al., 2020).

Policies to alleviate poverty and improve rural areas' livelihoods must consider local-specific needs and opportunities. One important aspect is to enable rural areas to exploit their available comparative advantage (Ruben & Pender, 2004). The La Guajira department has some of Colombia's and the world's best conditions for wind and solar energy, which has led to a growing interest in large-scale RE farms from the Colombian Government and Multinational Corporations (MNCs) in recent years (Rueda-Bayona et al., 2019; Gelves & Florez, 2020). However, the Wayuu people emphasize the need to meet their local energy needs first through RE to reduce their water and food insecurities while creating educational possibilities for their children (Schwartz, 2021). According to Ruben and Pender (2004: 304), LFAs comparative advantage is often found in 'resource management strategies that optimize the returns to scarce factors, improve local governance structures and reduce transaction costs'. In La Guajira, SSRRE serves as an opportunity for communities in the region to use their comparative resource advantage, i.e., wind and sun, and use it for their rural development. Allowing the Wayuu people to control the energy resources themselves through SSRRE would increase their agency and empowerment and limit the extraction of resources in the region at the local's expense (Eras-Almeida et al., 2019).

**Framework and Theory: Water-Energy-Food Security (WEF) Nexus and Political Ecology**

Water, energy, and food are vital resources for sustaining human lives and livelihoods. These three resources are highly interdependent – a disturbance or change in one of them impacts the other two. This relationship is called the Water-Energy-Food security (WEF) nexus (Nhamo et al., 2020). Approaches that analyse water, energy, or food, without consideration of the interdependency between the resources, threatens to increase the vulnerability of communities and livelihoods since a change in one of the resources might create unintentional outcomes that can cause depletion in one of the other resources and thus impoverish livelihoods (ibid.). The WEF nexus approach can contribute to sustainable and inclusive planning that ensures the improvement of vulnerable communities' livelihoods. Thus, to support rural development and improve rural livelihoods, decentralised energy solutions, such as SSRRE, must be incorporated within a WEF nexus thinking (Guta et al., 2017).

However, to examine the root causes of Wayuu's marginalised livelihoods and their current need for development interventions, such as SSRRE, the environmental conflict thesis (ECT) from political ecology will be used. The ECT 'draws heavily on historical experience of development activities' and shows how past development interventions, based on assumptions, results in further inequalities (Robbins, 2011: 200). Furthermore, ECT focus on how power is divided and 'differentially distribute access and responsibility for natural goods and systems' (ibid: 200). These historically unequal power relations pertain to the present-day world, and thus, it often creates conflict rooted in uneven historical and structural power relations between different groups, which continues contemporary power disparities (ibid.). The uneven power relations often result in 'the appropriation of lands and resources for environmental ends', undermining local actors (Fairhead, Leach & Scoones, 2012). The impacts of these conflicts often increase the divisions and conflicts between and within local communities (Robbins, 2011).

**SSRRE Through the WEF Nexus in Wayuu Communities**

Examining livelihood improving opportunities through the WEF nexus is important to understand how development

interventions impact water, energy, and food insecurity (Grafton et al., 2016). Therefore, this section aims to examine the potential for SSRRE projects to improve Wayuu people's energy, water, and food security, and thus, their livelihood potential.

Energy security refers to a reliable and accessible energy supply, and remains a challenge for Wayuu people's, severely undermining their livelihoods (Staupe-Delgado, 2019; Camargo et al., 2016). The Wayuu people suffer from a general lack of electricity due to their communities' dispersed and off-grid location, making it hard to connect them to the national electrical grid (Camargo et al., 2016). Currently, the main electricity source is diesel generation, which serves as an unreliable energy supply for the Wayuu people and pollutes their environment (Spiegel-Feld et al., 2017). SSRRE offers a solution to unstable international and national energy sources since it can be produced and supplied within a community (Camargo et al., 2016).

Moreover, SSRRE projects have shown to increase rural people's autonomy by increasing their ability to support their livelihoods (Buechler et al., 2020). SSRRE projects empower local actors since they require their involvement in the planning and implementation process and to maintain the energy system (Guta et al., 2017). Furthermore, community participation reduces transaction costs and bureaucracy and has shown to incorporate local knowledge, making SSRRE projects more sustainable in the long-term (Pansera, 2012). In Colombia, SSRRE projects have proven to be a cost-effective alternative to common diesel electrification (Herran & Nakata, 2012). To improve the Wayuu people's livelihoods, and reduce energy costs, SSRRE systems hence serve as a zero-emissions cost-effective tool to achieve rapid electrification in rural areas (Uamusse et al., 2019).

Water security concerns having sufficient clean water quantities to support human livelihoods within a region, state, or nation (Staupe-Delgado, 2019). The Wayuu people lack access to a clean and reliable water supply, often suffering from long-periods without drinking water (Silva et al., 2020). Wayuu people often collect water from groundwater wells or ditches far away or collect it during the rainy seasons in tanks (Daza-Daza et al., 2018). Furthermore, desalination plants are not in operation due to a lack of a reliable electricity supply. Therefore, the population can only use little water to support their welfare and agricultural activities (ibid.). SSRRE, such as wind and solar power, are some of the most efficient energy systems when counting litres per MWh. In places that rely on gas and oil, such as in Wayuu communities, wind and solar energy provide a low-emission, water-saving alternative that would increase water access and reduce water usage while not polluting local water reservoirs (Al-Saidi & Lahham, 2019). Furthermore, SSRRE could power desalination plants for Wayuu communities and thus provide clean drinkable water (Burbano, 2014).

Food security involves having enough nutritional food to feed all people within a territory or a nation (Staupe-Delgado, 2019). To ensure food security, small-scale farmers in developing countries must overcome their low-production capacities and supply constraints. Countries must, therefore, engage in serious efforts to allow small-scale farmers to overcome their production constraints and ensure a reliable food supply (Agarwal, 2014). The Wayuu people experience increasing food insecurity the lack of secure energy and water supply (Silva et al., 2020). Furthermore, the Colombian government's mining and energy extraction during the 19th and 20th century has limited the agricultural potential of the Wayuu people (ibid.). To make the matter worse, water resources and irrigation systems suitable for agriculture are undermined due to climate change impacts such as droughts, increasing desertification and decreased rainfall (Battisti & Naylor, 2009; Carvajal-Romo et al., 2019). The impacts of droughts, desertification and less rainfall have adversely affected food and nutritional security since it limits Wayuu people's agricultural possibilities (WFP, 2014; Minambiente, 2015). However, hard to reach areas that suffer from adverse climate change impacts that limits their agriculture capabilities can benefit widely from small-scale irrigation (Ruben & Pender, 2004). Agricultural activities and food-production capacity, especially in impoverished rural areas, benefit from RE since they can create a cheaper energy source that does not create water, soil, or air pollution, which would otherwise undermine the food supply (Al Saidi & Lahham, 2019). SSRRE can support rural livelihoods and ensure food security by creating power for refrigeration, reducing food waste, creating power for feed and product grinding, compressors and pumps, and livestock feeders (Chel & Kaushik, 2011). For the Wayuu people, many of their water and food insecurity issues can be solved with better access to electricity, since it would increase their ability to use water from more distant places for irrigation and livestock, and fulfil other water needs (Ojeda, Candelo & Silva, 2016).

Furthermore, Indigenous knowledge and practices can serve as an important source of information that can enhance the resilience and adaptation to climate change amongst small farmers. Often, indigenous peoples have a more realistic and sustainable way of viewing the world and natural resource usage, thus creating further sustainability (Altieri, 2009). Creating access to SSRRE for the Wayuu people would give them more agency and empowerment and thus allow for more sustainable agricultural practices. SSRRE creates a bottom-up economic model for farmers and rural people due to its favourable economics at a local level compared to other energy sources. Once solar energy systems are built, they have low running costs, high reliability, and does not cause pollution or soil contamination (Al-Saidi & Lahham, 2019). Furthermore, SSRRE water pumps can provide a reliable environmentally and economically viable option in rural areas compared to diesel generator pumps, thus improving food security amid climate change impacts that might change a territories water accessibility (Chel & Kaushik, 2011).

**Discussion: Why Has SSRRE Not Been Implemented?**

Moreover, non-farm employment is important for rural poverty reduction and requires basic water, sanitation, education, and health care services (Ruben and Pender, 2004). SSRRE programs allow rural communities to use their comparative advantage, RE, and sell the excess energy and diversify their livelihoods. Solar energy farming would, for example, create a bottom-up way for rural communities to engage in the marketplace according to their conditions since they would be the owner of the energy source (Al-Saidi & Lahham, 2019).

As seen in the previous sections, rural Wayuu livelihoods relies on the interdependencies within the WEF nexus. SSRRE projects can reduce poverty while increasing energy, water, and food security and would be an adequate solution to many of Wayuu people's livelihoods issues. Although the WEF nexus approach identifies the interdependencies between the different resources, it does not identify the root causes of the Wayuu people's marginalisation and why its potential solutions, such as SSRRE, has been neglected (Staupe-Delgado, 2019). The discussion part of this paper will thus analyse the lack of SSRRE development amongst Wayuu people through the ECT.

*La Guajira: Historic Energy Development and Assumptions*

As shown through the WEF nexus, energy is a foundational resource that underpins access to water, food and livelihood possibilities. Although energy does not determine particular forms of politics, it lays the material conditions for many political forms and struggles (Huber, 2015). According to Huber (2015: 487), energy sources 'are highly politicised objects that become objects of struggles over control'. To fully understand the WEF issues and the Wayuu people's marginalised situation, a historical overview of the impacts of past energy economics and politics in Wayuu territory must be examined. This is especially important in the ECT, which highlights the usefulness of acknowledging the 'historical experience of development activities' and the contemporary relevance of such activities while emphasising that 'specific assumptions' of people on the receiving end of a development intervention often tend to lead to local marginalisation and conflict (Robbins, 2011: 200).

Due to the energy crisis in the 1970s that caused a lack of an international energy supply to Colombia, Wayuu's territorial energy sources became central for Colombia's economy, which secured a national energy supply through coal extraction from Wayuu territory (Silva et al., 2020). Since the 1970s, coal mining in Wayuu territory has underpinned Colombia's energy system and economic growth (ibid.). Development actors framed coal mining as positive for the Wayuu territory's economic growth, assuming that economic growth was needed for Wayuu people to improve their lives. However, the coal-extractivist economic model in Wayuu territory, which supplied much of the national energy need in Colombia, led to short-term, low-wage work conditions for many Wayuu peoples (Contreras, Bhamidipati & Contreras, 2016). Furthermore, the coal mines environmental degradation has undermined the water security of Wayuu people by polluting water resources, and using the available clean water for industrial usage, instead of local livelihood needs (ibid.). Therefore, Wayuu people have suffered immense adverse consequences due to coal mining, which has undermined Wayuu people's livelihoods through water pollution, soil degradation, and low wages (Silva et al., 2020). Thus, the historic coal mining for national energy in Wayuu territory, based on development activities rooted in assumptions about what the Wayuu people need, has led to the impoverishment of most Wayuu communities and undermined their livelihood possibilities. The extractivist economic model in Wayuu's

territory is thus one of the root-causes of many of their contemporary development issues (Silva et al., 2020).

Due to past adverse economic policies in Wayuu territory, mainly due to coal mining, the Wayuu people are hence increasingly suffering from energy, water, and food insecurity which has transformed the Wayuu people from a relatively strong independent indigenous community to becoming dependent on the Colombian state and development agencies for survival (Silva et al., 2020). Therefore, development initiatives are needed to support the current malnutrition and water insecurity in the region. Like during the coal-mining-era in Wayuu territories, current development initiatives continue to be based on assumptions of the recipients of the development interventions, the Wayuu people, and their needs. The power disparity between the 'developer' and the ones who ought to be 'developed' is thus highly prevalent since the view of the recipients of the development interventions is often lacking in decisions (Robbins, 2011; Silva et al., 2020). Furthermore, the focus on economic and technical barriers often obscures the political and power dimensions related to rural energy projects (Cloke, Mohr & Brown, 2017). For Wayuu communities, SSRRE projects have often been claimed to be non-feasible due to the lack of technical skills and indigenous communities' training (Gaona, Trujillo & Guacaneme, 2015; Chaves et al., 2018). Instead, large-scale RE farms are framed as better suitable since it would be worth the cost of construction and maintenance due to the economic benefits the RE would bring when connecting it to the national grid (Cloke, Mohr & Brown, 2017). However, the Wayuu people's communities are dispersed and located in extremely difficult places to connect to through large-scale RE systems or the national power-grid (Camargo et al., 2016). Therefore, the current top-down RE development approach fails to account for Wayuu territories local-specific contexts while it would not support the Wayuu people's energy needs. Thus, the top-down approach, neglecting local knowledge and opinions, limits the ability to improve livelihoods and alleviate energy poverty for Wayuu communities (Cloke, Mohr & Brown, 2017). Moreover, the proclaimed lack of being able to take care of SSRRE projects by the Wayuu people thus justifies the development of large-scale RE farms instead since it would provide more clean energy for Colombia and is framed so support local rural livelihoods, even it would not meet the Wayuu people's local-specific energy needs (Camargo et al., 2016).

*Renewable Energy in Wayuu Territory: A Global and National Political Agenda*

The ability for SSRRE to be implemented, and function, depends on political, socio-cultural, regulatory, financial, and cooperative factors (Guta et al., 2017). To further explain the lack of interest in SSRRE and the emphasis on large-scale RE systems instead, one must examine energy by analyzing the arising conflicts over energy and as the underpinning and integrating force of all institutions and modes of modern power (Boyer, 2011). From a political ecology perspective, large-scale RE production 'only reinforces already burdensome inequalities' 'at the cost of rural residents and livelihoods' (Robbins, 2011: 249). A further underpinning factor to the lack of SSRRE in Wayuu communities, and the focus on large-scale RE farms, is thus by, like the need for coal in the 1970s, Colombia's current need of securing a stable national energy supply which is further reinforced by the global push to reach GHG emission reduction targets.

Many local rural Wayuu communities land areas overlap with current and planned wind energy farms in Colombia (Schwartz, 2021). Colombia's current national electricity grid-primarily comes from unreliable hydropower, vulnerable to droughts (Schwartz, 2021), while La Guajira has the potential to power all of Colombia's national energy demand through wind and solar energy (Carvajal-Romo et al., 2019). Therefore, today, the need for reliable energy serves again, just like in the 1970s, as a reason for Colombia's government to express interest in Wayuu's territory, this time for solar and wind energy expansion that can fuel a secure energy supply (Schwartz, 2021). Tapping into the potential RE sources in La Guajira would, therefore, ensure a safe and table national energy supply (Schwartz, 2021). Although the transition towards RE serves as a potential way for new social arrangements and more equal power relations between rural, urban, low-income, and high-income populations, energy transitions often lead to similar inherited power dynamics as previously existed (Franquesa, 2018). The inherited power disparity from the coal extraction sector between local Wayuu communities has undermined the Wayuu people's agency over their territory due to their marginalized living conditions which has re-enforced state presence in Wayuu territories in the name of development (Silva et al., 2020). Therefore, the national support for Colombia's large-scale RE farms is increasingly becoming more widespread in the region while SSRRE projects are neglected (Schwartz, 2021).

To access valuable land for large-scale projects, international and national collaboration often undermines local rights (Dunlap, 2017). The inherited power dynamics between the Wayuu people and Colombia's government is further exacerbated by the need to reach global climate change mitigation goals. For Colombia to reach their emission reduction targets in the Paris Agreement, the country needs to rapidly expand its RE sector (Washburn & Pablo-Romero, 2019). Understanding the 'complexity of property rights over natural goods and systems, especially in traditional societies' when analyzing environmental and socio-economic challenges, is very important (Robbins, 2011: 202). The complexity of property rights often justifies green grabbing – the appropriation of land through privatization – which is usually further supported by changing the legal framework towards large corporations' favour and has global, national and local interlinkages (Fairhead, Leach & Scoones, 2012). The extractive energy policies in Wayuu territory since the 1970's coal boom in Colombia has undermined local indigenous governance structures (Cardoso, 2018), which was further exacerbated by the privatization of the energy sector in the subsequent decades (Vélez, 2012), and by calls from international actors to remove any barriers to large-scale RE projects. (UN, 2012). Wayuu's different governance systems, compared to Colombia's privatized energy sector, often allows for MNCs and the Colombian government to delegitimize disapproval from local Wayuu communities regarding the increasing expansion of new wind farms on Wayuu territory (González & Barney, 2019).

Moreover, in 2014, with the increasing interest in Wayuu's territory for large-scale RE expansion, the Colombian government approved a law that promotes private ventures for funding RE projects. Large-scale RE projects are framed to be built to benefit local communities and improve their capabilities of supporting their livelihoods (Becerra, Salamanca & Pérez, 2020). The privatization of resources is often promoted to reduce transaction costs while improving economic efficiency (Robbins, 2011). In Colombia, RE projects are funded through competitive auctions involving large-scale corporations and MNCs (Gaona, Trujillo & Guacaneme, 2015). Auctions can, however, exclude smaller investors from the market, especially undermining SSRRE projects (Grashof, 2019) while increasing privatization of resources often cuts off marginal users (Robbins, 2011). Furthermore, wind energy farms are built to provide energy to Colombia's cities, not to the rural communities it claims to serve (González & Barney, 2019). A large portion of La Guajira is non-interconnected zones (ZNIs). Providing electricity to ZNIs is considered expensive due to such areas' natural conditions and locals' low ability to pay for the service (Gaona, Trujillo & Guacaneme, 2015). Colombia's energy system is developed under centralized generation schemes, focusing on large generating stations that can provide as much regional power as possible. The commercial frameworks and current regulations favouring a liberalized energy market serve as barriers to new energy distribution structures in the country, such as SSRRE (ibid.). Colombia's government provides subsidies for electricity ZNIs; however, subsidies for generation plants of less than 20MW is not provided (ibid.). Instead, large-scale RE is promoted to rural areas by attempting to incorporating them to the national interconnected system (ibid.). However, Wayuu communities' locations hinder them from being connected to the national grid (Camargo et al., 2016). Still, the current market legislation and energy system makes all Colombian citizen and people in rural areas dependent on large-scale power plants (Gaona, Trujillo & Guacaneme, 2015), and hence undermines the possibility to expand SSRRE for Wayuu people due to the proclaimed benefits of large-scale RE projects.

Furthermore, SSRRE initiatives was further undermined in September 2020 when Colombia's President signed Decree no. 8, allowing project managers to apply the 'proportionality test' principle – i.e., deciding themselves if a project is appropriate – if there is conflicting view and lack of agreement between local community members which are subject to the project (Gobierno de Colombia). This impacts Wayuu communities particularly, since past and current extractive energy projects in the region have created conflicts and disagreements between community members (Silva et al., 2020; Schwartz, 2021). Thus, through support from legal measures, Wayuu's ability to decide over their territory has been undermined by a new legislative agenda that favours large-scale corporations and the privatization of the market at the expense of the local Wayuu people, which limits their ability to implement SSRRE technologies.

The focus on large-scale RE projects, instead of SSRRE projects, showcase how the continued power disparity between rural poor populations, large MNCs, and the Colombian government is continued through the country's current RE sector. The national and global demand for RE, which large-scale RE projects can support (Carvajal-Romo et al., 2019), comes at the expense of local economic, social, and environmental aspirations (Powell, 2018). Therefore, instead of providing SSRRE to populations who currently lack energy, the more pressing national issue for

Colombia to establish itself as a 'green country' in the geopolitical sphere is to create large-scale RE projects that can help decarbonize the country's economy at the expense of local Wayuu communities.

**Conclusion**

This paper has argued for how SSRRE can improve the livelihoods and liveability of the Wayuu people in the rural parts of La Guajira, Colombia. Through the WEF nexus, SSRRE's potential for improving energy, water, food insecurity, and interdependency between these sectors was examined. Thereafter, a political ecology perspective was used to further understand the root-causes of Wayuu people's marginalisation, and the underpinning barriers SSRRE face. Examining past energy economics in the region helped explain why Wayuu face marginalisation today and how the impacts of such marginalisation have led to the need for development interventions, which are based on assumptions of what the Wayuu people need. These assumptions attest that large-scale RE projects are most suitable for improving welfare in Wayuu territory. However, these assumptions are also driven by a global and national agenda of reducing GHG emissions and making Colombia into a green climate-friendly country, which has been further supported by the privatisation of land and legal means at the expense of Wayuu people's territory and livelihoods.

**References**

Agarwal, B. (2014). Food sovereignty, food security and democratic choice: Critical contradictions, difficult conciliations. *Journal of Peasant Studies*, *41*(6), 1247-1268.

Al-Saidi, M. and Lahham, N. (2019). Solar energy farming as a development innovation for vulnerable water basins. *Development in Practice*, *29*(5), 619-634.

Altieri, M.A. (2009). Agroecology, small farms, and food sovereignty. *Monthly review*, *61*(3), 102-113.

Battisti, D. S., and Naylor, R. L. (2009). Historical warnings of future food insecurity with unprecedented seasonal heat. *Science, 323*, 240-244.

Bebbington, A. (1999). Capitals and capabilities: a framework for analyzing peasant viability, rural livelihoods and poverty. *World development*, *27*(12), 2021-2044.

Becerra, J.A.J., Salamanca, M.B. and Pérez, Á.G. (2020). Challenging Asymmetries of Power and Knowledge Through Learning Communities and Participatory Design in the Creation of Smart Grids in Wayúu Communities. In *Digital Activism, Community Media, and Sustainable Communication in Latin America* (pp. 287-310). Palgrave Macmillan, Cham.

Boyer, D. (2011). Energopolitics and the anthropology of energy. *Anthropology News* 52(5), 5–7.

Buechler, S., Vázquez-García, V., Martínez-Molina, K.G. and Sosa-Capistrán, D.M. (2020). Patriarchy and (electric) power? A feminist political ecology of solar energy use in Mexico and the United States.*Energy Research & Social Science*, *70*, 101743.

Burbano, A.M. (2014). Evaluation of basin and insulating materials in solar still prototype for solar distillation plant at Kamusuchiwo community, High Guajira. *International Conference on Renewable Energies and Power Quality,1* (12), 547-552.

Camargo, E, O., Riaño, H.H., Valencia, L.B., Sarmiento, A.B. and Becerra, J.C. (2016). Strategies Applied for Renewable Energy Source Adoption in Indigenous Communities of La Guajira, Colombia, *International Journal of Engineering and Technology, 8*(6), 2689-2695.

Cardoso, A. (2018). Valuation languages along the coal chain from Colombia to the Netherlands and to

Turkey. *Ecological Economics*, *146*, 44-59.

Carvajal-Romo, G., Valderrama-Mendoza, M., Rodríguez-Urrego, D. and Rodríguez-Urrego, L. (2019). Assessment of solar and wind energy potential in La Guajira, Colombia: Current status, and future prospects.*Sustainable Energy Technologies and Assessments*, *36*, 100531.

Chaves, F. D. M., Efrain, B. A., Salazar, F., and Posada, A. O. G. (2018). Issues associated with the implementation of wind energy power generation in isolated and non-interconnected rural areas–case study, WSEAS Transactions on Environment and Development, 14(47), 446-550.

Chel, A. and Kaushik, G. (2011). Renewable energy for sustainable agriculture. *Agronomy for Sustainable Development*, *31*(1), 91-118.

Cloke, J., Mohr, A. and Brown, E. (2017). Imagining renewable energy: Towards a Social Energy Systems approach to community renewable energy projects in the Global South. *Energy research & social science*, *31*, 263-272.

Contreras, D., Bhamidipati, S. and Contreras, S. (2016). The fight of the Wayuu ethnic community against the drought in La Guajira, Colombia. In *The 6th International Disaster and Risk Conference IDRC Davos*.

Daza-Daza, A. R., Serna-Mendoza, C. A. and Carabili-Angola, A. (2018) El Recurso Agua en las Comunidades Indígenas Wayuu de La Guajira Colombiana. Parte 2: Es- tudio Cualitativo de las Condiciones de Higiene, Aseo y Disponibilidad de Agua. *Inf. Tecnol., 29(*6),25-32.

Dunlap, A. (2017). 'The Town is Surrounded:' From Climate Concerns to Life Under Wind Turbines in La Ventosa, Mexico, *Human Geography, 10*(2), 16-36.

Eras-Almeida, A.A., Fernandez, M., Eisman, J., Martin, J.G., Caamano, E. and Egido-Aguilera, M.A. (2019). Lessons learned from rural electrification experiences with third generation solar home systems in Latin America: Case studies in Peru, Mexico, and Bolivia. *Sustainability*, *11*(24), 7139.

Fairhead, J., Leach, M., and Scoones, I. (2012) Green Grabbing: a new appropriation of nature?,*Journal of Peasant Studies*, 39(2), 237-261.

Franquesa, J. (2018). *Power Struggles: Dignity, Value, and the New Renewable Energy Frontier*. Bloomington: Indiana University Press.

Gaona, E.E., Trujillo, C.A. and Guacaneme, J.A. (2015). Rural microgrids and its potential application in Colombia. *Renewable and Sustainable Energy Reviews*, *51*, 125-137.

Gelves, J.J.P. and Florez, G.A.D. (2020). Methodology to Assess the Implementation of Solar Power Projects in Rural Areas Using AHP: a Case Study of Colombia. *International Journal of Sustainable Energy Planning and Management*, *29*, 69-78.

Gobierno de Colombia. (September 8, 2020). *DIRECTIVA PRESIDENCIAL No. 8*., Ivan Duque Marquez: Presidente de la Republica de Colombia, available at https://dapre.presidencia.gov.co/normativa/normativa/DIRECTIVA%20PRESIDENCIAL%20No%2008%20DEL%209%20DE%20SEPTIEMBRE%20DE%202020.pdf

González P. C. ,and Barney, J. (2019). *El viento del Este llega con revoluciones. Multinacionales y transición con energía eólica en territorio Wayúu*, Indepaz, Heinrich Böll Stiftung: Bogota.

Grafton, R. Q., McLindin, M., Hussey, K., Wyrwoll, P., Wichelns, D., Ringler, C., et al. (2016). Responding to global challenges in food, energy, environment and water: risks and options assessment for decision-making.*Asia Pacific Policy Stud. 3*, 275–299.

Grashof, K. (2019). Are auctions likely to deter community wind projects? And would this be problematic?.*Energy Policy*, *125*, 20-32.

Guta, D.D., Jara, J., Adhikari, N.P., Chen, Q., Gaur, V. and Mirzabaev, A. (2017). Assessment of the successes and failures of decentralized energy solutions and implications for the water–energy–food security nexus: Case studies from developing countries. *Resources*, *6*(3), 24.

Herran, D. and Nakata, T. (2012). Design of decentralized energy systems for rural electrification in developing countries considering regional disparity. *Applied Energy*, *91*, 130–145.

Huber, M.T. (2015). Energy and social power: from political ecology to the ecology of politics. In*The Routledge handbook of political ecology* (pp. 481-492). Taylor and Francis Inc..

IEA. (2020). Defining Energy Access: 2020 Methodology, available at https://www.iea.org/articles/defining-energy-access-2020-methodology

Madriz-Vargas, R., Bruce, A. and Watt, M. (2018). The future of Community Renewable Energy for electricity access in rural Central America. *Energy research & social science*, *35*, 118-131.

Minambiente – Ministerio de Ambiente y Desarrollo Sostenible (2015). Plan de Acción Nacional (PAN) de Ecoetiquetado. Available at http://www.minambiente.gov.co/images/AsuntosambientalesySectorialyUrbana/pdf/Sello_ambiental_colombiano/Plan_de_Acción_Nacional_de_EE.pdf

Nhamo, L., Ndlela, B., Mpandeli, S. and Mabhaudhi, T. (2020). The Water-Energy-Food Nexus as an Adaptation Strategy for Achieving Sustainable Livelihoods at a Local Level. *Sustainability*, *12*(20), 8582.

Ojeda, C. E., Candelo, J. E. & Silva-Ortega, J. I. (2017). Per- spectivas de Comunidades Indígenas de La Guajira Frente al Desarrollo Sostenible y el Abastecimiento Energético. *Espacios, 38(11).*

Pansera, M. (2012). Renewable Energy for Rural Areas of Bolivia, *Renewable and Sustainable Energy Reviews, 16*, 6694-6704.

Robbins, P. (2011). *Political ecology: A critical introduction. Vol. 16*. John Wiley & Sons.

Ruben, R., & Pender, J. (2004) Rural diversity and heterogeneity in less-favoured areas: the quest for policy targeting, *Food Policy, 29*(4), 303-320

Rueda-Bayona, J.G., Guzmán, A., Eras, J.J.C., Silva-Casarín, R., Bastidas-Arteaga, E. and Horrillo-Caraballo, J. (2019). Renewables energies in Colombia and the opportunity for the offshore wind technology.*Journal of Cleaner Production*, *220*, 529-543.

Schwartz, S. (2021). Wind extraction? Gifts, reciprocity, and renewability in Colombia's energy frontier.*Economic Anthropology*, *8*(1), 116-132.

Silva, C.P., Muriel, E.T., Epiayú, R.C.A., González, A.D., Epieyú, F., Epinayú, E.F., Guariyü, Á.I., Boscán, M.R. and Epiayú, J.R. (2020). "If the coronavirus doesn't kill us, hunger will": Regional absenteeism and the Wayuu permanent humanitarian crisis. *Regions and Cohesion*, *10*(3), 140-155.

Spiegel-Feld, D., Cabrera, O.F., Carvallo, J.P., Garcia, D.R. and Rudyk, B. (2017). The Promise of Renewable Energy Microgrids for Rural Latin America. *Guarini Center on Environmental, Energy and Land Use Law.*

Staupe-Delgado, R. (2019). The water–energy–food–environmental security nexus: moving the debate forward. *Environment, Development and Sustainability*, 1-17.

Uamusse, M.M., Tussupova, K., Persson, K.M. and Berndtsson, R. (2019). Mini-grid hydropower for rural electrification in mozambique: meeting local needs with supply in a Nexus approach. *Water*, *11*(2), 305.

UN. (2012). Sustainable Energy For All: A Global Action Agenda, The Secretary-General's High-Level Group on Sustainable Energy for All, Available at https://www.seforall.org/system/files/gather-content/SEFA-Action-Agenda-Final.pdf

Vélez, T. I. (2012). Water Grabbing in the Cauca Basin: The Capitalist Exploitation of Water and Dispossession of Afro-Descendant Communities. *Water Alternatives*, *5*(2).

Washburn, C. and Pablo-Romero, M. (2019). Measures to promote renewable energies for electricity generation in Latin American countries. *Energy policy*, *128*, 212-222.

WFP – World Food Programme. (2014). *Colombia: The Effects of Drought in La Guajira*. Available at http://www.wfp.org/stories/colombia-effects-drought-la-guajira