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Participation of the wayuu community of the municipality of urbia guajira in photovoltaic projects

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ABSTRACT

The present research was developed in the Cabo de la Vela Municipality of Uribía Guajira Colombia, due to the characteristics of solar radiation that the area has, its average radiation is 8.3 $kWh / m2$, being the highest in the country. The objective was to design a social economic model for the local development of the Uribia Guajira municipality based on the implementation of a photovoltaic park and the conditions to promote social welfare that improve their living conditions. The mixed research methods were based on: a type of exploratory study, supported by observation and social cartography, a semi-structured survey and interview and two participatory workshops were applied. The results showed the importance of generating photovoltaic energy from the creation of the company Sutsuim Ka'ït BIC, where the community and investors participated. The communities was trained in the strengthening of management capacity and in decision-making for the people of the reservation and their leaders in the entire area of direct and indirect influence of the project, strengthening community participation and how to develop macro projects affect a better quality of life for the Wayuu people of Cabo de la Vela

Key Words: *photovoltaic energy; social development; wayúu culture; quality of life and community participation.*

Participación de la comunidad wayuu del municipio de urbia guajira en proyectos fotovoltaicos

RESUMEN

La presente investigación se desarrolló en el Cabo de la Vela Municipio de Uribía Guajira Colombia, por las características de radiación solar que tiene la zona su promedio de radiación es de 8.3 $kWh\ /m2$, siendo el más alto del país. El objetivo fue diseñar un modelo económico social para el desarrollo local del municipio de Uribía Guajira a partir de la implementación de un parque fotovoltaico y las condiciones para impulsar el bienestar social que mejoren sus condiciones de vida. Los métodos de investigación mixta se basaron en: un tipo de estudio exploratorio, apoyado en la observación y la cartografía social, se aplicó una encuesta y entrevista semiestructuradas y dos talleres participativos. Los resultados mostraron la importancia de generar energía fotovoltaica a partir de la creación de la empresa Sutsuim Ka'ït BIC donde participaron comunidad e inversionistas. Se capacito a la comunidad en el fortalecimiento de la capacidad de gestión y en la toma de decisiones para las personas del resguardo y de sus líderes en toda el área de influencia directa e indirecta del proyecto, fortaleciendo la participación comunitaria y como el desarrollo de macro proyectos incide en una mejor calidad de vida de las personas Wayúu del Cabo de la Vela

Palabras Clave: *energía fotovoltaica; desarrollo social; cultura wayúu; calidad de vida y participación comunitaria*

INTRODUCTION

Worldwide, 97% of the energy used comes from non-renewable natural resources (38% coal, 40% oil and 19% natural gas), on the other hand, non-conventional renewable energies are generating around 26 % of electricity worldwide, for the decade 2010-2019, investments in new capacity in photovoltaic and wind energy, reached 2,7 billion dollars, with solar energy being the one that attracted the most investment, for a value of 1,4 trillion dollars (Global Trends in Renewable Energy Investment, 2020). Taking into account the objectives of the Paris agreement, Colombia, supported by Law 715 of 2014, has been promoting new business models that make foreign investment attractive in the department of La Guajira due to its greater radiation and wind force at the national level, which allow direct contracting between renewable energy developers, the community and trading companies, through PPA agreements (Power purchase agreement), (IRENA, 2018).

Alternative solar energy is clean and safe energy that does not pollute the environment and that the only fuel supply it needs to work is sunlight. This type of energy is obtained directly from the sun, the sun's rays fall directly on the earth and can be used to heat directly or through specifically designed optical devices. The country has a daily average of solar irradiance over the entire territory of 4.5 $kWh\ /m2$, in the Guajira region its radiation average is 8.3 $kWh\ /m2$, an area where radiation is the highest, the country has a good potential in general terms for the use of solar energy, while the Andean region has an average of 1,643 $kWh\ /m2$ annually, thanks to this the use of solar energy can be massified for both urban and rural use, normally this technology is used in isolated systems not connected to the electrical network but even today there are many drawbacks, mostly due to misinformation and ignorance (Bimal, 2013).

The Department of La Guajira is not electrically interconnected with the country, at this time Elec-Norte is assembling the first networks in rural areas, the lack of electricity has generated low growth and development in the region, with few sources of employment, which causes a low quality of life, coupled with the lack of drinking water, the lack of these two basic services, which makes that access to education has low coverage, causing almost 50% of illiterate population and restricted technological development. For all this, the poverty rates in this area are very high; Similarly, the unsatisfied basic needs (UBN) in the region exceed 24.7% with respect to the UBN at

the national level; when the established minimum threshold is not reached by the groups, they are classified as poor (DANE, 2016).

For La Guajira and all its municipalities, being able to use solar energy would be an alternative which would provide electricity supply in the different rural areas. In the department there are some experiences with photovoltaic energy, such as Nazareth school, which has allowed its students to have access to the Internet. The community located in the district of Dividivi has a photovoltaic energy service where 54 families and a school have been benefited. In the Middle and Upper Guairá, it is evident that their rural communities do not have local, regional or national support for the development of a sustainable social economy (Goodbody, Walsh, McDonnell, & Owende, 2013), (Huesca, Sheinbaum & Köppel, 2016); and (Munday, Bristow, & Cowell, 2011). Some authors consider that electrical energy is the element that allows generating wealth and job opportunities for the different rural and indigenous communities of the country (Andrade, & da Silva, 2011).

This community makes its towns through settlements that are inhabited by numerous families, the small settlements are made up of 30 families and the large ones by more than 150 families where are the closest relatives (Prieto, 2012). Its main economic activity is craft, artisanal fishing, grazing, goat and cattle breeding; mixed with an agriculture of corn, cassava, beans, cucumber, melon among others; the desert soil conditions and the lack of interconnection to electricity networks cause that its economic development is not the best. The implementation of photovoltaic energy would make it easier for these communities to technify their different economic activities, which allow the increase in the production of their income and with it a better quality of life.

Therefore, it is intended to design a social economic model for the local development of the municipality of Uribía Guajira based on the implementation of a photovoltaic park and the conditions to promote social welfare that improve their living conditions.

This is how Guzmán, Araya, Castro, & Obando (2016) considered that organizations and industries are currently looking for new energy alternatives that help minimize or control the greenhouse effect that has been occurring. The researchers implemented a thermophotovoltaic system, to be used in dairy plants, as a result it was possible to establish the energy capacity and the utility that it can have in the agro-industrial

sector. The EFV generates about 30% of the energy required in these activities. In addition, production costs are reduced and the most important thing is the reduction of the carbon footprint.

Similarly, Cortes & Arango (2017) suggested that energy is necessary if the economic development of a municipality, region or the country is desired. The strengthening of the industrial sector and the emergence of new technologies and the increase in population, make the energy demand greater every day, the current energy system does not satisfy energy consumption. Apart from that, the use of fossil fuels for power generation has been negatively impacting the environment.

On the other hand, Posso & Sánchez /2014 identified the factors that form part in the development of the hydrogen solar energy system (SESH) at the Latin American level. It was concluded that the majority of Latin American countries have enough resources for the generation of non-conventional renewable energies and that economically the implementation of the SESH system; in rural areas and urban transportation are opportunity niches.

According to Cantillo & Conde (2011) they formulated a marketing plan in order to promote photovoltaic energy at the urban level on the Colombian Caribbean coast located in the capital districts of these departments; A situational diagnosis of marketing was carried out that allowed establishing the real and potential market on the needs of photovoltaic energy and the benefits generated for users. Concluding that the marketing plan for photovoltaic solar systems for urban areas is profitable and viable with the figures raised.

Likewise, Martínez (2016) showed the evolution of photovoltaic energy technology and how its costs decrease more and more. The objective was to design a methodology to establish the proper location and orientation of the different elements that are required to install a photovoltaic system on the roof of a building, it also generated parameters to calculate solar radiation in its gain and loss. Concluding that the use of SFV in building facades is promising for cities, and the generated mathematical model is replicable anywhere in the world.

According to García, Sepúlveda & Ferreira (2018) they assessed the technical and economic feasibility of implementing a photovoltaic system that facilitates the optimization of a lighting circuit, for this they analyzed different proposals for

autonomous and grid-connected EFV, the results showed that the grid-connected system generates a viable rate of return.

This is how the authors Criollo, Marks & Rodríguez (2020) proposed a methodology where the community interacts in a very active way in the development of a photovoltaic project in Ecuador. The authors use direct observation, a probabilistic snowball sample, semi-structured interviews, and participatory workshops. The results showed the socioeconomic importance of community participation in this type of photovoltaic projects that have a positive impact on quality of life.

For Colombia, it is vitally important to diversify the energy matrix, projects that implement non-conventional renewable energies such as photovoltaic or wind power to improve energy efficiency for each of the economic sectors and be able to achieve energy sustainability are required: This requires to reduce the use of non-renewable sources (fossils), and that clean fuels be added to the energy system in order to gradually reduce emissions of polluting gases and other collateral environmental impacts (Energetic Mining Planning Unit [UPME], 2020).

On the other hand, the Fund for Non-Conventional Energies and Efficient Energy Management (FENOGE, 2020) is in charge of developing energy projects that benefit the social development of urban and rural communities located in remote places, which offer advantages for investors, the country and the communities with the generation of jobs, improve the quality of life of these communities and support the economic reactivation of the region, while traditional energy consumption decreases and with it the emissions of polluting gases.

Wayúu culture

The Wayúu people belong to the Arawak group and they moved through different territories such as the Amazon and the Antilles, their reports date back to 150 BC. Their main customs are hunting, fishing, horticulture, and gathering where it could be done. Their dwelling was communal, in the form of a maloca.

The Wayúu community means person or people of sand, sun and wind within the morality of the desert, it is opposed to the arijuna term that corresponds mainly to "white" people, to a strange person in the region or a possible enemy. They are characterized by having their own language and culture where their worldview and way of life make them different from other societies. The Wayúu ancestral territory

corresponds to the entire Guajira Peninsula limited to the east by the Gulf of Coquibacoa, to the south-east by the Perijá mountain range, and to the west by the northeastern slope of the Sierra Nevada de Santa Marta, where they are born. the Hacha, Ranchería and Limón rivers that flow into the sea, after crossing the plains of Baja Guajira, in the southern part there are other Wayúu settlements. In Cabo de la Vela a tectonic fault was born that divides the territory into two zones known as the Alta and Baja Guajira, which are separated by an extensive region called the Media Guajira.

The Wayúu community have their own language called Wayuunaiki, which belongs to the Arawak linguistic family, being a factor of ethnic identity and culture for them. They are considered socially and culturally strong, which has allowed them to join and articulate themselves to the different regional and national processes (economic, cultural, social, political and economic), without losing their identity and traditions.

Geographic Characterization of La Guajira and the Municipality of Uribía

La Guajira is located in the northeast of the country and is part of the Colombian Caribbean coast. To the north and west it limits with the Caribbean Sea, to the east with Venezuela; to the south with the department of Cesar and to the southwest with the department of Magdalena. Its capital is Riohacha. (IGAC, 2010). It is made of 15 municipalities, for 2015 it had a population of 1,046,641 inhabitants, for the 2019 census the current population was 880,560, showing that there was a reduction of 16%. Immigrants from different parts of the world, especially from the Middle East, arrive in the territory. It has five Native American towns and a large Arab community that has played a transcendental role in its economy. In the area is the Makuira Natural Park, unique in the world because it is a dwarf cloud forest rich in a variety of flora and fauna and different geographical accidents.

Figure 1. *Map of the Middle and Upper Guajira*

Source: Development Plan of the Department of La Guajira 2020-2023

The department has different thermal floors of the intertropical zone with average temperatures between 35 and 40 °C, and a maximum of 45ºC, it has a great variety of terrestrial ecosystems, the desert, the dry forest and the humid mountain. It has an energy potential for the generation of both wind and photovoltaic energy that has not been widely exploited. In La Guajira, the average temperature is between 27 and 30 °C, with maximums of 45 °C. In its mountainous part the temperature reaches 38 °C. It presents a xerophytic climate, to the south and west of arid or semi-arid steppe. The rains occur in the months of September and December. Its vegetation is thorny bushes and different varieties of cacti.

Geographic Characterization of Uribía

Uribía is a municipality that is located in the north of the department; the majority of its population is indigenous and belongs to the Wayúu ethnic group, and they consider themselves ancestral owners of the territory, forming the largest indigenous reservation in the Middle and Upper Guajira, extending throughout the rural area of the Municipality of Uribía.

Uribia has 21 districts in the rural area such as: Puerto Estrella, Nazareth, Cabo de la Vela, Siapana, Taroa, El Cardón, Casuso, Wimpeshi, Guarerpa, Irraipa Bahía Honda, Carrizal, Punta Espada, Castilletes, El Paraíso, Taguaira, Porshina, Taparajin, Urú, Jojoncito and Puerto López. In the urban area are the neighborhoods: Colombia, Ismael García, Fonseca Siosi, Los Guajiros, Abuchaibe, Aipiamana, Sports Center, San José, Venezuela, Wayúu Effort, Eduardo Ochoa, El Triunfo (Matadero), Las Mercedes, Wayúu-Yosu Ethnic Group, , Simón Bolívar, La Florida, Sports Center, Patio Bonito and the recent settlement called Villa Fausta. The indigenous territories of Pesuapa Enrique Ipuana and Juyasiraín are in urban formation. (Secretary of Economic Development of La Guajira, 2020).

Community participation

The participation of communities in infrastructure projects is a mechanism that allows strengthening the different social organizations such as the clans and reservations of the Wayúu ethnic group, which have been transforming communal spaces. When the community is organized, they achieve many benefits for their territories, when their inclusion is achieved in the formulation, execution and monitoring of electrical

infrastructure projects that are developed in their territories and that also link investors, it allows the social fabric and the model of development with a territorial approach for the municipality of Uribía Guajira to be strengthened and to be the basis for the development of what the Wayúu communities require (Contreras, 2016).

The articulation between community participation, the State and investors in photovoltaic energy infrastructure projects in the Cabo de la Vela Municipality of Uribía Guajira occurred from the design in order to generate a successful project that meets the needs of the Wayúu (Martínez , 2017)

Community Energy

It is considered that community participation establishes a clear distinction between those proposals that can be successful for photovoltaic or wind energy, since the communities know of their capacities to promote a renewable energy project in their territory, which contributes to the social development of the Municipality.

Martín et al., (2016) considers that photovoltaic projects in Colombia have facilitated access to electricity for rural populations that are remote and are not interconnected to the national system, through the generation of energy in situ. In La Guajira, taking into account its climatological characteristics of winds and radiation, it has been building photovoltaic plants where the community participates as a partner, on the other hand, wind farms are also being built that produce energy that is injected into the network of the national electrical interconnection system to be transferred to places distant from the site where it is generated. "Electric power generation is not limited to large production plants, the possibility of generating electricity locally, or in homes, neighborhoods, with the integration of renewable sources, is increasingly simple and affordable" (p. 1)

Moreover, the Commission for Environmental Cooperation (2010) stated that community renewable energy depends on the organizational capacity of the communities, the knowledge they have on the subject, access to public and private entities that are able to finance these types of projects. For the development of this type of proposals, it is important that the community participate from the moment of its inception, making a difference.

According to Yáñez, (2016) and Alonso, (2015) they stated that it is important that the communities know and accept the new energy technologies, for this it was necessary to

work with the community, and the leaders of each Uribía clan; where they were taught what a solar plant is, how it works and the benefits they would have if they agreed not only to allow the construction of the plant but also to be partners in the company. Additionally, the movement for community renewable energy considers that it is important to think that within the community everyone is equal that there are reasons that will determine the location of a project such as their beliefs, respect for nature and its sacred places. (Sposato & Hampl, 2018).

In the same way, Schweisfurth (2017) considered that in the development of projects with renewable energies it is important to have a leader who generates motivation for the community. In the case of the Reservation of Alta Guajira, the leaders are the chiefs of the clans of Cabo de la Sailing supported by the babbler who is the person who becomes the meter between the community and the investors who will be in charge of showing the community the benefits that being part of a BIC society would generate for them, using state-of-the-art technology and be able to access electricity service 24 hours a day.

For Hienerth & Lettl, (2011) they stated that Sutsuim Ka'ït BIC could be considered as a Leading Company (LE) which is willing to carry out a transfer of knowledge about the innovations that would be used in this solar plant, which generated processes of training for contracted professionals who belong to the community. It was also possible to identify and solve a series of problems that affect the community.

Finally, it can be established that for the Wayúu community, community photovoltaic renewable energy has become an activity that, supported by Prior Consultation, the participation of the leaders of each clan allows them to intervene in decision-making regarding the planning process, installation and plant operation. It also has to do with the benefits and compensation received by the people who are directly affected by the construction of the plant and the supply of sustainable energy (Šahović & Pereira, 2016).

Social Cartography

According to its authors, cartography is considered a language which represents the geographical space where the settlements are located in the rural area of the Municipality of Uribía, this form of abstraction to show the reality and the vision that

the Wayúu have of their territory. In these maps they show their images, signs and symbols (Velez, Rátiva, & Varela, 2012).

Barragan & Amador, (2014) stated that social cartography takes the map as a graphic form of those phenomena present in a community, it is conceived as a means and not as an end, in which the existing reality and territorial relations are outlined through signs, symbols and words that are identified through conventions that have shared meanings and collective projections.

For the development of social cartography, the social and political characteristics of the Wayúu community of the Municipality of Uribía must be taken into account with the aim of being able to guarantee that all the necessary conditions are in place so that the participants can meditate and socialize the perceptions, representations and interpretations of the reality of the Wayúu culture. It can be concluded that social cartography allows taking a comprehensive-critical position that shows the symbology of this community and also contributes to the interpretation of its world and how it could be transformed (Barragán & Amador, 2014).

Being able to recognize social cartography as a methodological strategy is essential to start from a territorial vision that provides the strengthening of communities from self-recognition and self-representations, as well as the analysis of the information collected (Barragan, 2012); (Barragán, 2019).

Starting from the previous concepts, Barragán (2016) considers that three types of maps can be prepared, in which one can: "prioritize collective reflections, recognize the territories, relationships, needs, knowledge and opportunities for transformation in social actors, therefore that it is necessary to take them into account before starting the exercise with the community" (p.8).

- Eco-systemic-population map: Shows the existing territorial relationships between population and nature, beyond political-administrative demarcations.
- Temporal-social map: It allows the different events that have happened to be identified and remembered by the community, which makes it easier to understand the present and what is desired for the future.
- Thematic map: Helps to identify the strengths and weaknesses of the Wayúu culture to transform them for the benefit of the community.

METHODOLOGY

An investigation was carried out with a qualitative methodology, which was done in two phases: the first is a primary investigation and later a study of social cartography whose origins are in the Participation Action investigation (IAP) due to its dynamic characteristics in the elaboration of maps, and the development of a dialogue that occurs during the work that the community carries out in each settlement with respect to their representations (Barragán, 2016). It can be said that subjectivity arises during the process, possibly due to the strategies used in collecting information, which are the experiences of the actors in the territory and the analysis and meanings that the results yield (Uribe et al., 2017).

A semi-structured interview was designed and applied to the leaders of the Settlements Concha Ipuana, Mamisha, Jokoliwou and Acapajushi. Also, a participatory workshop was in order to guarantee the participation of the community and to be able to establish the main sources of income, as well as the willingness to participate in a long-term photovoltaic project and the possibility of wanting to participate as partners in a community long-term renewable energy project, for the development of the research, central elements of the cartographies were taken:

- **Mapping of senses, perceptions and territories:** allows the identification of the sounds of nature, smells of plants or food, feelings, flavors, experiences and everything that is significant for the participants.
- **Mapping of sociodemographic assets:** it shows what their homes and the surroundings of their ranch are like.
- **Cartography of routes and landscapes:** The community in its maps shows what its social environment is like (See Table 1).

Table 1. Steps of the methodology.

PHASE	Type of Research	Methodology
I	Primary exploratory	Passive observation
		Sample
		Semi-structured interview
II	Social cartography	Preferences matrix
		Participatory mapping
		Workshops
		Action plan matrix

Source: Own elaboration

Ethical considerations: To be able to work with the community of the different settlements and have access to the leader of each clan, it was necessary to have bilingual support staff and a social worker who facilitated access to the community. Informed consent was also obtained which was delivered and read in Spanish and Wayuunaiki. Once its reading was completed, the participants proceeded to fill it out in compliance with the provisions of the Declaration of Helsinki and Resolution 08430 of 1993 for Colombian territory, as also the 2018 Bioethics and Investigative Integrity Policy.

Unstructured passive observation: Passive observation allowed us to observe the state of the public infrastructure of the Municipality of Uribia, access to basic services both in the urban area and in the rural area, and the characteristics based on the methodology of Friedrich, Karlsson, & Federley, 2013. Some contents of the study could also be adapted, as the researcher and the support group recognized the territory under study (Herrera, & Naranjo, 2004). With the authorization of the leader and the community of each settlement; maps of the place, photographic records and voice or written notes were used.

Sample: With the previously established sample and the established settlements, a visit was made to each one of them looking for the leaders. In addition, the stores in the area, commercial premises, urban and rural hotels were visited, where offered information about the activities and routines of the Wayúu community (Franz, 2015).

Semi-structured interviews: This instrument allowed the collection of information provided by the leaders of each clan of the Alta Guajira reservation, on the needs of electrical energy and the knowledge they had about solar energy through flexible questions such as to allow the interviewees express themselves freely, with the information obtained the participatory workshop was designed (Laforest, 2009).

Participatory mapping: Adults and young people participated in this activity who drew their territory showing their houses, corrals, schools, the sea and the vegetation of the area. In addition, they were asked to draw the incidence that it would have for them if they had electricity 24 hours a day. Later, the maps were socialized, likewise the researcher and the facilitator (Wayúu professional) generated questions about what natural resources mean to them, about their culture and if the solar plant were implemented, what would be their ventures.

Matrix of preferences: This exercise stimulated discussion for decision-making on different problems that afflict the community, once each of these needs has been established, a prioritization of each of them is made based on the collective benefit. The exercise ended with a vote by the participants to decide which was the most felt need by the community. At the end of this exercise, an exercise for renewable energy is proposed, it was explained that each alternative would be qualified based on the decision criteria chosen and the weights associated with each one of them, each criterion had a score as follows: 1 (the worst possible) to 10 (the best) (Bolt and Fonseca, 2011).

Analysis of the interested parties: Prioritized each of the needs of the community, an analysis of each of them is made, the support staff asked questions about these problems. Additionally, the different entities interested in this type of project are identified. At the end of the analysis, a person from the community explains how the analysis was carried out and what consensus was reached.

Matrix of action plans: Questions were asked by the support staff and the researcher about the possibility of proposing a photovoltaic project with the direct participation of the community (Commission for Environmental Cooperation, 2010). The participants expressed how the project could work as well as the possible impacts it could have on wildlife and the landscape, because if this were to happen it would be necessary to carry out a series of rituals to ask nature for permission.

RESULTS

The results of the primary and/or exploratory research and social mapping are shown below. In order to fulfill the established tasks, it was necessary to start by generating motivation in the community of each of the settlements. For this, it was necessary to participate in the different activities of the community, to know their interests and tastes, in a moonlight there was a sharing of their dances and food allowing to generate empathy between the community and the researcher. With the community motivated, the primary research is carried out.

Primary and exploratory research

From passive observation, it was established that 163,462 people live in the Municipality of Uribia, where 90% of the inhabitants are indigenous Wayúu. Of the total population of the Municipality of Uribía, 85,960 are women and 78,828 are men (DANE,

2019). In the rural area is the Reservation of the Middle and High Guajira, its population is organized into 20 matrilineal Clans (Eirruku) that are distributed in the peninsula of la guajira being the clan with the greatest representation the Epieyu which houses 78,409 people.

In rural areas, most people lack income, education, justice, health, credit and other productive resources and opportunities. Therefore, it could be said that multidimensional and monetary poverty coexist in the rural area of Uribia. Regarding extreme monetary poverty in La Guajira, it was $114,420 per month, while the monetary poverty line per capita for La Guajira was $229,271 per month which affects the high rates of illiteracy, health problems and death of infants due to malnutrition. The unsatisfied basic needs in the municipality are 89.03%, surpassing the national level, which is 27.3%. The people who are in misery 61.07% with respect to the housing deficit this is 64.29%. This result goes hand in hand with the component of overcrowding of people in the houses that reaches 61.12%. Another important index is the component of economic dependence of the elderly is 38.07%.

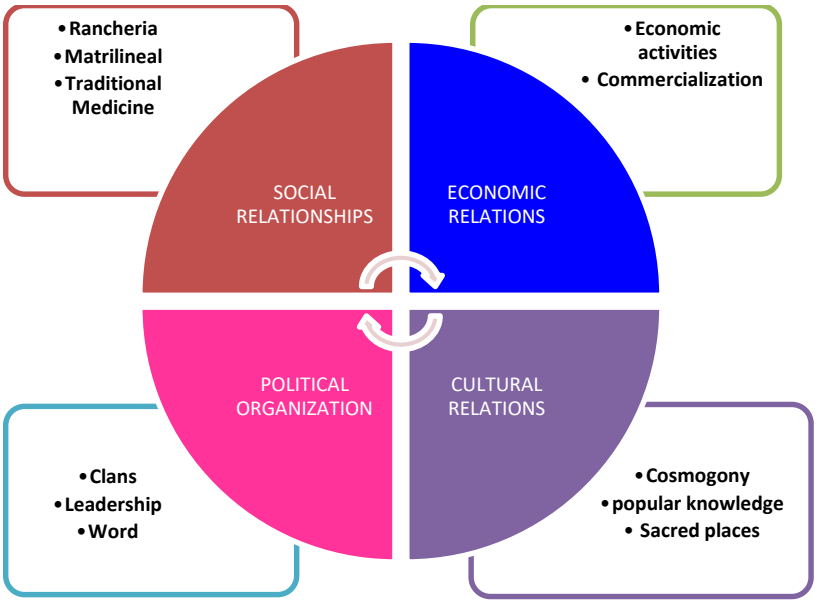
The concept of culture takes into account immaterial and material characteristics, their emotions and knowledge that are specific to the person to create their meanings, this set is what has allowed the Wayúu that their way of life, traditions, values, customs, costumes, folklore and their organization continue to be maintained over time. The Wayúu community considers that its legends and myths allow men and women to know through them their history and everything related to their existence. Legends reveal the origin of the world, plants and animals; all this exists by the power of those beings, as well as the different events experienced by man. Their culture is expressed and represented through oral tradition. When the myth is narrated, it becomes an explanation about the sociocultural organization and the social models that are generated and that the community assumes. Orality allows to relate the sacred and the material, in the oral tradition knowledge and experience is transmitted by the elderly, to adults, youth and children. These elders preserve the cultural heritage and coexistence with nature and among themselves.

For the Wayúu culture to build is to weave, in the construction of their homes they use clay and other structural elements that intertwine to generate a strong wall, the women begin to weave the transversal intersections with cacti branches, to be able to add clay

or mud that must be yellow and mixed with cattle dung, which gives firmness and does not allow it to crack over time.

From the observation it was possible to establish that in the Wayúu territory there are 4 types of relationships such as: Economic, Cultural, Political and Social, which are the ones that govern the life of the community. The semi-structured interview was applied to four (4) clan leaders that once the interviews were answered, a categorization and sub-categorization of the different responses was made.

Figure 1. *Social Mapping and Community Assets*



Source: Own Elaboration

Table 2. *Categorization and Subcategorization of interview responses*

Categorization	Subcategorization
My family is Wayuu The family is matrilineal	What family means in the Wayuu culture
The importance of women in the Wayuu culture Culture is inherited from the mother Education is transmitted by mothers The mother teaches the daughters to do by playing with dolls Before the first period, the girl shuts herself in with her grandmother to finish learning everything a woman should know.	The value given to women within the Wayuu culture
The *atushi* is the most important person in the Wayúu community.	The head of each clan is the *atushi*

Importance of the earth and its ancestors Land is inherited through the maternal line	Territorial organization Ancestral landowners and living people who live on the land but will never be able to sell it, it is not theirs
Jepira place where the dead go The dead take a bath first, get dressed and cry	Belief of death
Worldview is the earth and the rain	Visión deista
Plants are an ancestor of them, plants feel what is done to them	Vegetation is a living ancestor
Father Jipa is the rain and he fell in love with the earth and gives rise to the plants, then the woman was born in the second birth	Belief in the creation of the world
Professionals in social work (3) and in environmental impact allows you to work in your area under your beliefs Two male anthropologists	Companies hire women and men professionals, some accept women more and others do so with men when negotiating
Uribía indigenous city	The largest concentration of indigenous people is in Uribia and they continue to respect their culture
The importance of the environment	It's their whole worldview
There is no access to energy service only in the urban part at the rural level	The Wayúu are not afraid of the dark, it is a poem surrounded by stars, this is taught to them since they are small and small
Solar energy	Obtain energy through the sun to be used by us
Importance of energy in the family	It would improve the quality of life, there would be work, food could be conserved and study at night
Impact of living in the area	Strengthen our culture
benefits of solar energy	It is a renewable energy that does not pollute and could pump and extract drinking water
I would pay for the service	Yes, because it is cheaper than diesel, which pollutes.
The community would be interested in being a partner of a solar company in Uribía	If it is interesting, it is the first time that they have taken us into account, the other companies only offer us compensation to the community that is close to the project.
What kind of compensation do they give you?	Goats, seeds tanks to store water

Would you like to work in the company	Yes, because the woman could be the one who keeps the panels clean and the man can do other activities.
If society were given, what would you contribute?	The land and work and we would take great care of it because it would be ours, but first we must ask nature for permission

Next, an analysis and interpretation is made from the context

Table 3. *Analysis and interpretation*

Statement	Argument	Context validity
Importance of the family in the Wayuu culture	For each of the participants, their family is Wayúu and the family is matrilineal	In the settlements where the participants live, numerous uterine families live together, this is their residence that consists of a collective corral, jagüeyes orchards or water reservoirs and the cemetery.
Value of women in the Wayuu culture	The woman is the most important She is in charge of transmitting the culture Education is provided by women Her confinement occurs before her first menstruation and her maternal grandmother locks herself up with her to teach her what a woman must know to get married.	Education plays a key role in strengthening women with respect to her autonomy and the ability to make decisions for what her life project will be (Regnault, 2017)
The territorial organization occurs in the high Guajira where all the ancestors are	The migration of some families to the middle and lower Guajira lost their ancestors	In the high Guajira the Wayúu culture arises (Figueroa, 2017)
Belief of death	*Jepira* place to go once the person dies	n this culture, death is sacred, so they cannot kill a human being, if they do, they break the family harmony of the aggressor and the victim, which must be repaired by the aggressor with goats and gold. Death the worst poverty that a Wayuu can have (Figueroa, 2017)

Environment and nature	You don't cry before the bath, then you get dressed to cry	*Pulowi* is the woman who is related to drought, Java is the nomadic man who hunts and kills and represents evil and disease and also death. To use nature it is necessary to ask permission from different rituals
Flora and fauna are living ancestors	Worldview is the earth, and the rain	
Creation of the indigenous world	*Japa* is the rain father who falls in love with the land of the first birth plants are born second birth the woman was born and then it is a collective birth	Figueroa (2017) argues that Maleiwa is the center of a mythical universe that gives life to man and iron to be able to mark each matriarchal clan so that they do not get confused and gives each one a name.
Environmental impacts	Ali-Juna is not an indigenous person, he is a Westerner who affects his environment	The effects generated by Ali-juna affect the health of the environment that must be treated like the heart.
Training of Wayuu men and women who work in the area	They learned to strengthen their beliefs of the Wayuu culture in their universities	The differences between Wayúu and Ali-junas is how the breeze stirs but they are necessary to breathe and refresh each other and oneself. "With the face of intelligence that is serenity, think that the fruit of the clans can only be eaten and enjoyed if you are calm" (López, 2013, p.5%

	Criterion	Weigh (A)	Score (B)	Weighted score (AxB)
Urbia ancestral land	Indigenous land		Here man was born, his culture and love for the land and what it gives them.	
Solar energy	Energy from nature that is permanently renewed and does not pollute		It would light up the life of each Wayúu	

Benefits	Quality of life, food safety	The health of each Wayúu is important because each patient weakens the plants

Source: Own elaboration

All the interviewees start by explaining the importance of the family and how it is the woman who is in charge of providing the lineage, that is why in a marriage it is desired that women be born because of the inheritance of the lineage and men so that they help in the different economic activities. They also show how their social organization is given their beliefs and within them is the respect for nature. Finally, they showed interest in knowing more about solar energy and what would be the benefits that they would have if this type of projects such as wind power were implemented in the area as long as they do not affect nature and even less its sacred sites.

Table 4. *Preferences Matrix*

	Weighted Score		1850
Tracks	30	5	150
Employment	40	8	320
Drinking wáter	60	9	540
Energy	80	10	800
Transportation	20	2	40
	Weighted Score		1850

Source: Own elaboration

Once all the problems that afflict the community were listed, they were explained that they should prioritize and give a weight and a score, leaving only 5 criteria. They consider that the roads are very important, but they know that the government will never invest in secondary roads, and less tertiary.

With regard to employment, they gave it a score of 320 and they explain that if the different projects that they are mentioning are developed, they could access and improve their quality of life. For them, the most important thing is access to electricity, which they rated with 800 points. They state that with energy they can access underground water or a desalination plant, have public lighting, refrigeration and appliances that they do not have, such as television, transportation would be difficult if They don't have good roads.

Participatory Mapping

In the meetings with the community, the objectives of the research were socialized, from the elaboration of the map, it was possible to find out about the physical, economic and cultural resources of the community of the formal and informal

associations, of the organizations and of the subjects, where their popular knowledge was included. The location of each resource was very specific, to later facilitate the construction of the map.

For the social mapping exercise, two groups were organized made up of adults and elders from the community who remember what Cabo de Vela was like before and by young people who have current knowledge of the territory. Each group worked on the elaboration of a map of Cabo de Vela; Annex A represented the territory before the development of tourism. The (Annex B) represented the territory of a more internal settlement (figure. 3). Each of these maps allows us to reflect on and compare changes in lifestyles and changes in the landscape.

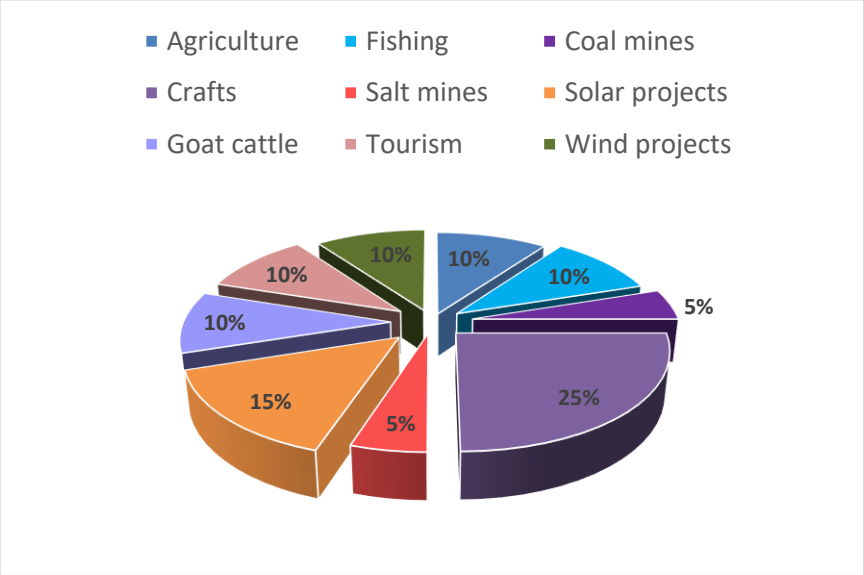
In social cartography it is important to take into account all the factors that are related to the environment and with which the territory is represented and which can be modified according to the dimension of the territorial effects, since the map of the past shows a territory more associated with the immediate environment, while the map above clearly refers to coal extraction, water and air pollution, the privatization of spaces, among other factors that can be seen in figures 2 and 3. At the time of socializing the map, two were chosen, one that shows the economic and tourist activity of Cabo de la Vela and another that is located in the internal area of Cabo de la Vela.

Participatory Workshop

On another moon, a participatory workshop was worked with the community, which had the objective to identify the main economic activities carried out by the community of the different settlements.

Of the 300 people who participated in the workshop, 10% of the people stated that their income comes from agriculture, goat care, fishing, tourism and wind projects, 25% of the women work in handicrafts, 5% work in the salt and coal mines and 15% work on solar projects as unskilled labor and a few as skilled labor.

Graphic 1. *Economic activities carried out*



Source: Own elaboration

At the end of the exercise, the community expressed interest in the use of photovoltaic energy, the questions revolved around the cost of installing this type of energy in the region and what benefits they would have, the people of Punta Gallinas asked if a plant was feasible community solar, they also saw it as a source of income that would allow them to improve their quality of life, they also considered it an opportunity to install decentralized FE services and more in these remote areas that do not have energy networks, on the other hand the company of Energy AIR-E would not be so pressured by the implementation of high voltage networks. It is important to remember that the current regulations for non-conventional renewable energies support this type of initiative.

Table 5. Interested parts matrix

Interested parties	Role
National and Foreign Investors	They provide the capital
Ministry of Interior	Verifies that the communities are aware of the project and that prior consultation is carried out
Ministry of Environment	Supervises compliance with environmental regulations
Electric sector	It is pending the generation of energy for its commercialization at the national level and the surpluses to sell them internationally.
ANLA	Grants environmental licenses for more than 100MW

Corpo Guajira	Grants an environmental license to projects of less than 100 MW and monitors and evaluates to grant the environmental license and throughout the development of the project.
Guajira Governorate	Supports the generation of projects with non-conventional renewable energies that support the development of the Department
Mayor of Uribia	Support the development of projects in your municipality that generate employment for the community
Companies that produce solar panels	They provide the different equipment required for this type of project
Banks	They offer loans for the development of this type of projects
Chamber of Commerce	Analyze the development of new businesses in the areas where this type of project is implemented
Community and Clan Leaders	The leaders of each clan and the Wayúu community are in charge of accepting or not the development of this type of projects on their land, as long as they do not affect their sacred places and the agreed commitments are fulfilled.

Source: Own Elaboration

Once the stakeholder matrix was prepared, the participating community explained who the entities are and the role they play in this type of project. The most important aspect of this exercise is how the community identifies the public and private institutions of the Regional, Departmental and National order linked to these projects. They are also aware that in order to work on these proposals they require training, in the same way investors who wish to develop projects on Wayúu lands also need to be trained on their culture, cosmogony and customs in order to enter the territory.

The elaboration of an action plan between the different Government Entities, investors and the community is a fundamental part when you want to implement Photovoltaic Energy projects. The participation of the Wayúu community of the municipality of Uribia allows the socioeconomic development of the area to improve the quality of life of the community of each ranchería and social development with equity, both for the population that participates in the project and for those who only want the payment of their compensation.

Table 6. Action plan matrix

Actividades	Recursos	¿Cómo?	Responsables
Formation of a commission of leaders of Clans of the Reguardo de la Media and Alta Guajira	Rancherías that wish to participate in the Photovoltaic project	Meeting of the leaders of each clan with the investors supported by Juan Cambar President of the Major Board of Babblers	Leader of each settlement
	Prior consultation, benefits that can be generated. Verification by the different entities		Entities responsible for renewable energy projects, Investors
	Socialization of the project		
	Signing of minutes		Ministry of the interior and leader of Clans
Production of the action plan	Achievement of the Environmental License by Corpoguajira	Advice from Corpoguajira, Ministry of the Interior	Corpoguajira and professionals who carry out the environmental study
	Environmental study	Preparation of training workshops	Community Trainers
	Training for investors and community professionals in new technologies		Investor Trainers
	Training for the community in management processes		

Source: Own elaboration

DISCUSSION OF RESULTS

The present investigation wanted to show the importance of social cartography when working with vulnerable communities such as the Wayúu culture, this process facilitated a recognition of the territory of Cabo dela Vela Municipality of Uribia, in the same way the active participation of the community allowed to elaborate the community maps where they showed their positive and negative realities of their territory, the most important thing were the social agreements between the community and the investors that would generate a transformation of the territory and the community.

Taking into account the above, Braceras (2012) considered that it is important when the reality of the community is changed and it is who identifies their problems, their capacities and assets, and is also capable of making proposals to improve the reality of the Wayúu population. Likewise, Oslender (2017) stated that social cartography is a methodology with which a reflection can be generated with the participants based on their lived experiences, the maps allow recognizing the Wayúu territory and the sociocultural aspects of each ranchería and the way how the population relates to nature and the importance that their cosmogony has for them.

According to Barragán et al., (2019) non-conventional renewable energy projects need sites where the amount of radiation guarantees the sustainability of the project and that benefits the community, as is the case of the Cabo de la Vela project where people who have never had access to the service, they will be able to have it at a low cost, thus improving their quality of life.

Similarly, Contreras (2017) stated that for photovoltaic projects to be developed, the participation of the community and investors is necessary in the identification of the territory, which generates trust, solidarity, and cooperation. When this type of alternative is given, the participants discuss the different social and economic opportunities that having electricity means.

On the other hand, Tovar-Ospino (2010) showed that the lack of electricity affects the Wayúu population due to the lack of drinking water, little access to health services, and an unbalanced diet that puts their lives at risk. Living in desert areas and not interconnected makes living conditions much more difficult and their unsatisfied basic needs exceed those of the country.

Authors such as Huesca, Sheinbaum, & Köppel, (2016) have suggested that electrical energy allows forging wealth and new job opportunities for the inhabitants of the Municipality of Uribia as long as the environment and the sacred places of the community are preserved.

Finally, Gómez et al., (2016) stated that the photovoltaic and wind energy that Alta Guajira can generate, would allow the generation of a true socioeconomic development of the population. This indicates that energy contributes to the development of the Wayúu population, its purchasing power is low because agricultural activities do not allow for a stable economy.

CONCLUSIONS

The qualitative research helped the community of the Municipality of Uribia to determine the problems that affect them, such as lack of employment, roads, drinking water, basic services, but the most important thing for them is the lack of electricity.

Participatory methodological strategies such as social cartography allow the achievement of opportunities between the community, investors and the state, which could be evidenced in the present investigation, since it started from a recontextualization of community assets such as knowing the territory, the rapprochement between the community and the arijunas (investors), and the agreements reached, supporting the importance of community work.

Starting from social cartography, the Wayúu community socialized their culture, knowledge, customs, practices that account for their reality and daily life on the participatory map and in the workshops.

La Guajira is characterized by having the best solar radiation and the strength of its winds, so the implementation of photovoltaic energy projects would improve the quality of life of the community.

The development of community photovoltaic projects for those areas that are not interconnected would make it possible to obtain resources from royalties, generate local infrastructure and encourage the development of these families.

The quality of life of the community of the Municipality of Uribia is due to the lack of electricity, having this service would mainly improve their conditions of food conservation, medication refrigeration, lighting of their homes, public lighting, recreation, management of desalination plants and the development of commercial activities. At the same time, it was established that the potential of non-conventional renewable energies that the guajira has allows the development of new community enterprises.

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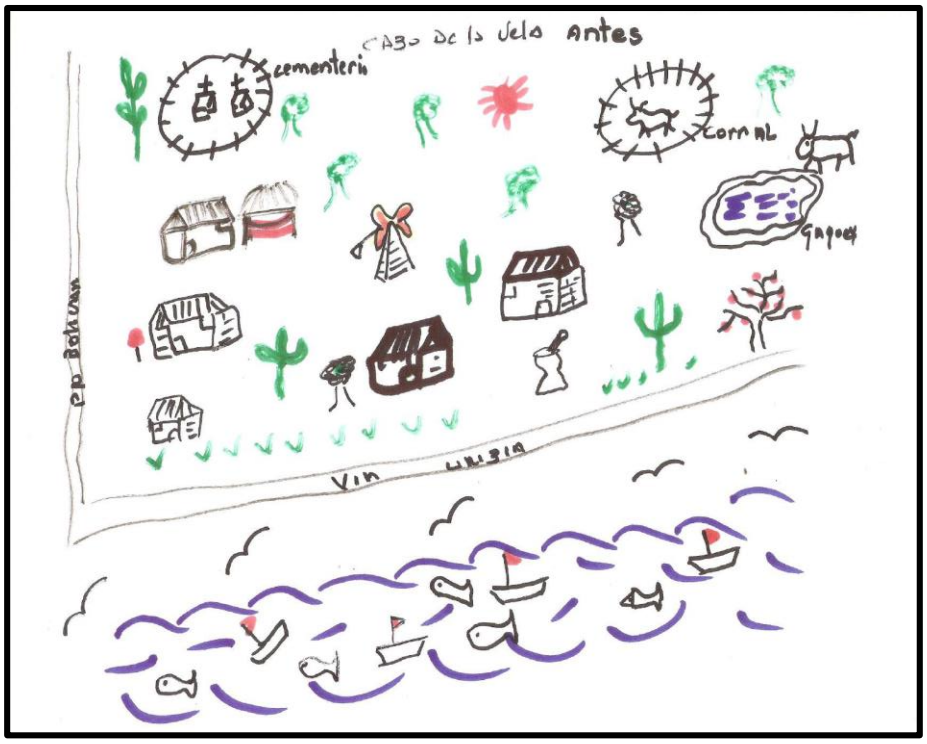
ANNEXES

Annex A. Map of Cabo de la Vela before tourism development



Annex B Map of Cabo de la Vela With Tourist Development