



## Social & Environmental Aspects at La Yesca Hydropower Project.

### Abstract

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*La Yesca Hydropower Project is located between Jalisco & Nayarit state limits, 109.5 km from Guadalajara city, in western Mexico, using Santiago River drainage, where other CFE<sup>1</sup> projects had been constructed, in a “cascade” sequence (Aguamilpa, El Cajon, and Santa Rosa). La Yesca Project is intended to produce 750 MW using two units for a total generation of 1210 GWh per year. A curtain of 210 meters high<sup>2</sup> will retain a reservoir covering a total area of 3,492 hectares, regulating both Santiago and Bolaños River drainages.*

*The present document is aimed to explain communication forms established between all parts involved within the project, in accordance to its competence; implemented programs for environmental fulfillment, compensation and restitution for affectations derived or caused by the project, as well as future perspective for operation phase, to attend related issues concerning environmental control, as well as gas reduction from greenhouse effect.*

### I.- INTRODUCTION

For La Yesca Project construction phase, a strategy including environmental and social impact aspects has been established, expressed on the *Environmental Impact Assessment*, with which authorization was granted. This strategy has been improving along construction process, within real conditions present in this particular project, considering the involvement of different areas and departments in CFE's organizational structure, as well as Municipal, Federal, and State authorities, local representatives, and interested parts.

Results of the participation of all of the above, was defining environmental control actions, social compensation and mitigation, addressed to the fulfillment of environmental authorizations, and involvement of all interested parts, in order to perceive an improve on infrastructure, services, and productive activities, propitiated by the project.

Organizational structure within CFE includes different areas attending several aspects between diverse departments, as well as outer institutions related to the project. Derived from General Construction Department, a Social & Environmental Department exists.

Within the project, numerous proceedings including supervision and monitoring actions concerning contracts, permissions, concessions, etc. take place, as well as environmental fulfillment actions, permit and consent procedures, real estate payments to land owners, social compensation projects and additional benefit actions supporting local population are included. At the same time, permits, supervision and monitoring procedures concerning government federal institutions are being followed, in order to grant legal, environmental, and archaeological authorizations, among others.

Other kind of actions are related on attending different social issues and needs: health and education programs, diverse employment training, as well as fishing, agricultural & livestock productive programs, attending local individual and community claims, etc.

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<sup>1</sup> Federal Electricity Commission is a Government Corporation aimed to Energy Generation and Distribution all over Mexico and several Latin American countries.

<sup>2</sup> Curtain's construction volume will equal twelve times Teotihuacan's Pyramid of the Sun.

## II.- APPROACH

Social and Environmental Project's Approach starts under following premises: A).-Projects derived impacts; B).-Impact control actions, and C).-Geo-economic conditions on the area related with the project, in order to reduce social lags, as well as promote and increase benefits.

Social and Environmental actions to achieve are: Prevention and control of negative impacts, Affection Restitutions, Compensation for non-controllable impacts, Promoting and executing actions to improve life quality on population related with the project, and new opportunities development.

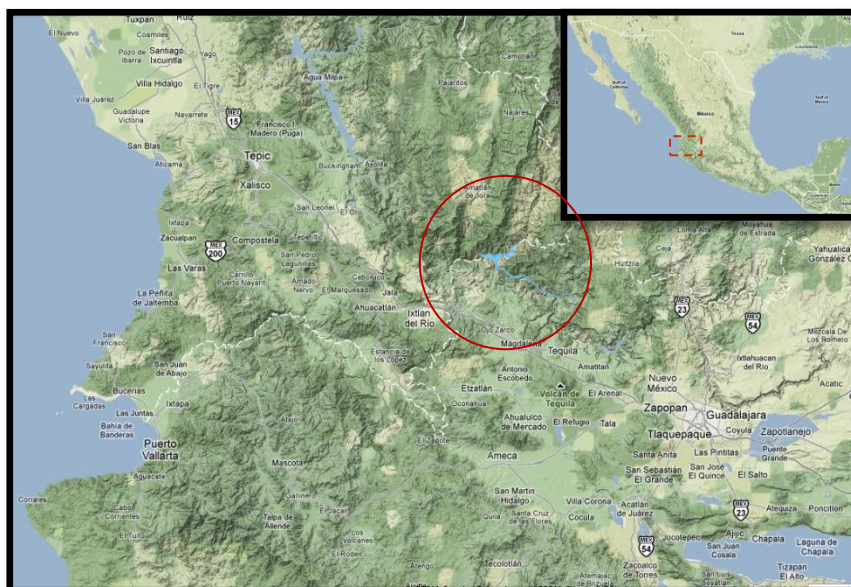
Previous studies had been undertaken prior to project construction:

**Environmental Impact Assessment (EIA):** In August 2006 resolution was granted. Actually, La Yesca Power Project is on fulfillment process for its terms and conditions. Up to date, eight semester reports had been presented.

**Technical Study for Land Usage Shift:** A total surface covering 2, 617hectares for main and derived construction works, as well as reservoir area.

**Archaeological Survey:** Between 2006 and 2007, archaeological field work has been undertaken, in order to obtain INAH'S<sup>3</sup> federal authorization, concerning access road highway, main construction, and reservoir area. Since 2008, several archaeological surveys had been conducted regarding associated construction projects.

Strictly following EIA's terms and guidelines, most important aspects considered for site selection were: 1.- A site along the drainage where a suitable topographic unevenness exists, for electric energy generation. 2.- Appropriate geologic and geotechnical features for curtain's construction. 3.- Take full advantage of drainages along river basin for maximize useful reservoir capacity. 4.- Material availability for curtain's construction and concrete fabrication. 5.- Low reservoir surface level in relation to curtain's height. 6.- Low population density involved with reservoir formation. 7.- Ethnic groups absence. 8.- Minimal infrastructure affectation.



**La Yesca Hydropower Project localization.**

<sup>3</sup> National Anthropology & History Institute.

### III.- ENVIRONMENTAL ASPECTS

According to the EIA, a series of conditioning terms had been observed and fulfilled along all project phases, such as: Environmental Compensation Programs, Designing a Soil Restoration and Conservation Program, Undertake an investigation program, covering from Santa Rosa Dam, up to Santiago's River mouth, on the west coast, creation of a Natural Protected Area, etc. aspects that have been attended in coordination with DGIRA<sup>4</sup>, CONAFOR<sup>5</sup>, CONANP<sup>6</sup>, and Guadalajara University.

Actually in process, it has been looking for an agreement with CONANP a financial operation mechanism of Conservation & Management Plan (CMP) from La Yesca polygon area, as well as formalizing an operation agreement, reporting all advances to DGIRA.

For its importance on the national infrastructure context, up to date, nine PROFEPA<sup>7</sup> inspections from Jalisco & Nayarit had been undertaken. All this inspections had verified correct fulfillment of terms and conditions of authorizations in Environmental Impact Assessment (EIA) and Land Usage Shift.

In July 2009, La Yesca Project joined the *Environmental Voluntary Audit National Program*, including principal structures, access highway, the new Analco Bridge, and its access roads. Three semester reports had been delivered to PROFEPA for validation. Goals to achieve are: 1).- Obtain each semester PROFEPA's certification on environmental compromises project fulfillment along its construction phase. 2).- From beginning of operation phase, settle conditions to obtain *Clean Industry Certification* in short term.

In other hand, CFE has been working along with the *Interamerican Development Bank* to obtain Carbon bonus from La Yesca Project, under technical assistance, contracting consultant firms for PDD elaboration and validation, as well as project registration before U.N. by a designated operation entity. Also, supporting CFE to commercialize Emission Reduction Certificates has been accomplished, with an estimated benefit around \$70 to 140 million dollars, without Bank receiving any compensation.

### IV.- SOCIAL ASPECTS

Tequila, Hostotipaquillo and La Yesca state districts are directly involved, caused by reservoir area covering different land portions on them. All three districts present high marginalization levels, due to its roughly topographic conditions on the Sierra Madre Mountains.

A series of different programs and actions had been applied to support surrounding population, in order to improve their life quality condition, taking advantage of project's presence. Some of these actions deal with: health, education, environment, employment opportunities, productive activities support regarding agricultural & livestock productive programs: cattle rising, breed improvement, vaccine programs, agricultural technical assistance, fishing programs, tourism projects, etc. as well as improving urban infrastructure among several settlements related with the project.

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<sup>4</sup> General Environmental Impact Assessment Agency.

<sup>5</sup> National Forest Commission.

<sup>6</sup> National Commission for Natural Protected Areas.

<sup>7</sup> Federal Environmental Protection Agency.

Restitution Projects are aimed to improve life quality level of affected people, due to reservoir formation. A *Home Restitution Program* to attend eight families by nine new broad, comfortable, and secure homes were constructed, with spaces for familiar connivance, including all basic services: sanitary, water, electrical energy, etc., as well as a couple of warehouses, in order to improve their life and working conditions.

Communication roads restitution is also considered as well. Several local roads had being constantly maintained; nevertheless a new 40 km road leading from the dam up to La Yesca town is actually under construction, attending a district petition. Renovation with paved stone of an old 11.35 km road to *El Llano de Los Vela* community is almost concluded. Renovation with paved stone of an old 4 km road to Santo Domingo de Guzman community is underway.

A couple of actual bridges crossing Santiago River will be flooded. One of these will be substituted by crossing over dam curtain's top. Second Analco Bridge will be restituted by a new one, larger and taller.

Compensation Projects scope the following: At *Mesa de Flores* community, commerce places and house improvement project has been applied. Improvement consisted on sanitary units, potable water net, sewers, electrical energy installation, as well as general house repairs (walls, ceiling, floors, interior and exterior painting). Personal and constant communication was established with owners for support and coordination during execution time. This project included a total of 15 households, for 15 families, benefitting 78 habitants.

Roadways and urban equipment (garden pits, paving stones, benches, public lighting, etc.) were improved for connivance and recreation.

Two new schools, one at Mesa de Flores, containing two classrooms were constructed for Kindergarten and primary levels. Second school was constructed at *Las Conocas* community.

Reservoirs: These are artificial water pools for retaining rain and natural slope drainages for cattle and/or agricultural purposes. Up to date, 80 had been constructed in Nayarit and 50 in Jalisco, benefitting 150 ranchers.

At Hostotipaquillo town, a specialized medical clinic was arranged, improving its construction, as well as medical equipment, benefitting 3,500 habitants.

A series of secondary roads reaching 25 kilometers had been opened, communicating isolated communities.

Renovation and road maintenance covering 379.48 km, at Hostotipaquillo, Tequila and La Yesca districts.

Electric power installation on 17 isolated communities at La Yesca district will help in terms of health, education, communication and improvement on life conditions in general, implicating a better service and appropriate maintenance.

Construction of three bridges across the Bolaños River, at *El Yesquero*, *Apozolco* and *Los Sauces*, communicating all these communities.

## V.- CONCLUSIONS

For environmental aspects, at construction area, laws and rules are clear concerning environmental construction control and environmental audits, At reservoir area, several studies for flora and fauna affectation had been done, as well as management plans applied to species monitoring. For influence area, a series of environmental compensation, soil and vegetation loss programs, and the creation of a Natural Protected Area, as well as a Management Plan has been implemented. All these actions had been taken from inside *CFE*'s Environmental Department Area, in coordination with several agencies and institutions from the outside. This reveals a clear path of rules, laws and actions that has to be followed, at Construction, Reservoir and Influence areas, as clear are the institutions and government agencies that are involved to work with.

Regarding social aspects and regional development, several studies and a public consultation had been done at the beginning of the project, in order to define productive activities programs (Cattle, Agriculture, Fishing, Tourism, etc.) with *CFE*'s specialized personnel, bringing together a number of institutions, agencies and universities.

It has to be pointed that with the projects arrival, a series of demands and claims are to be attended at different levels, going from landowners petitions, up to local, municipal and state supporting, helping to fulfill State districts developing plans.

Nevertheless a problem has to be underlined: various government administrations at different levels, as well as representatives of Civil society are waiting for *CFE* to determine work lines and actions that are to be applied and have to be done: roads, electrification, housing, services improvement, etc. Many institutions, federal agencies and government departments' don't make a stand on leading these activities, with a series of development action plans that could be organized, in order to take a better advantage of project's presence.

La Yesca Hydropower Project, as all *CFE* infrastructure projects in the last decades, has been working under Impact Assessment guidelines. All along this particular project's construction, terms and conditions have been applying and improving day by day showing its importance and utility.

Application of EIA's terms and conditions in both, environmental and social aspect has proven to be on great importance for infrastructure projects success. Serving as a working guideline, most permits, authorizations and concessions are not only too much easier to obtain at every level; at the end, both aspects traduce in a better life quality for people; This is the reason *CFE* has been working on.



**Programs and Actions applied to Environmental Social Aspects.**

## VI.- REFERENCES

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**La Yesca Hydropower Project's Curtain.**

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