

Proposal for a public aquarium at Vlorë (Albania)

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ABSTRACT

The present work is the first proposal for the carrying out of a Public Aquarium in Albania. This project has a twofold objective which consists both in attracting the public's attention on the nature and its preservation, and in the opportunity to spin the local economy based on tourism. The proposal lies in a series of studies conducted from 2002 to 2007 by the marine biology researchers and aquarists of the Salento University (Lecce, Italy) supported by the University of Vlorë (Albania). The researchers explored both the sea-coast of Southern Albania and the innermost part of the Country in order to detect the most important aquatic (marine and freshwater) biotopes which should be largely represented in the Public Aquarium.

Further, the choice of the District of Vlorë as elected place to build the Aquarium, is the result of an in-depth socio-economic analysis which immediately obtained the support of the local administration (Region and Municipality) and of the University. This process included a scrutiny of the geographical and economical aspects of the area, and the choice of the potential site where the Aquarium could be built.

Key words:

public aquarium, Albania, tourism, research, education.

RIASSUNTO

Proposta per la realizzazione di un Acquario Pubblico a Valona (Albania).

Il presente lavoro rappresenta la prima proposta di realizzazione di un Acquario Pubblico in Albania. Questo progetto ha doppia finalità e consiste da un lato nell'attirare l'attenzione del grande pubblico verso la Natura e la sua protezione, e dall'altro nel sostenere l'economia locale principalmente basata sul turismo. La proposta nasce da una serie di indagini condotte tra il 2002 ed il 2007 dai biologi marini ed acquaristi dell'Università del Salento (Lecce, Italia), e supportati dall'Università di Valona (Albania). I ricercatori salentini hanno esplorato sia le coste marine dell'Albania meridionale e sia gli ambienti naturali dell'entroterra. Ciò al fine di individuare i principali biotopi acquatici (marini e d'acqua dolce) del Paese, che dovrebbero essere rappresentati all'interno dell'Acquario proposto.

La scelta del Distretto di Valona come luogo ideale per la realizzazione della struttura, è inoltre il risultato di una approfondita analisi socio-economica supportata dalle amministrazioni pubbliche (Regione e Comune di Valona) e dalla locale Università. Tale indagine ha avuto come finalità l'approfondimento degli aspetti geografici ed economici dell'area, e la scelta del sito potenziale in cui potrebbe sorgere l'Acquario.

Parole chiave:

acquario pubblico, Albania, turismo, ricerca, educazione.

INTRODUCTION

The development of the Marine Biology in the XIX century was also supported by the building of the first Public Aquariums. In Europe, fourteen Aquariums were inaugurated before 1900 (Potts, 1989; Van den Sande & Jouk, 2001) (tab. 1).

The first one opened to the public was the Regent's Park in London in 1853. Subsequently, others started to rise in different parts of the "Old Continent". Although many of these pioneer structures do not exist anymore, the Aquariums' charm induced public administrations and private societies to economically invest in the realization of new and more innovative structures. Today, hundreds of Public Aquariums are spread in all over the Continents (Van den Sande & Jouk, 2001) and the increasing number of visitors fully reflects the interest towards this type of public attraction.

The first Aquariums - see as example the Aquarium in Naples (Italy) or the New York Aquarium (USA) - were born as "appendixes" of the sea which supplied them cleaning and oxygenated water (Townsend, 1919; Anonimous, 1922). For this reason, they needed to rise near the sea coast. Subsequently, technological innovation that involved since half of the XX century, allowed also the planning of Aquariums in areas far from the sea. The autonomous and independent management of the tanks, facilitated therefore the work of the aquarists (Fontana, 1989). There was also the possibility to rear delicate species and of difficult acclimation to the life in captivity.

Since their original concept, the main goals of Public Aquariums are the education (Hignette, 1989; Evans, 1997; Nightingale, 2001; Ohara & Nishi, 2001; Sonnenschen, 2001), conservation (Holthus, 2001; Miller et al., 2004; Packard, 2001; Rabb & Saunders, 2005; Rabinowitz et al., 2004) and research (Andersen, 1989; Boyle, 1989; Prescott, 1989).

Public Aquariums are planned with the main purpose to fully be integrated to the social and environmental contest of the place they rise. As well as representing different biotopes, they promote the local aquatic environments (Alayse & Hussenet, 1989), allowing to the visitors to also appreciate the aquatic biodiversity of the place in which the structure was built.

The present work represents a first attempt to give input to the opening of the first Public Aquarium in Albania. As a consequence of all that has been presented above, it would be not only a way to focus the attention on the nature and its preservation, but it would represent an opportunity to spin the local economy based on tourism.

The choice of the District of Vlorë as the site, comes from the manifested interest of local administrations (Region and Municipality), and of the Vlorë

Aquarium	Opening Year
Regent's Park, London	1853
Jardin d'Acclimatation, Paris	1860
Hamburg	1864
Brussels	1868
Berlin	1869
Crystal Palace, London	1871
Brighton	1872
Stazione Zoologica, Napoli*	1874
Trocadero, Paris	1878
Artis, Amsterdam*	1882
Vienna	1886
Marine Biological Association, Plymouth*	1888
Aquarium Museum, Sevastopol*	1897
Aquário Vasco da Gama, Lisboa*	1898

Table 1. Public Aquariums opened in Europe before 1900 (*Aquariums still opened to the public).

University, but also because the tourism is the main economical input of this area.

METHODS ADOPTED

The project of realization of a Public Aquarium in Vlorë (southern Albania) is the result of a scientific collaboration among Italian and Albanian research centres (INTERREG project Italia-Albania 2000-2006; MAE projects of researcher exchanges). Between 2002 and 2007, the marine biologists of the Salento University of Lecce carried out seven surveys in Albania, each of 7-15 days of duration. During these surveys both the emerged and submerged marine coasts of the Province of Vlorë were explored. Several surveys were also planned to explore freshwater habitats, some of great naturalistic interest (for example the lake Ohrid, at the border with the Macedonia).

Thanks to these explorations, several scientific articles describing the local habitats explored were also published in the recent years (Belmonte, 2002; Belmonte et al., 2003; 2006; Moscatello & Belmonte, 2006; Denitto et al., 2007; Shehu et al., 2009).

A complete bibliography has been collected both on past and recent knowledge of the water natural status and an economic evaluation of the sustainability of such a proposal has been funded on recent projects of tourism development in the area (see web site: www.pernatur.org).

The proposal was also sustained by tours to several Aquariums and/or Centres for the rearing/studying of aquatic fauna in Italy (Genoa, Naples, Cattolica RM, Ravenna, Milan, Mola BA, Giarre CT), in Europe (Vienna, Lisboa, Valencia, St. Malo,

Antwerpen, Stockholm, Liege) and in the rest of the World (San Francisco, Shanghai, Singapore) to evaluate exhibitions, subjects, and technological solutions. In addition, these visits allowed the data collection about the public affluence, ticket price, and evaluation of costs and benefits, strength and weakness of the economic structures.

Finally, a list of potential sites was done to evaluate their possibility to host the Aquarium in the Vlorë Province, and they were ranked according six characteristics:

- 1- distance from the centre of the city,
- 2- distance from the sea,
- 3- availability of freshwater,
- 4- availability of seawater at constant temperature,
- 5- existence of buildings equipped with the main urban services (electric power, water pipeline, road type and public transport),
- 6- landscape position.

The value of each characteristic was expressed as a number. In the first 4 cases the number corresponds to the distance in Km. In the 5th and 6th cases, the judgement was made according an arbitrary score (excellent, good, sufficient, not good, problematic, un-existing) ranging from 0 to 18 as the distance scores of other 4 points (see tab. 2).

The present preliminary proposal, was part of the Program 29 AE7s financed by the Albanian Government within the Scientific and Technological Cooperation Agreement between Italy and Albania, signed in Tirana on June 21st 2005.

GEOGRAPHY AND ECONOMY OF THE TERRITORY

Albania is situated in the central basin of the Mediterranean and the city of Vlorë, one of the tourist destinations more visited in the Country

(AA.VV., 2002), strategically results a suitable site for hosting a structure with tourist finalities.

The District of Vlorë offers the followings advantages:

- 1) geographical/naturalistic reasons:
 - it benefits of a low and sandy coast (to North) and a high and rocky one (to South),
 - presence of the unique deep Gulf of Albania,
 - presence of the only Island (Sazan) of Albania,
 - presence of the only Peninsula (Karaburun) of Albania,
 - presence of coastal lagoons of fresh- (Orikum) and brackish/salt- (Nartë) water,
 - presence of a freshwater network (rivers Vjosa, Sushica, Bistrica),
 - presence of one National Park (Llogara), on the mountains, far from the sea coast just 30 minutes by car,
 - presence of the very close Regional Oasis (Pishe Poro, Oriku);
- 2) economical reasons:
 - high hotel receptiveness (tab. 3),
 - presence of tourist infrastructures (sporting fittings, diving centre, etc.),
 - presence of a Port and direct connections with UE (Italy),
 - connections with the rest of Albania through roads of primary importance,
 - tourists' presence (around 190,000 in the period 15th May - August 31st 2006), coming from every part of Albania and from the foreign countries (Macedonia, Greece, Italy and North Europe),
 - existence of historical and cultural roots of great importance that enrich the possibility of integrated tourist offering (beach/sea, monument/culture, congresses/lectures);
- 3) cultural reasons:
 - historical bond of the city with the sea,

Site	Distance from the town centre	Distance from the deep sea (bathymetry at 30 m)	Distance from freshwater spring	Distance from the tourist area	Panoramic location / view	Building availability and services	Total index
Dajlan	13.0	10.0	18.0*	18.0	0.3	9.3	68.6
Triporti	8.0	5.0	18.0*	13.0	9.3	0.3	53.6
Barracks "Old beach"	3.0	2.0	18.0*	4.0	3.6	3.0	33.6
Navigation Depart. Area	3.0	2.5	3.0	2.0	6.3	3.0	19.8
Ex Hydrometeorological Institute	5.0	1.0	1.0	0.0	3.0	9.3	19.3
"Laundry" Uj i Fhtot	7.0	0.3	0.5	2.0	0.0	6.3	16.1

Table 2. Eligible sites for the building of the Aquarium based on different criteria of evaluation. All distances are expressed in Km. The best values for each parameter represented in bold. The lowest "Total index" represent the best compromise among the criteria evaluated.

Year	Population	Hotels	Beds
1999		4 ⁺	
2001	77691 [*]	10	
2004		23	
2006	125000 ^{**}	44 [#]	1773 [#]
2007 [°]		48	1998

Table 3. Hotel increasing offer in Vlorë area since 1999. Reported data by: ⁺Meçaj, 1999; ^{*}ISTAT, 1999; ^{**}Bashkia at Vlorë (unpublished data); [#]Murati et al., 2006; [°]personal investigation.

- presence of historical and cultural museums, theatre and centres of exploitation of the local traditions,
- presence in Vlorë of an University in strong expansion (around 100 admitted students in 1994; 3958 general affiliate in 2004; 9400 in 2006; Shkurtaj, pers. comm.),
- consolidated collaborations with foreign institutions.

GOALS OF THE PROPOSAL

The Public Aquarium of Vlorë has been thought as a multifunctional structure turning to satisfy educational, recreational, and promotional demands of the Albanian community.

Education

The structure, through the proposition of various submerged landscapes, would promote the education of the visitor in the knowledge and respect of the aquatic life and environment. The educational/cultural role will be strengthened with the realization of a Museum of preserved material, and by the institution of a research centre for the protection and care of the living organisms in the wild.

Promotion

It is desirable the creation of a lecture hall (at least 500 sits) equipped to entertain groups and students interested to deepen the environmental thematic promoted by the Aquarium. The lecture hall would be also rent for meetings and celebrations to use also those occasions in promoting the image of the Aquarium. It would be also welcomed the realization of a periodical magazine about the Aquarium activities to be freely distributed to the visitors.

Conservation

In the Aquarium it should be possible to rear and to breed several rare or protected species, otherwise invisible to the public. It would allow to release the new generations into the wild and in particular in their original biotopes accordingly.

Research

An important goal would be to arrange an aquatic research laboratory that must contribute to the management of the Aquarium and particularly of the health of the aquatic guests. At the same time, it would promote collaboration projects with both Albanian and foreigners research structures.

Tourist support and/or expansion in the area

A new and original attraction should promote the receptive potentialities of the Albanian southern coast. The contemporary realization of a tourist information office about the aquatic environments, a book-store, a shopping centre, an internet-café inside the structure, will guarantee a constant frequency of the structure from the outside.

Job opportunities

The structure should provide the employment of a group of operators that, through specific courses of professional formation, would be formed to manage the Aquarium in all its aspects. In addition the Aquarium, with all that it represents, encourage a series of related thematic activities which should enhance the occupation and the economy well more than the simple employment of the staff.

Sport and recreational purposes

The Aquarium would be the ideal place where opening a diving centre for all those people interested to acquire a dive licence. Otherwise a swimming pool could be realized where to begin the practice of the scuba diver. The same swimming pool would be in turn occasion of tourist reception.

CHOICE OF THE SITE

The site, for practical reasons, have to be built near the sea coast. This solution would facilitate the operations of periodic water renovation in the tanks. A possible solution could be also the utilization of saltwater that could be drawn by underground. This water, withdrawn to the depth of 80-100 m, should be relatively pure and at constant temperature (18-20 °C).

The tanks, many of them of large dimension, should take place at the ground level just for not having stability related problems. The site would not be less extended than 5,000 m² and it should include a parking area easily reachable from the main roads of the District.

The realization of a Public Aquarium at North or at South of Vlorë, is involved in a wide goal of the town expansion.

Since our first visits to the District, the attention was focused on two potential sites, one at South and the other at North of the town of Vlorë. Both of them are represented by buildings previously destined for

other goals and of Government property. Nevertheless, we would warmly suggest to build a new structure more adapted to the structure finalities. The two areas are respectively known as Uij i fhtot, (it means "freshwater springs") and Zverneç/Dajlan.

After careful inspections, our proposal is to focus main attention to the southern area of Uij i fhtot because of several logistic considerations. A comparison among several potential sites is summarized in table 3.

THEMES AND EXHIBITION HALLS

The realization of the plant should follow a leit-motiv so to transmit a harmonic and pleasant emotions to the visitors. It will be opportune to recreate many typologies of aquatic landscapes. Also, in the rigor of the presentation of the valuable naturalistic emergencies of the Country, the tank exhibition will be planned carefully for being particularly attractive from a scenic point of view.

As many Public Aquariums all over the world, also the Vlorë Aquarium should welcome the visitors to an exotic pavilion, followed by a local one which host local (both marine and freshwater) flora and fauna coming from the geographical area where the Aquarium takes place.

All the rooms must be endowed with dioramas and back-lighted posters which explain the habitats recreated in each tank. Marine and freshwater landscapes, posters and representations of the human activity, historical references to the mythology, will be studied for the "emotional" introduction to the thematic rooms. Detailed information, brochures and cards will be furnished to the visitors.

Here we shortly point out a general description of the proposed display.

Tropical pavilion

In this first sector of the building, it has to be reproduced a series of aquatic environments, both of fresh and saltwater, that will have to host a typical flora and fauna coming from tropical aquatic biotopes. In fact, it is our opinion that also the displaying of no-local biotopes could add a great value to the Aquarium. According to the dimension of the room, tanks displayed could be in number of 5 to 10, with different dimensions varying between 200 and 50,000 or more litres. Regarding the freshwater biotopes, there will be the possibility to reproduce: 1) the Amazonian habitats, hosting flora and fauna from the Amazon River and its tributaries; 2) African habitats, pointing the attention to the great lakes of the Rift Valley Area (South-East Africa), with the representation of some cichlid species of the lakes Victoria, Tanganika and Malawi; 3) and Australasian habitats, where it would be possible to represent, among the others, a biotope of

brackish water typical of the coastal mangroves that, in nature, offer shelter to a particular and well adapted aquatic fauna.

Regarding the marine tropical fauna, it will be possible to arrange several tanks housing fishes and invertebrates, such as corals, from Indo-Pacific area and Caribbean barriers. In the greatest ones they can also find hospitality unusual animals and certainly from the notable potentialities attractions such as pelagic fishes, small sharks and sea turtles.

Freshwater local pavilion

From the mountain to the open sea, the visitors can progressively "explore" the main aquatic habitats of Albania. The local pavilion should be arranged as follows:

it should be the section devoted to the Albanian aquatic fauna. As already underlined in the introduction, Albania enjoys a strategic position in the Mediterranean basin. In this context it would be desirable the realization of different thematic tanks of various size, according to the type of the hosted community. The tanks should have a volume ranging from 100 to 100,000 litres.

Many rivers and lakes are present in the Albanian country, so part of the Public Aquarium could be destined to host several local freshwater biotopes. Here we suggest the display of some interesting habitat that we explored during the Albanian surveys:

a) River habitat (10,000 litres) housing sturgeons: *Acipenser naccarii* Bonaparte, 1836 and *Acipenser sturio* (Linnaeus, 1758) are both species living in several Albanian rivers. Because of their large adult size (about 4 metres long in the wild), it is needed of a big tank for housing several specimens of these species. Their rearing is not problematic if few devices are satisfied, such as clean, cold, and well oxygenated water. Although these species spend part of their life in the sea before spawning in the river where born, several studies demonstrated that sturgeons are able to complete their life cycles also in freshwater condition (Nardi, 1982; Gandolfi et al., 1991). *Acipenser naccarii* is also included in Annex II and III of the European Council Directive 92/43 "The Conservation of Natural Habitats, Wildlife and Flora" and, for this reason, its presence in the Aquarium would represent an important message about the protection and conservation of species at risk of extinction.

b) Ohrid lake biotope (10,000 litres). This environment is, without doubt, one of the most spectacular lakes of Albania. Sited along the Macedonia border, several investigations were already conducted on the aquatic fauna living in this ancient (about 2 million-year old) environment. Here, it lives the Albanian trout and endemic species

Salmo letnica (Karaman, 1924). This species is not the unique endemism of the lake. Up to now are known 17 fish native species belonging to 4 families: Salmonidae (2 species), Ciprinidae (12 species), Cobitidae (2 species) and Anguillidae (1 species). For this reason, one or more aquariums recreating this peculiar biotope are highly recommended.

c) Spring habitat (1,000 litres, subdivided in a series of small tanks of 50-150 litres): mainly (but not only) in the inner land, many springs can be observed. It is desirable to realize an aquarium housing flora and fauna coming from the freshwater springs of the South Albania, such as the spring in Tragjaz. Among the submerged flora, it is possible to rear the aquatic plants *Apium nodiflorum* (L.), *Zannichellia palustris* (L.), *Nasturtium officinale* (L.) and *Typha angustifolia* (L.). All these plants were found in the biotope above mentioned. Among fauna, amphibians as the frog *Rana bergeri* Günther, 1985, the common toad *Bufo bufo* (Linnaeus, 1758) and the yellow-bellied toad *Bombina variegata* (Linnaeus, 1758), the water turtle *Emys orbicularis* (Linnaeus, 1758), and the cyprinodontid fish *Aphanius fasciatus* Nardo, 1827 can be easily bred in display tanks. In particular, *A. fasciatus* is the only species that could have been affected by the Messinian Saltwater Crisis which interested the Mediterranean Basin. It is actually included in Annex II and III of the European Council Directive 92/43 "The Conservation of Natural Habitats, Wildlife and Flora". *A. fasciatus* is a species extremely adaptable to many environmental conditions. Although its Mediterranean distribution includes the Balkan area (former Yugoslavia), just recently this species was found in the Albanian waters (Denitto et al., 2007).

Transitional waters represent the link between freshwater and the sea. Along the Albanian coast, many lagoons offer interesting habitats easily displayed in aquarium.

d) Brackish water habitat (1,000 litres): the lagoon of Nartë, sited in the Northern part of the town of Vlorë, is one of the most representative marsh habitat of the Region. A particular vegetation can be found here. The biotope is widely dominated by *Ruppia cirrhosa* (Pedagna) and *Enteromorpha* sp. Among the aquatic vegetation, many eurialine fish species can be found such as *Liza ramada* (Risso, 1826) and others. Also invertebrates can be housed in the marsh biotope aquarium such as pagurids, crabs and small shrimps belonging to the genus *Palaemon* and *Palaemonetes*.

Mediterranean marine pavilion

Albanian coasts are represented by well diversified habitats, both sandy shores and rocky cliffs. In this last one, it is possible to find manifold environments such as the coralligenous, marine caves, etc. All the environments, together with the *Posidonia* meadows,

can be reproduced in separate tanks and therefore independently managed (from a point of view of the abiotic aspect of the environmental factors) according to the specific requires of the housed species.

e) Environment of hard substratum with community of coralligenous: (10,000 litres). The hosted species could be represented by both vegetal and animals as sciaphilous algae, sessile invertebrates such as poriferans, anthozoans, bryozoans, serpulids, etc., mobile invertebrates such as molluscs, echinoderms and crustaceans, and, of course, pelagic fishes both small and medium sized such as *Chromis chromis* (Linnaeus, 1758), *Anthias anthias* (Linnaeus, 1758), *Apogon imberbis* (Linnaeus, 1758), and sparids (*Oblada melanura* (Linnaeus, 1758), *Pagellus erythrinus* (Linnaeus, 1758), *Diplodus* spp., *Sparus aurata* (Linnaeus, 1758), etc. This tank would represent a typical submerged habitat found on the external side of the Karaburun Peninsula, the mountainous land delimiting the Gulf of Vlorë. Although the higher organic matter concentration, a semi-closed system for changing the water, would allow to maintain optimal physical and chemical values of the seawater in the tank.

f) Environment of the marine cave habitat (10,000 litres). In this case, the population will be composed by fishes usually inhabiting lairs, gorges and caves along the Albanian rocky coast. As example we cite the common moray *Muraena helena* (Linnaeus, 1758), the groupers (*Epinephelus marginatus* (Lowe, 1834) and *E. costae* (Steindachner, 1878), *Serranus cabrilla* (Linnaeus, 1758), *S. scribe* (Linnaeus, 1758), etc. All these fishes are well adaptable to live in captivity because of their territoriality and solitary life. The number of specimens will be chosen in relation to the size of the tank so to avoid spatial competition. The species of this habitat attracts the public attention due to their large size, calm behaviour, and the preference to stay in the shadow. Each specimen will have its own shelter and/or refuge. The scenario will be realized with natural material.

g) Sandy beach (10,000 litres): this natural environment can be observed on both the sides of the Karaburun Peninsula. It generally appears at a depth of 10-20 metres where the sandy bottom allows the settlement of the *Posidonia oceanica* (Linnaeus, 1758) meadow. This particular and unique biotope represents the natural shelter for many invertebrates and small fishes. The aquarium destined to host this community would be one of the most exacting of the Aquarium because of it needs of stable physical and chemical values of the water and an appropriate lighting for the survival of the aquatic plants. The animal community would be represented by marine tube worms such as *Sabella spallanzanii* Grube, 1851 and the large anthozoan *Cerianthus membranaceus* (Spallanzani, 1784). The fishes could be

choose among the fish fauna usually living on the sandy bottom such as *Lithognathus mormyrus* (Linnaeus, 1758) and the sole *Solea* sp.

h) Pebble bottom environment (5,000 litres). This habitat frequently appears in the Gulf of Vlorë and along the Karaburun peninsula coast. For this reason, an aquarium housing the community living in this particular biotope is recommended. In the environment, it is not rare to observe many Second War surpluses on the bottom. This suggestive submerged scenario could be easily reproduced in a tank expressly dedicated to it. Back-lighted panels could find place behind or upper to the tank for explaining to the visitors the origin and the history of this military wreckages. Molluscs bivalves and gastropods, echinoderms, and small shoals as labrids, blennids, sparids, etc. would form the animal community usually found in this environment.

i) Monothematic tanks (each of 100 to 300 litres). Several (from 10 to 20 in number) small Mediterranean tanks (managed through a close filtration system) would house particular species which would have survival difficulties in the larger tanks. Delicate fishes as the horse-fishes (*Hippocampus guttulatus* Cuvier 1829, *H. hippocampus* Linnaeus, 1758) need of stable conditions and very clear seawater. Furthermore, because of their slow-swimming, they would have feeding problems if cohabiting with other fast-swimming species. These small tanks should be positioned around the largest tanks previously described.

j) Circular tank for great pelagic species (100,000 litres or more). This should be the largest of the Aquarium and it should surround a great room with the possibility to be observed around to 360° so to give the impression to the visitor to be submerged into the sea. It should house big pelagic species such as fishes and sea turtles. In addition, groups of small fishes, would contribute to create "movement" in the tank. Because of the high organic matter produced by the living organisms housed in this aquarium, it would be opportune to plan a electronic system for continuous exchange with clean seawater. It should be preventively filtered and sterilized with UV rays. Finally, before living the local pavilion, the final part of the trail could host as follows:

k) Microcosms: small aquariums (each of max 10 litres) should represent particular niches housing few specimens belonging to a single species which, on the contrary, would not be able to survive or to be appreciate by the visitors in a big tank. Small planktonic or benthonic species such as marine copepods, gammarids, small jellyfishes, etc. could be well observed if housed in small tanks specie-specific without the presence of predators and competitors.

l) Ponds (total 10,000 litres): in the external part of the building, it would be desirable to realise a garden for the sojourn of the visitors before they leave the

Aquarium. Here, could be find place several ponds hosting carps, goldfishes and exotic turtles (see for example *Trachemys scripta elegans* Wied, 1839) as representatives of the alien species that could threat the survival of many autochthonous freshwater species if released in the wild.

ECONOMICAL ASPECTS

A public structure as an Aquarium cannot be planned without an important economic investment by local administrations and privates who intend contribute to the realization of a new tourist attraction for the city and the Country. The initial investment should be recovered within few time (in order of 5-10 years), and the public attraction will have to be self-kept with the visitors' proceeds. Although the National Strategy of Economic and Social Development is one of the most important documents from the Albanian government so far (CBG, 2003), its economy is still far from the European ones. For this reason, all the incomes would be maintained more low than the European averages. Below, we report several exemplificative tables which represent hypothetical benefits deriving by the Aquarium activities.

Incomes:

- a) from ticket entrance (entry price = 3 €) (tab. 4)
- b) from the rent of commercial activities (bar, restaurant, bookstore, etc.) (tab. 5).

Entry price (3,00 €)

The ticket has been cautiously established as corresponding to that of a soccer match in the Albanian championship (3-4,00 €); or to a film projection (2,50 €); or to a theatre play (4,00 €); or to a pizza-beer menu (6,00 €).

Taking under consideration the huge tourism capacity of Vlorë (about 190,000 presences from 15 May to 31 August 2006, and even more in 2007), it is foreseen that the Aquarium could be visited by 40,000 persons at least each tourist season (Summer). To the present forecast we have to add all the other visitors of the remaining part of the year (Autumn-Spring) who could be identified as students of school trips, for a total cautiously estimated of 20,000 persons (total, 60,000 visitors per year).

Estimated visitors	Period	Annual earns
40000	Summer season	120.000,00 €
20000	Rest of the Year	60.000,00 €
60000		180.000,00 €

Table 4. Estimated annual earns from ticket entrance.

Commercial activity	Income (x month)	Income (x year)
Bar	500.00 €	6,000.00 €
Gadget-Book shop	1,000.00 €	12,000.00 €
Others	500.00 €	6,000.00 €
		24,000.00 €

Table 5. Estimated annual earns from the rent of commercial rooms inside the building.

Such numbers need a prove period for the management of great people fluxes, but they are not impossible, because they have been maintained under the numbers of the Neaples Aquarium (100,000 visitors/year, mainly students), or of other similar structures in Italy (see table 6).

The Italian experienced capacity of attraction and its quality will not be equalled in short time, hence in the forecast we just consider the expenditure possibilities of a common visitor (maintaining low the ticket price and foreseeing reductions and/or discount periods) who is considered, at the beginning, as exclusively Albanian.

This considered, the forecast of incomes from tickets has been estimated as 180.000 € (60.000 visitors x 3,00 €) a year.

Trade rooms to let (500,00 €/month)

In every Public Aquarium, shopping centre represents an important economical incoming for the Aquarium management. Bookshops, coffee bar, restaurants, and other shops offer to the visitors a wide range of products and entertainments which could support the survivorship of the structure. According to the let average for trade rooms, we can estimate an incoming of 60,000 €/yr (1000,00 €/month x 5 rooms).

Conference hall (500,00 € for each event) and tourism info point to let (300 €/month)

A conference room for events presentation could be let to privates, associations and groups who want organize some special event for short periods. In addition, also a tourism office managed by local administration could find place in the Aquarium structure which could be candidate as main tourism info point of the Region.

At the light of this facts, the Aquarium could get a total amount of about 260,000 €/yr which would allow to sustain the management costs and to pay the operators who work at the Vlorë Aquarium. We would also highlighted that local administrations (such as Municipality and Region) and Government could economically support part of the costs. It would help, mainly during the firsts opening years, the starting phase of the new Public attraction.

CONCLUSIONS

The realization of a Public Aquarium also including the reproduction of local habitats needs of a preliminary and careful investigation of the territory. The exploration conducted in the Vlorë area and, most in general, in the southern Albania, confirmed the presence of many aquatic environment. Thanks to the modern aquarium technologies, many of them can be represented in an exhibition structure.

The Vlorë Aquarium can become a valid way for supporting education (Evans, 1997; Nightingale, 2001; Ohara & Nishi, 2001; Sonnenschen, 2001), conservation (Holthus, 2001; Miller et al., 2004; Packard, 2001; Rabb & Saunders, 2005) and research (Andersen, 1989; Boyle, 1989; Prescott, 1989) finalities. The Albanian waters revealed a high biodiversity which is still unknown to the public. The Aquarium project allows to discover the natural patrimony of the Country and thanks to its educational role it will be possible to awaken locals and visitors to the respect of the environment. Finally, the structure could host also species hardly threatened of extinction.

The collaboration among the new cultural centre (the first of this kind in Albania) with research realities such as the Marine Biological Station of the Salento University of Lecce (Italy) and Excellence Centre of the E.U. for the study of the marine biodiversity, is a trend already followed by many other Aquariums (Nightingale, 2001). This collaboration will give a great opportunity to the Vlorë Aquarium (through the local University) in the training of professional figures who will find job opportunities in the structure. Finally, we have no doubts regarding the importance that a Public Aquarium would have on the tourism in the Country. The District of Vlorë attracts, already by

Aquarium	Locality	Opening yr	Visitors/year	Ticket (€)	Target
Acquario di Genova	Genova	1992	2,000,000	8-12.00	international
Aquae Mundi	Ravenna	2003	30,000	11	regional
Parco "Le Navi"	Cattolica	2000	112,000	9-16.00	national
Stazione Zoologica "A. Dohrn"	Napoli	1873	100,000	5-10.00	national

Table 6. Italian Public Aquariums and information related.

several years, many tourists (also from other European countries such as Italy, Greece, Macedonia, etc.) who spend their summer holiday on the beaches of this Region. Finally, the Aquarium would represent another original and pleasant attractive, mainly with the perspective of the institution of a Marine and Coastal Protected Area in the Vlorë District.

All the reasons above summarized, represent all valid point of strengths which sustain the realization of this important Project.

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