

Ecological Museums: Sustainable tourism and restoration of biodiversity

Museos Ecológicos: Turismo sustentable y restauración de la biodiversidad

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Received June 27, 2018; Accepted September 18, 2018

Abstract

This transdisciplinary research promotes the restoration of biodiversity and tackling climate change through a critical museology that starts the inter-institutional development of a Network of Ecological Museums in Mexico, with an educational model with immediate action that acts on the basis of sustainable tourism, social entrepreneurship and cultural identity. The first case – Magic Town of Mazunte, Oaxaca - plans an archaeological/ecological museum that disseminates ancestral roots and regional biodiversity, to the Mexican people and international tourism. The museum will seek to promote ecological awareness in all social and productive sectors; and one of the fundamental strategies will be using high-impact spectacular exhibitions through multisensory exhibitions operated by mechatronics and clean energies within an ecological-demonstrative architecture. The museum will promote the restoration of ecosystems through ecological engineering that allows the cultivation of regional domestic flora for diverse markets, with community economic benefit, and through preservation strategies that encourage the protection of local fauna on earth/coast/sea. It will have cybernetic educational technology to widely extend free environmental instruction; in addition, it will have documentation centers, eco-technological training and civil protection in a region (until today) marginalized and with high social risks due to the threat of natural disasters.

Ecotechnics, Mechatronic, Educational technology

Resumen

Esta investigación transdisciplinaria promueve restaurar la biodiversidad y afrontar el cambio climático mediante una museología que inicia el desarrollo de una Red de Museos Ecológicos en México, con un modelo educativo de acción inmediata que actúa sobre la base del turismo sustentable, emprendimiento social e identidad cultural. El primer caso –Pueblo Mágico de Mazunte, Oaxaca- planea un museo arqueo/ecológico que divulgue raíces ancestrales y biodiversidad regional al turismo nacional/internacional. El museo promoverá la conciencia ecológica en todos los sectores sociales y productivos. Una de las estrategias fundamentales será realizando museografías espectaculares de alto impacto a través de exposiciones multisensoriales operadas por mecatrónica y energías limpias dentro de una arquitectura ecológico- demostrativa. Aunado a ello se busca que el museo promueva la restauración de los ecosistemas mediante ingenierías ecológicas que posibiliten el cultivo de flora doméstica para mercados diversos en beneficio económico comunitario, y mediante estrategias de preservación que exhortan la protección de la fauna local en tierra/costa/mar. También, contará con tecnología educativa para extender ampliamente la instrucción ambiental gratuita por Internet; además, tendrá centros de documentación, capacitación ecotecnológica y protección civil en una región (hasta hoy) marginada y con altos riesgos sociales por la amenaza de desastres naturales.

Ecotecnia, Mecatrónica, Tecnología educativa

Citation: CORREA-FUENTES, Miguel Ángel & CUEVAS-OLASCOAGA, Miguel Ángel. Ecological Museums: Sustainable Tourism and Restoration of Biodiversity. Journal-Agrarian and natural resource economics. 2018. 2-3: 26-41.

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Introduction

Undoubtedly, global warming and climate change with rising sea levels, pollution and acidification of the oceans, together with the massive destruction of ecosystems and the decrease of natural resources due to the exponential growth of the population with human activities expanded as never before, is a problem of global magnitudes that is unprecedented in human history.

From the Industrial Revolution, the economy was suddenly driven by a production based on energies obtained by mineral and fossil fuels, before the scientific and technological expectations of that time to conquer an infinite planet, of immeasurable wealth and with vast natural resources; vision that today, almost two centuries of having started the process, has serious consequences for the balance of the biosphere, as it had never happened in the world for 65 million years (NatGeo 2016).

For the National Commission for the Knowledge and Use of Biodiversity (CONABIO 2006), the state of health of the Earth's ecosystems are extremely severe: half of the world's tropical and temperate forests disappeared, as well as half of the wetlands and one third of mangroves; 95% of large predatory fish have been lost and 75% of fishmongers have been depleted; 20% of the coral reefs disappeared and their degradation continues; the majority of semi-arid agricultural lands are very deteriorated and numerous toxic substances of the industry are found in the cells of our body.

The storage of fresh water doubled in the last 40 years, which represents more than 25% of the flow of all the rivers in the world, some of which no longer drain into the sea in periods of drought, in rivers so large in the past like the Colorado, the Yellow, the Ganges or the Nile.

Current energy production and transport use fossil fuels that emit 3,500 million tons of carbon per year in the stratosphere, which have caused, in a few generations, climate change with imponderable and perhaps irreversible consequences (CONABIO 2006, 8), at least for the next 10 thousand years (NatGeo 2016).

The future of the Earth is discouraging, mainly because of the goals imposed by all nations for sustained economic growth, with productive activities that increase energy demands (largely supplied by combustion) and increase pressure on natural resources, already devastated, in front of the unbridled population growth and the consequent pollution that do not grant any opportunity to the planet to recover on its own. Mexico is a megadiverse country and has a huge natural capital, therefore, it requires complex forms of use and management for the sociocultural and ecologically balanced development of the immediate future: our biological and cultural diversity requires great sensibility and social sensitivity with high resolute capacity before the complex conflicts that arise in the relationships of the components implicit in this challenge:

The challenges imposed by our mega diversity in national life are ignored or disregarded, which has led to loss or deterioration; the loss of our natural capital and the serious marginalization of important sectors of society, which are the owners of that natural capital -and that depend on it-, while also being the most marginalized from the socioeconomic point of view (CONABIO 2006, 9).

The misery in the countryside and migration, the lack of opportunities and the social repercussions of activities and the fight against organized crime along with erosion, soil infertility and depletion of fisheries, destruction of forests and extinction of unique species, are the conditions that prevail today as a result of our irrational way of life; situation that leads to having depleted, contaminated and overexploited ecosystems without the possibility of recovering. To face this biological-cultural reality of our country is to face our own commitment, responsibility and destiny before its enormous natural capital:

This is the heritage we must know, learn to manage sustainably and appreciate and preserve for the benefit of all Mexicans. This is not knowledge that we can import from other regions or countries; we have to generate it fundamentally in ours, with our own human capital. Ecosystems are not transportable from one place to another, as are the environmental services they provide or their biological diversity.

Both government programs and civil society must understand these ideas as a **priority of the highest hierarchy**, since they permeate day by day all aspects of the national economy, society and security. (*Id*, 11).

The management of biodiversity concerns a viable and competitive society with a sustainable material base that ensures the future of the country, with the survival of our biological and cultural heritage as part of the complex natural world:

In Mexico, there have been discrepancies and confrontations between development and efforts to conserve and sustainably manage ecosystems. It is time to assume that this should not be the case. Sustainable development implies a sustainable economic development with permanent social welfare, bounded by the environmental characteristics of each region (*Ídem*).

The research presented here is inserted in the National Development Plan of the Government of the Republic of Mexico considering the last axis of 5 main ones: **"Mexico with Global Responsibility"**. And under the goal of "strategies and lines of action" that has to do with *promoting the value of Mexico in the world, through economic, tourist and Cultural dissemination*. (PND 2013-2018).

Due to the above, our research takes strategies and actions to reverse this situation, changing the anthropocentric and sustained destructive development position at all costs for a holistic vision of the biosphere, with respect to nature through sustainable productive activities under the rigorous magnifying glass of the ecology and with economic benefit for the communities that apply them. We value and encourage the promotion of strategies that allow us to communicate and persuade the change of social vision by an ecological way of life, by means of spectacular and impressive museographies without losing the sense of cultural identity, which at the same time impact and impact directly - through the instruction- in sustainable economic and tourism activities to achieve balance with permanent restoration and conservation actions by the own communities that own each natural landscape: fundamental participation with substantial benefits without which it is impossible to face this great challenge.

Museums are means of education, transcendental communication and agile instrumentation to transform themselves into pioneering entities and agents that promote, speedily and interinstitutionally, social action responses that overcome the bureaucratized management of other instances and, also, complement and interact with the replicas of the Other entities dedicated to review, investigate and solve the problem of biodiversity in the 3 levels of government and in the international order.

Our proposal is based on a Critical Museology that analyzes current social problems to propose action strategies that give a new magnitude and meaning to the museum (Hernández 2006, 201), conceiving the museum space as an appropriate place to socialize knowledge with an interdisciplinary dialogue that generate new discourses for the society of the future (Santacana 2006, 19).

The **core** of our proposal is located in the natural / cultural / touristic heritage of the peoples that own the ecosystems, based on the territorial characteristics of each municipality, through multi-inter-transdisciplinary programs and strategies (science, art, technology, engineering, architecture, tourism, education, anthropology, sociology, philosophy, economics, museology, communication, among others) with governmental and international programs that intersect our **central object**: the regional heritage, with the sustainable tourism and economic links implicit in the environment of each project, to restore and conserve biodiversity by acting exemplarily through a museological **model** of community participation under the vision of social entrepreneurship that - once perfected - will lead to cover other regions of the country.

The **central problem** lies in creating intersectoral relations and communicative, educational, productive and supply conditions of products and services needed in local communities to work in favor of biodiversity, to restore and conserve it permanently without detriment to regional social improvements.

Our **hypothesis** establishes that, only by communicating and persuading the public to become ecologically aware with a striking museology based on their own cultural identity, with a relational aesthetic that entails applying what is captured in the exhibitions through solutions of immediate application to productive, tourist activities and domestics with local and regional community economic development -validated by communication and instruction in the specialized ecotechnological centers of the museum and other institutions, with the opening of possible markets to market the regional sustainable products and services that the community will offer-, will be counted with a solid platform to guarantee the restitution of biodiversity by the community itself, giving continuity through its traditional governance (uses and customs), overcoming the periods of the transpolitical administrations in the 3 levels of government and, consequently, re to support continuous inter / national scientific support, since the problem is endogenous and at the same time globalized.

This article describes our approach with the first case study: Magical Town of Mazunte, Oaxaca.¹ Then he explains the development of the research through the following sections: 1) **Museological Model**, which establishes the foundations of a Network of Ecological Museums in Mexico; 2) **Multisensory Museography or NeoMuseography**, as a powerful communication tool for museums as well as for Communication and Educational Technology; 3) **Mazunte Museum**, describes the Museum's vision and goals in relation to the ecosystems that must be met in its municipal territory; 4) **Educational Technology Units**, as a free dissemination strategy for the entire regional population; 5) **Value and Use** with the Policies of the international letters on the patrimony; 6) **Requirements of the public building** before the threat of earthquakes and cyclones, as well as exemplify the ecological architecture that will distinguish it. Then mark the 7) **General methodology**; 8) **Conclusions** that indicate the progress of this project and, finally, the acknowledgments to various people who favored and promoted this proposal.

¹ Oaxaca, State of the Republic of Mexico, located southwest of the national territory with coasts towards the Pacific Ocean. This State considered to be the most biodiverse in the country.



Figure 1 and 2 Marine species that inhabit the beaches and coast of the Mazunte region, Oaxaca, in Mexico
Author: Juan Eduardo Cruz Archundia (JEC) 2018

Approach

In this section we consider the elementary information to think and consolidate an Ecological Museum in the "Magical Town"² of Mazunte, with a model of education and social action that elevates the ecological conscience as a way of collective life, which promotes ecotechnics to reduce pollution, protect ecosystems, conserve and restore biodiversity with community benefit through sustainability, in addition to helping to reverse global warming with actions in productive activities and services as well as in domestic uses, tourism and civil protection. It means a look at the regional panorama with data from 2005-2010, a review that is guided by the formula of *entrepreneurship-social / community / investment* itself that is cited in an article on this topic (Correa 2015) in order to modify social attitudes in favor of the planet.

² It is called "Magical Town" as a distinctive of the Government of the Republic for purposes of cultural tourism promotion of peoples with great cultural and architectural background in the country. Created in 2001, to date has been awarded the badge for 111 towns in Mexico.

This is an initial reference to capture the municipal environmental problem and to visualize the conflictive relationships of its economic activities and social actors, as well as to ratify the viability of the Museum in the town of Mazunte (due to its strategic importance in the Puerto Escondido-Huatulco tourist corridor or "Ribera Oaxaqueña", who has a link with the tourist corridor of the coast of the State of Guerrero) to make decisions that consolidate a plan that activates the initiative of the Museal Preliminary, with the approval of the Council of the Magical Town³ so that, with their collaboration, the executive project will be developed during 2018 and, then, during 2019-2021, carry out the respective intersectoral procedures to achieve it.

Mazunte had 873 inhabitants in 2010 (9% of the municipal population) and belongs to the municipality of Santa María Tonameca (24,318 inhabitants) where 22% were economically active and 12% were illiterate; the municipality covers 0.5% of the state territory with 49,739 hectares, it is a rural region with 89 communities 7 police agencies, 2 municipal agencies and 1 head. 26% of the population is indigenous, mainly Zapotec; It also has Afro-Indigenous (Abajeña) population, which is why it has a great cultural diversity. Its relevant activities are: tourism, agriculture, livestock, fishing, forestry, aquaculture, conservation of natural areas and protection of species (Correa 2017a, 1).

In this sense, during the talks with community leaders, the topic of economic activity was relevant, since, despite being a world-recognized tourist center, job opportunities are limited for the inhabitants. Because of this, they welcome our initiative.

Its orography gives the municipality of Santa María Tonameca a great wealth of ecosystems and biodiversity ranging from forest, pasture, deciduous and semi-deciduous tropical forests and low plains with rivers, wetlands and lagoons to coastal areas and oceanic areas.

³ The council of the Magic Town is made up of people of recognized moral quality, assuming responsibilities to promote, conserve and disseminate the traditions of their peoples. They are original and recognized as leaders of their own communities.

In addition, it has a protected area by the National Commission of Protected Areas (CONAMP) in the Mexican Center of the Turtle and also other Areas Voluntarily Destined to Conservation (ADVC) by the inhabitants (Correa 2017a, 8).



Figure 3 Orography and sea of the Mazunte region, Oaxaca, in Mexico
Author: JEC, 2018

The CONABIO (2008) points out that because the ocean zone is connected to terrestrial ecosystems along the coastal zone and also to rivers and various runoffs, marine ecosystems have an immense biological diversity structured by physical, chemical interactions, geological and ecological that provide abundant goods and services for social development and are essential to maintain life on the planet.

However, these ecosystems are finite and vulnerable to over exploitation and bad practices in productive activities, therefore, it is necessary to reformulate them to clean, conserve and restore coasts and oceans so that they are healthy and preserve their biodiversity:

The seas and the coastal zone of Mexico are one of the pillars for national development. Unfortunately, environmental deterioration, with the consequent loss of marine biodiversity and many socio-economic resources, continues to increase every day.

Our country is currently one of the most fragile marine ecosystems vulnerable to the impacts of natural and anthropogenic phenomena. Unfortunately, until today, our country has not integrated or adopted responsibly the principles of sustainability (CONABIO 2008, 156).

Mazunte is a favorable place to face this ecological challenge due to its rural and multicultural category, as well as the national and international tourist flow and for being a strategic point that associates in its coastal zone diverse ecosystems and that, in addition, has areas of conservation and municipal ecological ordering. CONABIO highlights the emergency of serving coastal areas:

Coastal ecosystems are the most threatened by anthropogenic activity, due to the effects of industrial, agricultural, tourism, fishing and mining activity, and the discharge of urban waste, sewage and hazardous industrial waste. Wetlands in this area, for example, are among the ecosystems most affected by human activities, both directly and indirectly. This affectation is leading to a loss of environmental services of great importance for society. Deterioration trends are increasing and the measures taken are still insufficient.

The most contaminated ecosystems are in the Gulf of Mexico region, however, the coastal regions of the Pacific are seriously threatened by the unsustainable development (tourism, industry and aquaculture) that is occurring throughout the Mexican coastline.

In addition to the local or regional impact, there is now the threat of potential climate change, whose effects (warming and sea level rise) will affect all coastal ecosystems. **It seems that the coast of Mexico is dying silently, without the political will or social participation can stop this deterioration and possible loss** (CONABIO 2008, 128).

This alert call, issued 10 years ago, must be attended urgently to address the anthropogenic and conservation problems that afflict the Pacific area of Oaxaca, starting with the first museum in the Magical Town of Mazunte, which already has a State Ecological Law and a Municipal Ecological Ordinance (SEMARNAT 2011).

Museological Model

The Mazunte Museum stands as an indeterminate entity that will highlight the prehistoric and ancestral origins of the region and its relations with the environment, that is, with its natural landscape.

On the other hand, the investigations of the National Institute of Anthropology and History (INAH) that will be developed in Punta Cometa, recently declared as an archaeological zone, also serves as a convening entity among the local population to study and disseminate it.

In addition to recovering and cataloging the pieces scattered archeological; at the same time that the Museum will disseminate the biological wealth of the State of Oaxaca, the entity with the greatest biodiversity in Mexico (the country that occupies the 4th place in the world), and will disclose the current seriousness about the deterioration of the biosphere on the Pacific coasts South with meteorological threats and global warming, dangers that require providing long-term solutions to achieve social change and foresight to build a viable future for its inhabitants.

Therefore, here is proposed a museological model that articulates the dissemination of local cultural identity and regional ecological problems with research, technologies and social actions that will help address them, through *identity / knowledge / community / investment / entrepreneurship* where policies on development will provide the initial *government-private-international* investment for the community to carry the destinies of a long-term visionary model, with an economic perspective that grants permanence to the project and guarantees protection to the biosphere.

The aim is to overcome the political transitions that arise in the administrative exercises of the federal, state and municipal governments.

This statement is based on the consideration that a municipal museum requires at least 3 years to establish itself, 2 more years to stabilize and then, from the sixth year, consolidate and project in the long term; hence the need to have a strategy to overcome the aforementioned transitions. Social entrepreneurship will contribute - through continuous economic action with clearly defined environmental and environmental objectives - benefits to the community, tourism and biodiversity.

Conceive social entrepreneurship, as a museum vehicle that allows to overcome the transpolitical and administrative periods in the three levels of government for the execution of projects of community and environmental benefit, with a strategy that guides the efforts to produce jobs and self-employment with sustainable economic development, besides governing the activities with a vision of self-financing and community economic growth, it opens a door to transcend the governmental paternalism that historically has seen its social perspectives truncated at the end of its cycles.

The social enterprise proposed here is governed by a museological horizon that sees economic development with benefit in cultural and biological diversity through sustainability (opposed to the business sector that sees capital accumulation as its sole purpose), it offers another possibility to develop this type of projects.

It is a mutant museum model, that is to say, a model that transforms in time to achieve its ends, passing the post between each of the agents involved during its different stages, which makes it a viable strategy.

The development phase is in the management stage of the executive architectural project, is on track and has been accepted with pleasure in the preliminary work by the community.

Starting in 2019, the building, assembly, training and operation of the museum will be managed to implement the general plan, tentatively in 2021, with an economic logic that highlights, at first, the possibility of carrying out dissemination efforts from receive income to address the identatary / ecological problem; that is to say, "to be able to live" of the activity with which the own sustainable future is constructed.

Thus, people will be able to specialize in this type of development from the perspective of entrepreneurship that provides social benefit, while consolidating identity and solving environmental problems. It is a scheme that can be reproduced in other regions of the country with promoters from the same communities of Mazunte.



Figure 4 Aspect of the landscape and architecture in conjunction with the beaches in the Mazunte region, Oaxaca, in Mexico.
Author: JEC, 2018.

The model has an ambitious horizon, by integrating four social objects:

a) *Heritage Registry*: Heritage documentation, both archaeological, historical and cultural as well as natural, agricultural and productive of the municipality to offer a coherent museal offer between identity and sustainable tourism with a sustainable regional economy.

b) *Cultural infrastructure*: it builds a museum building as a permanent community enterprise that enhances the Mazatlan identity and allows the preservation of ecological wealth, as well as disseminating the natural / material / immaterial cultural richness of the region; with strategic support between museums and diverse spaces of socialization and dialogue to stimulate the social and tourist exchange of traditional knowledge and identities with biological engineering and ecological sciences.

c) *Cultural expression*: disseminates scientific knowledge and traditional knowledge through talks, conferences, courses and workshops; presentation of books on archeology, history, art and science, the biosphere and ecotechnics; promotes related topics through literature, painting, sculpture, multimedia, video art, short films, performance, photography, music and projection of artistic or documentary events and cultural or sports television programs to enhance identity and promote the socialization of knowledge in the museum.

d) *Economic development*: investigates, promotes and trains on the use of ecotechnologies to restore and protect the coastal ecosystems and marine areas of the municipality, with its application in tourism, domestic and sectoral activities -in congruence with their uses and customs- to expand the offer economic and employment with ecological awareness with the production of goods and services through the opening of financing and markets specialized in sustainability.

The scheme is formed by two axes: heritage / tourism and identity / economy, in which the policies of community benefit are based on their respective tasks.

Here the organization sees the museum as an articulator and promoter of social action that leads to the consolidation of cultural identity and regional benefit.

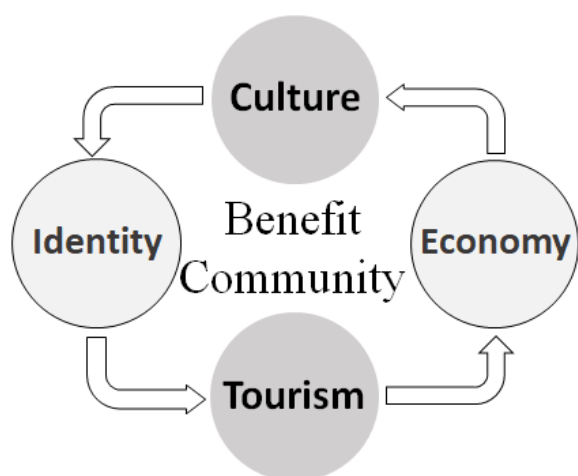


Figure 5 Scheme of components for social benefit
Author: Miguel Ángel Correa Fuentes (MACF), 2015

The general order is conceived based on a central conceptual core-the Mazunte Museum-that articulates its social functions before the regional heritage with economic sectors and inter-institutional relations related to culture, history, science and technology, which constantly nourish the topics that the museum should disseminate, with an interaction that adapts to diverse social changes over time, as well as identifying and addressing the opportunities, frailties and threats that affect every society.

Thus, the museum will become an institution that allows the articulation of the dissemination of awareness and ecological awareness with long-term community development, through an economic scheme based on entrepreneurship that serves as a pillar and driver of social benefit with the consolidation of identity, as well as the preservation of the cultural and biological diversity of the region, promoting cultural tourism with community integration that includes festivities, routes, sites, material and immaterial production, protection of ecosystems and species -among others-, in a productive cycle related to sustainability.

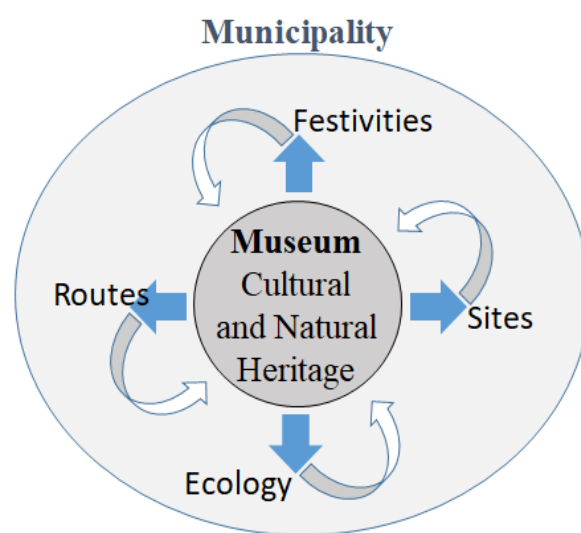


Figure 6 Outline of cultural organization of the Museum in the municipality

Author: MACF, 2015

Multisensory Museum

A museum that deals with research, protection and awareness about identity, prehistory and ancestral past, about the biosphere and global warming, as well as local economic conditions to disseminate the necessary ecotechnologies and respond fully to these problems, can not omit social participation, that is, to be inclusive with all social sectors, since without it, museum institutions will have limited influence on the fulfillment of their social functions, as well as being a fundamental right for every community.

This is vital, because most of the world's biodiversity is not found in protected and monitored reserves, but in landscapes managed by the communities that inhabit them.

Much of the world's biodiversity is managed by marginalized traditional groups, which is why the dissemination of identity and ecological awareness through museums should make it clear that the process of reception / understanding / ecological assessment / conservation in these spaces has that incorporate the substantial idea of including and benefiting these groups.

Starting from this precept, the educational axis of the museological model requires to be mediated by a relational aesthetic, that is, by a museography that impacts the visitor, giving importance to the relationships it establishes with the public, which is designed as a process oriented towards educational actions through the apprehension of immediate practical applications for daily and productive life. This guiding axis considers the public not as a receiver but as an interactor and creator, since each archaeological and ecological concept captured in the exhibitions must form a material for people to produce immediate and tangible actions in favor of the environment and identity. Then the museum is considered as a "living" center, captivating and motivating effective initiatives to be applied by residents and national and international tourists.

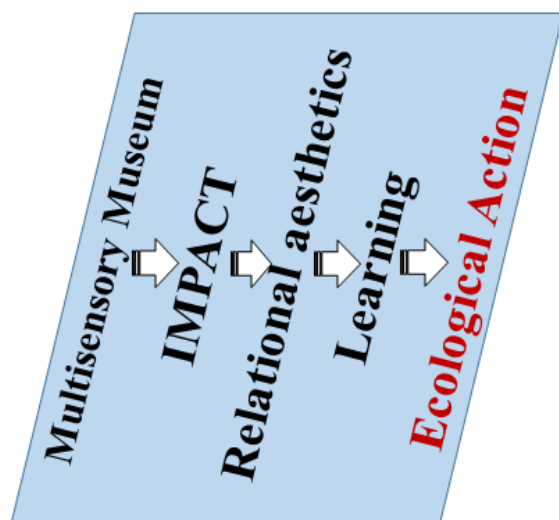


Figure 7 Diagram of the educational axis with ecological Action

Author: MACF, 2018

On the other hand, a museological project that addresses social identity and ecosystems requires technological representations rather than collections.

That is, technical resources can motivate the pride of ancestral origin, its rituals and worldview in connection with nature to explain entities biological systems integrated by a set of interrelated living beings in a given world, all in a fragile balance of diverse complexities that, together, make up the hypercomplexity of the global biosphere.

Therefore, mathematical models, statistics, metaphors and other literary figures, virtual simulations and interaction - through various intelligent technological resources and with different modes of representation - will be the substantial vehicle to develop emotive museographies that expose complex concepts of the relations between the open systems that integrate the biomes, between the relations of Physics and Chemistry with Biology, between the relationships of Biology with Archeology and Anthropology with ancestral rituals and traditional knowledge, with Sociology and Economics, and Ecotechnics. That is to say, it is required to go beyond the exhibitions sustained in the exhibition of historical objects or species.

For its part, an inevitable component in the dissemination of archaeo-ecological museums is to disseminate scientific research on the past, the biosphere, the environment, sustainable development and ecotechnics, both for tourists who attend the exhibition spaces and for the communities that participate in them and coexist in the region.

The promotion of this research will allow the museum to establish alliances with national and international institutes dedicated to these activities to disseminate them, fostering an instrument of development in the communities with a favorable impact for the identity and conservation of biodiversity.

The museography of museums that disseminate theories, concepts and identities requires powerful communication techniques that lead to representing the meaning of "what is proper", protecting biodiversity, that is, it requires the visitor to be immersed in the guardian thoughts of life and identity with experiences that provoke metacognition (exploration and physical interaction with global thinking and parallel knowledge, development of multiple intelligences, embodied imaginative comprehension and significant spatio-temporal learning).

The proposed NeoMuseography has its orbital axis in the concepts of multisensory image and technology as vivifiers of a holoperceptive language that submerges the public in an immersive / interactive / participative aesthetic and pedagogical process that introduces it -both body and mind- into one's own representation to grant him presence in the theme staged before him, a process that communicates and makes it possible to build identity and knowledge through enunciative techniques with signs, data, symbols, forms, photos, objects, paths, spaces, stimuli and emotions; which encourages the public, as a spectator, to become an explorer, actor, interactor and intellectual discoverer of the world of knowledge represented before him.

The technical resources that will make it possible resort to the use of museographic interfaces that allow identifying attitudes and situations through multimodal commands (oral, corporal and gestural) to give answers through designs of Mechatronic Engineering (discipline that integrates electrical, mechanical engineering, electronics, robotics and computer science to develop control systems that allow the design of intelligent processes), mediated by interactive scenic strategies to create emotive dialogic atmospheres, according to the nature of each expository topic.

The techniques that will make it possible are digital and analog audiovisual and interactive systems; animation, virtual reality and augmented reality; sensor automation, robotic lighting and stage control and internet; production, propagation and control of aromas / flavors, vibrations / sounds, as well as effects of special sensations, such as psychoacoustics, to intensify the museal significance in their exhibitions.

This new museography is potentially powerful and should contribute to generating changes in society through an integrating vision that develops an awareness of environmental and identity through experiential, interactive and imaginative exhibitions that lead to the understanding, appreciation and respect of cultural and biological diversity own with creative actions in the integral and sustainable management of expressions, resources and landscapes of each community.

In order to show them to the regional, national and international public, and contribute to social cohesion and environmental education, developing exhibitions that motivate initiatives of protection, rescue and conservation of environmental systems and social expressions to train generations of humans who respect life and the culture.

The exhibitions should be based on the diverse conceptual and conceptual experiences through technological art, showing the public the social "belonging" and the "fragility and complexity" of the relationships between the components that integrate society and ecosystems, favoring that contents of the exhibitions are applied to a direct and immediate use to influence the daily life and productive activity.

Besides spreading and promoting the application of clean technologies - developed in the country and in the world - to promote the protection and restitution of flora and fauna in regional ecosystems with the support of social networks to massify the initiative.

NeoMuseography will approach the concept of identity with perceptions that highlight the ontological landscape of Mazatlán based on the value of their ancestral customs of community collaboration compared to other ways of understanding social relationships; and on the other hand, it will approach the concept of life entering sensorialisations that explain the complex relationships between plant and animal beings interrelated in an environment with different levels and dimensions, as biological groupings that integrate open systems where each individual is independent but at the same time subject of other living beings and the mineral, geographic and climatic context they share; located in territories where each individual establishes a relationship in balance with the rest, in a fragile and harmonious interdependence that allows the development of life from the simple assemblies, which are added gradually to travel through the complexity of ecosystems and biomes until we reach planetary hypercomplexity.

In this way, the disciplines that intervene in the cognitive process to capture the complexity of the biosphere and the relationship of man with it, are added starting from those that study matter and energy, then those that deal with knowledge about life and finally those that approach the anthropogenic study in a profuse branch of specialties that communicate -in different degrees- the subjects related to biodiversity, culture and economy. In this way, establishing museum units in each type of environment, places us in the context we want to address, submerging the museum spaces and visitors in the own ecological and cultural scenario, with all its components and relationships.

This is how NeoMuseography deals with the systemic relations that the human eye can not perceive at a glance in the environment in question, in a game of artistic and technological possibilities to educate and motivate the public with immediate collaboration initiatives to preserve the cultural and biological diversity, highlighting that one of the main purposes is that the visitor acquires respect for nature and for all life on our planet, since human beings are part of it.

This new museography is based on the conception that the public is the creator of the experience, where the exhibition concept enters fully into the territory of the sensoryization of playful and interactive knowledge that creates astonishment in the visitor and produces creative and active reactions in he, in a display of pleasure and social commitment to consolidate the identity and protect what we observe in the museum environment. Art, play with multimodal interactivity and multisensory pleasure, exploration and discovery, meaningful learning and social commitment, are the elements that underpin the neomuseographic concept of ecological museums, encouraging the public to understand that the exhibitions they explore are an incomplete puzzle and that he it is the missing piece to complete the aesthetic / pedagogical experience

It is of fundamental importance to integrate the public as protagonist and main responsible of the cultural / ecological adventure where systems and subsystems have modifiable relationships, highlighting that the misuse of nature goes against oneself and damages the livelihood of humanity.

It is here that the concept of relational aesthetics explains the dynamics of the sensory experience proposed, understanding it as the immediate and conscious experience of oneself, as an active creative agent of an effect and its repercussions. This definition focuses on the final aspect of the neomuseographic concept: the evidence of the consequences that our actions motivate to reflect on them, is the fact of being aware of the multiple possibilities that triggers one or the other decision within the system, where the protection of the environment is a matter of decision, with the consequent instruction: "learn to decide correctly" (Museística, 2010).

The management of the institutional image of the museum will project boasting of biodiversity with technological cleanliness and social participation as a focus of action. The exhibitions will be large enough to allow visitor mobility and encourage exploration and intellectual and sensory discovery. The selection of recycled and biodegradable materials, as well as the application of technologies and clean energy in the construction and operation of museographies and operation of the museum, will be fundamental for the proposal to be consistent with the protection of the environment.



Figure 8 Location of the communal property "Casa del Pueblo" destined to build the Museum, where the proximity to the Punta Cometa Archaeological Zone is shown

Image of Google Earth, 2018. Edited by authors

Mazunte Museum

We think with a Biocentric vs. Anthropocentric Philosophy, conceiving a humanity in harmony with the environment through a different kind of consciousness in front of the biosphere, not of imposition but of preservation and balance, through a holistic understanding of the world, understood as an open and complex network of multi-dimensional systemic relationships where humanity is "only" a fragile component.

The museum is based on the consolidation of local cultural identity with a philosophy that promotes a humanity in harmony with nature and society, a non-destructive or dominant culture that preserves the world and ancestral history through a worldview that is understood as an open and complex network of multi-dimensional systemic relationships of planetary life and culture. Next, the constitutive criteria of the museum entity are established:

Vision: The museum contributes to generate identity and-together with other educational, technological and economic cooperation instances-changes in society through an integrating view man/nature to develop an environmental cultural awareness through living and immersive/interactive/participatory museums that lead to the understanding, valuation and respect of the identity with local ecosystems and biodiversity through creative community actions in the integral and sustainable management of the resources and landscapes they inhabit.

In order to show them to the regional, national and international public and contribute to education and environmental restoration of the planet.

Mandate: Develop an enterprising and enterprising attitude in the municipal population to preserve ancestral culture and restore biodiversity, with an educational sense based on a relational aesthetic; by building museum spaces that exalt local pride for their traditions and illustrate the immediate application of ecotechnics in all human activities, with the wide dissemination of research on prehistory, archeology and ancient history, the biosphere, the environment and development that propicien a healthy ecological conscience for the daily life and the productive sector of the region; through a sustainable development in accordance with the priorities of the communities that orbit around the Mazunte Museum, in a democratic and respectful relationship of cultural differences in biological diversity that encourages and protects the natural heritage to enrich the economic and multicultural life of Oaxaca.

SUPERIOR PURPOSE: Exalting the identity with the ancestral origins of the region, as well as restoring, preserving, conserving and protecting the biodiversity of Oaxaca, through a sustainable economic and tourism relationship with the growing application of ecotechnologies.

General objective: To disseminate an education that motivates, trains and stimulates domestic and productive actions aimed at awakening the ancestral identity and history and the awareness of the use of ecotechnologies for the conservation of biodiversity and environmental products / services in the long term, with the improvement of the living conditions of the local population through sustainable social entrepreneurship.

Specific objectives:

- 1) Exalt local identity and ecological awareness through museum spaces operated with ecotechnics and with the design of museographies based on technological art to sensorialize ecosystem relations and capture their complexity.
- 2) Build scripts and content according to the ecosystems and archeology of the municipality of Santa María Tonameca and in accordance with the priorities of their communities.
- 3) Conduct studies to develop social communication and marketing strategies for cultural and ecological tourism.
- 4) Establish links with research centers on history and archeology, the biosphere, studies of the environment and sustainable development, as well as institutes that develop ecotechnologies to apply them in the spaces destined to erect and operate the Museum.
- 5) Establish models of collaboration and financing among specialists, government entities and local and international communities to provide continuity to the purposes of identity and conservation of the municipal ecosystems involved.
- 6) Promote sustainable tourism projects and archaeological and ecological research for the sustainable economic development of the region.

7) Establish participation links with local, state, federal and international cultural authorities.

8) Build the Master Plan of the Museum, as well as create education, training and exchange programs for the communities involved in the project.

9) Form a Training and Liaison Center that promotes, trains, distributes and manages the application of eco-technologies to restore and conserve municipal biodiversity, according to the Ecological Ordinance of Santa María Tonameca 2011 in its 22 environmental management units, and in relation to the richness of the flora and fauna of the region, as well as the endemic species and other varieties protected by the Official Mexican Standard, in accordance with the following priorities:

A. Preserve / preserve / protect flora / fauna: 9.1) Mangrove (coastal lagoon system) 9.2) Coastal sand dunes 9.3) Riparian vegetation 9.4) Non-fragmented forest cover 9.5) Natural water bodies

B. Restore fragmented vegetation cover and degraded soil with its fauna: 9.6) Jungles (medium and low, deciduous and subcaducifolia) 9.7) Mangrove 9.8) Scrub 9.9) Coastal dune 9.10) Grassland

C. Promote agricultural production, financing routes and open markets compatible with natural and processed products of local ecosystems: 9.11) Food crops, fibers and ornamentals 9.12) Aquaculture with local species 9.13) Conservation and rearing of deer, iguana and other species 9.14) Products timber

D. Disseminate freshwater and saltwater purification methods, as well as procedures to trap carbon dioxide from the atmosphere and reduce the emission of greenhouse gases.

E. Promote the recycling of garbage for construction, usable in roads, dikes and various buildings, as well as fertilizers or domestic and tourist energy applications.

F. Encourage the development of runoff cleanup and conservation programs.

G. Train and provide products and services to implement clean photovoltaic, wind and other energy in the region.

Educational Technology Units

The Mazunte Museum will not only be made up of exhibitions in its building, it will also include external units throughout Tonameca, strategically located, as well as in other archaeological sites, in places where species are protected and also in other related instances (such as the Centro Mexican Turtle, University of the Sea or INAH, for example). That is, by "stations" with WEB link for the visitor to explore and capture information on site - through mobile technology- with "backpacking" routes through the municipality, through the design of Learning Units (or communication and technology environments) educational to learn at any time and anywhere) to highlight the identity of the Mesoamerican past, and train for free on various productive issues, ecological techniques and marketing to the entire population of the region.

The educational model of the Museum and its Learning Units complement each other, it is a concept that integrates neomusographic communication and educational technology with the Web to disseminate culture and biodiversity:

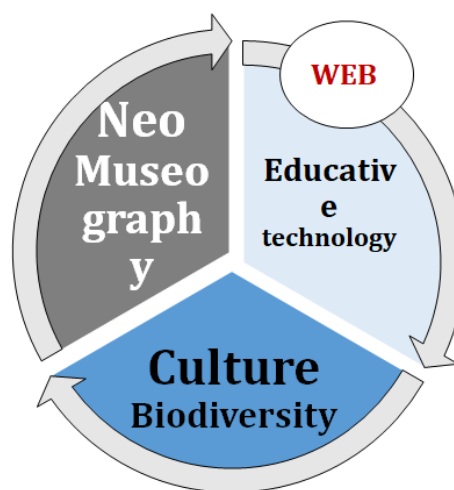


Figure 9 Educational model of the Museum

Author: MACF, 2018

Value and Use: Policies of international heritage letters

This research considers, in the same way, the international recommendations expressed in letters issued by NGOs from UNESCO and / or independently worked by specialists grouped in disciplines, concerned about situations and changes in the cultural heritage and its natural riches, its tangible and intangible cultural heritage including those considered mixed.

In this regard, since 1977 there were already concerns about the high levels of contamination in cultural heritage sites of the villages. This environmental pollution, which has worsened in unprecedented proportions, and potentially catastrophic as a direct consequence of the unplanned urbanization and the excessive exploitation of resources. (International Charter of Machu Pichu, 1977).

This document states in the area of natural resources and environmental ornamentation that "The official policies that regulate urban development must include immediate measures to prevent the degradation of the urban environment from accentuating and in turn achieving the restoration of the basic integrity of the environment, in accordance with the rules of health and social welfare". (*Idem*). This international letter prepares the governments of the world with vast patrimony to face a dynamic of urban growth in medium-sized cities and towns, which encourages them to create plans and projects based on environmental considerations; Today the letter is still valid from a contextual approach that involves the environment, resources and cultural heritage of certain areas or regions, which must be managed responsibly and sustainably.

The Paris agreements allow us to consolidate research, on the one hand, on the theoretical and, on the other, the development of the community project: 195 countries met and agreed to mitigate **global warming by two degrees centigrade with respect to the pre-industrial era**. How? Reducing greenhouse gas emissions through mitigation, adaptation and resilience. The objective is specific to lower global warming rates, considering various strategies emanating from the current legislation of each country in accordance with these agreements, the support in a very particular way is based on the commitments of "**adaptation**" which establishes as an end to protect to people, livelihoods and ecosystems, taking into account the urgent and immediate needs of the most vulnerable countries, (Paris Agreements 2016), all ratified by the Government of Mexico as a great commitment.

In Mazunte, in particular, it is urgent to apply measures that encourage cultural identity and, through this, seek mechanisms to preserve and preserve natural and mixed environments, typical of the cultural identity of the people.



Figure 10 Natural and mixed environments in Mazunte, Oaxaca

Author: JEC, 2018

Public Building Requirements

The conditions of risk / fragility in Mazunte and the conception of the Network of Ecological Museums, impose the following criteria for its design and construction:

1. Seismic resistance at 9 ° Richter.
2. Endurance to hurricanes with winds over 250 km / h (Category 4), where the predominant direction of the breeze comes from the southeast.
3. Bioclimate for a cool temperature (20-25 ° C) in rooms and training center.
4. Photovoltaic energy self-sufficiency with day and night application.
5. Rainwater recovery.
6. Water purification for hygiene and food.
7. Recycling of wastewater.
8. Ecological architecture mimicked the environment by roofs with low forest cover, adhered to the Construction and Structural Safety Regulations of Mazunte.
9. Use of recycled materials and ecological materials for building.
10. Application of digital and analog technologies friendly to the environment.
11. Elevator for a rolling chair with a companion through a design consistent with the Construction Regulation.
12. Pedestrian access ramps with a maximum of 8 ° of slope.



Figure 11 Preliminary proposal in model of the ecological building

Design of female students of the Bachelor of Architecture of the UAEM: Hernández Enríquez, Diana Laura and Lárraga Peralta, María Fernanda. 2018

Methodology

1. Theoretical and proactive development.
2. Search of interested communities.
3. Link with viable communities: Mazunte
4. Management, approximation and presentation of the generalities of the project to the leaders.
5. Acceptance by the Magical Town Council
6. Museological and architectural preliminary project.
7. Acceptance by the People's Assembly and designation of the Monitoring Committee.
8. Development of the executive project.
9. Master Plan and inter-institutional links.
10. Financing.
11. Construction.
12. Start-up.
- ▼ 13. Valuation before the community, before or after the change of Traditional / Municipal / State governance.
14. Review of strategies with the community and correction of directions.
- ▲ 15. Operational continuity after the first political transition and subsequent (return to phase 13 in permanent review and adjustment cycles to give continuity to the mandate and fulfill the objectives of the Museum)

Conclusions

At the time of closing this letter, our project is in phase 8 (we started the executive project), which was approved by the community of Mazunte in its General Assembly on September 8, 2018, where the Monitoring Committee was appointed.

Now the executive project will be concretized, which will allow the community to request resources from different governmental and private entities -of the country and international- to begin construction during 2019, with the possibility that the Mazunte Museum will begin operations in 2021.

The development landscape is promising for the area, however, processes should be taken care of in the last stages due to the change of the Federal Government in transition during this 2018; Policies should not change, but they should adhere to 2019 guidelines and strategies of a new National Development Plan for culture, heritage and the environment of Mexico in its different regions.

We urge readers to identify with this proposal, to contact us to promote museums of this type in other regions of the country and to initiate an ambitious program for the construction of a "Network of Ecological Museums in Mexico".

Acknowledgement

We acknowledge different people and instances that have supported this investigation during the course of their proposal. We started with the altruistic support of Mario Alberto Correa Fuentes with travel expenses to carry out the initial reconnaissance and incursions during 2017 and 2018; Engineer Manuel Rodríguez Gómez (former director of the Mexican Turtle Center) for capturing the importance of the project and promoting it among the community of Mazunte; also to Victor Emiliano Álvarez Rodríguez, President of the Magical Town, for giving acceptance and viability to the project, adding to his management the support to host and feed the students of social service and Professor Dr. Juan Eduardo Cruz Archundia for the topographic survey of the property "Casa del Pueblo", land that was proposed for the realization of the Museum.

Also the director of the Faculty of Architecture Mtro. Adolfo Saldivar Cazales and the provision of teamwork and human and material resources of the Academic Body "Management of Tourism and Cultural Heritage", in the same way to the Degree in Tourism of the same Faculty and its director Dr. Gerardo Gama Hernández, all of them of the Autonomous University of the State of Morelos.

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