

# Towards Energy Sustainability in Ecolodges for Latin America: A case in the Bolivian Amazon

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## 1. The Ecotourism is a sustainable development tool

Sustainable tourism has been a key concept for tourism researchers and the tourist industry alike since the early 1990s, and also environmental organizations are promoting the ecotourism as a tool to improve nature conservation and cultural heritage in an important variety of ecosystems with some kind of protection<sup>1</sup>. Socioeconomic analyses from different sources are coincident in the value of ecotourism to develop productive activities among local communities<sup>2</sup>; the ecotourism could be a major strategy to eradicate poverty in rural regions of Developing Countries, see figure 1. In the Less Developed Countries, tourism earnings as a share of all services were 70.6% in 2000<sup>3</sup>; it is almost universally the leader in the economic growth, foreign exchange, investment and job creating sectors.

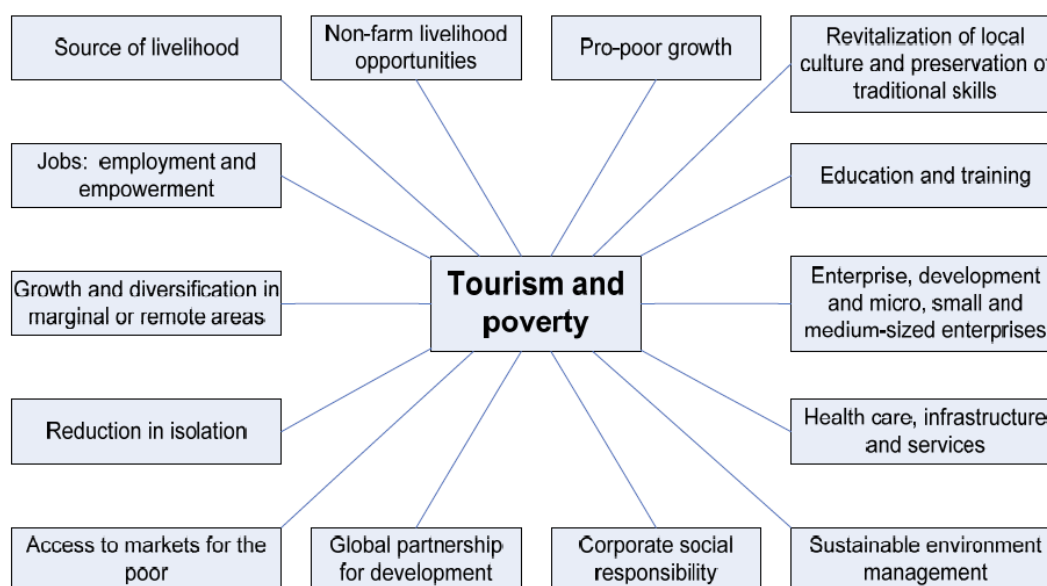


Figure 1 - Linkage between tourism and poverty reduction<sup>4</sup>

The big interest in the ecotourism sector is to strongly mobilize the tourism market. In the case of developing countries, also the cooperation and environmental sectors are implied in the activity because the ecotourism can help protect biodiversity by creating incentives to protect it and improving the quality of life of local communities. Important efforts on the subject are being dedicated by international organizations such as World Tourism Organization (WTO), United Nations Environmental Program (UNEP), World Wildlife Fund (WWF), Convention on Biological Diversity (CBD), and many more agencies providing relevant assistance, including NGOs, regional organizations, bilateral aid schemes and private sector bodies. In consequence, many support actions are in process, which are producing a huge bibliography about ecotourism.

All of these groups stress the sustainability exigency for ecotourism, i.e. guarantees in form of eco-label certifications are in development; however, the question of how to achieve this goal in the energy area remains an object of debate. Even with the considerable quantity of ecotourism guidelines published, and although these guidelines highlight the importance of the energy topic, none of them enter into detail about it.

All stakeholders accept or encourage the use of renewable sources for all energy services related with ecotourism, but the new energy sources are still poorly distributed, even though they are now a true alternative for many applications<sup>5</sup>. Also, in some cases, bad experiences caused by the low skill of promoters and the lack of maturity on these new energetic resources are hindering the diffusion of such as sustainable energies. However, a recent survey about tourist preferences to select accommodation show that 87% of the respondents would prefer to stay in hotels equipped with renewable energy services (RES), rather than staying in hotels of identical quality which do not have RES. Furthermore, the percentage of respondents who would be willing to pay fee surcharges for a hotel equipped with RES is 77%. Tourists from countries with high energy awareness, prove to be more willing to choose to stay at and pay for these ecological friendly hotels<sup>6</sup>.

## **2. The ECOTUR-RENOVA Project**

This project, funded by the Programa Iberoamericano de Ciencia y Tecnología para el Desarrollo, CYTED (Latin American Science and Technology for development Program), analyses the energy service requirements in sustainable tourism and will spread knowledge about renewable energies among the ecotourism stakeholders of Latin America. The target groups are local communities in protected areas, because they are the less up to date groups and, frequently, they are living in the most fragile

ecosystems, but also the most fertile in biodiversity; their living standard is very low and the ecotourism can be a successful economic resource. The regions considered are ecosystems in Latin America which have some protection degree and are managed by local communities. The selected countries to implement renewable energy infrastructures in ecolodges are: Bolivia, Ecuador and Peru. Also low cost telecommunications infrastructures will be installed to improve the diffusion among potential clients of the ecolodges, in order to permit direct reservation of the services.

Other criteria to select the ecolodges are that they should be businesses already constituted and with community management. The commitment of the community owners of the ecolodges with the new renewable resources requires partial financing of the infrastructures. The technology options for electricity production considered are: photovoltaic, wind energy and micro hydraulic, with diesel backup. Preliminary studies about the potential ecolodges' receptors of this project show that a PV-Diesel solution is frequently the best option. The electricity storage will be based on lead-acid batteries, but hybrid storage with lithium ion batteries will be implemented also in some installations. In some places domestic hot water is a need, i.e. in the ecolodges located in the High Plateau; it will be produced with solar thermal energy. Additionally, we have been testing solar refrigeration solutions, which are in a pre-market phase, to verify its reliability before to propose their use in ecolodges. In terms of energy requirements for the ecolodges we have considered daily energy consumptions between 3 to 15 kWh.

Case studies have highlighted both disempowering and empowering impacts of involvement in ecotourism for women; the experience shows that it is not a gender neutral activity<sup>7</sup>. In fact, in Latin America it is this gender group which usually manages the tourist accommodation and handcraft tasks for markets. The project dissemination will take into account this fact, promoting the participation of women in the training seminars, particularly from local communities.

The project consortium is composed by the Instituto de Energía Solar (Spain), from Technical University of Madrid, which is the coordinator and the consultant in PV systems; CIEMAT (Spain), stand-alone wind systems; Fundación EHAS (Spain), expert in information and communication technologies for rural areas in developing countries; Energetica (Bolivia), CER-UNI (Peru) and FEDETA (Ecuador) are the local institutions in the recipient countries, which are in charge of design, installation and management of infrastructures; TUSOCO (Bolivia), that is a non-profit association for community based ecotourism; and UNISINOS (Brasil), which is in charge of designing and testing solar refrigeration equipment.

### **3. Community-based Ecotourism in Bolivia**

Bolivia's tourism trade is growing, with more than 800,000 travelers in 2010, according to the World Bank. Ecotourism is an important segment of Bolivia's travel industry, and the government has responded by launching a wide range of projects aimed at keeping these destinations pristine and giving travelers more options for visiting the country without damaging the environment. The Bolivian institution in charge of the 22 National Protected Area (Bolivia has 123 Protected Areas in total) is the *Servicio Nacional de Áreas Protegidas*, SERNAP (National Protected Area Service), that depends of the Environment and Water Ministry.

Since the mid '90s community based ecotourism initiatives have gradually emerged to form a large group of tourist services; there are about 100 community initiatives across the country of which about half are working permanently. The enterprises usually repeat this touristic pattern: trekking and accommodation. In 2011, the National Protected Area System had 34 touristic ventures of this type, involving nearly 700 families (an average of 20 families is estimated by Community initiative) and generating about 140 jobs<sup>8</sup>. Some of these community-based organizations are associated members of the TUSOCO Network, one of the project consortium partners. At present time, this network is composed by 22 enterprises located in all Bolivian Departments.

### **4. An Ecolodge in the Bolivian Amazon**

The ECOTUR-RENOVA project will provide electricity services in three Bolivian ecolodges, two managed by the SERNAP and the other is a member of TUSOCO. The first ecolodges are located in the National Park Eduardo Avaroa in the Potosi Department; with 82,000 visitors per year it is the most visited of the country.

The first installation, now in the design phase, will be undertaken in San Miguel del Bala, an ecolodge in the Parque Natural del Madidi, in the Bolivian Amazon region, that is managed by 35 *Tacana* families, an indigenous community. It is located on the banks of the Beni River, only 45 minutes from Rurrenabaque, which is considered the "entry door" of the Bolivian Amazon. Lack of a continuous and sustainable electricity supply in the eco resort creates vulnerability in tourism; the illumination is covered by the use of candles or other poor lighting systems. The resort is composed by seven double cabins, two multiple cabins, two bathrooms, a kitchen and dining room, an information center and an office. At the moment, the electricity is provided with three small PV generators, 350 Wp in total, and a 5 KVA petrol generator. The services provided are illumination, VHF communication radio

and small kitchen appliances (mainly a blender for juice extraction), with a total daily consumption of one kWh.



**Figure 2. The kitchen and dining room (left) and one of the double rooms (right)**

The services provided with the new electricity infrastructure will be:

- LED illumination
- Efficient central fridge
- Low consumption fans
- Mobile phone charge
- TVs
- Small kitchen appliances
- Printer, computer, wifi modem

The total consumption estimated is 11 kWh/day and the distribution grid will be 220V AC. The electricity will be produced by a 4-6 kWp PV generator and the present petrol generator will be used as a backup resource.

Although the topology is not decided yet, we have considering hybrid storage with lead acid and lithium ion batteries. Recent studies<sup>9</sup> have shown that this combination can improve the life cycle of the battery system. On top of this, we can add that Bolivia is one of the biggest world exporters of lithium - 40 percent of the world's confirmed lithium reserves are in the Uyuni salt lake- and in January 2013, Bolivia opened its first industrial lithium-ion battery plant with the support of The Netherlands; producing 40 tons of lithium carbonate a year.

An initial scope of the area and the needs of the ecolodge have been already performed and the construction and operation of the renewable energy system is forecast at the end of 2014.

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<sup>1</sup> *Guidelines for community-based ecotourism development*, WWF International, July 2001.

<sup>2</sup> *Sustainable Tourism as a Development Option - Practical Guide for Local Planners, Developers and Decision Makers*, GTZ, 1999.

<sup>3</sup> *Tourism and Poverty Alleviation*, World Tourism Organization, 2002.

<sup>4</sup> *Tourism and Poverty Reduction – Making the Links*, Pro-poor Tourism Partnership, 2004

<sup>5</sup> *Switched On: Renewable Energy Opportunities in the Tourism Industry*, United Nations Environment Programme, 2003.

<sup>6</sup> Konstantinos P. Tsagarakisa et al., *Tourists' attitudes for selecting accommodation with investments in renewable energy and energy saving systems*, *Renewable and Sustainable Energy Reviews* 15 (2011) 1335–1342

<sup>7</sup> Regina Scheyvens (2000). *Promoting Women's Empowerment Through Involvement in Ecotourism - Experiences from the Third World*, *Journal of Sustainable Tourism* Vol. 8, No. 3, 2000.

<sup>8</sup> *Estrategia para el desarrollo del turismo en el Sistema Nacional de Áreas Protegidas*, Servicio Nacional de Áreas Protegidas, Ministerio de Medio Ambiente y Agua, 2011. Downloaded from <http://www.sernap.gob.bo>

<sup>9</sup> Garimella, N.; Nair, N.C., "Assessment of battery energy storage systems for small-scale renewable energy integration," *TENCON 2009 - 2009 IEEE Region 10 Conference* , vol., no., pp.1,6, 23-26 Jan. 2009