Water as main element of landscape of exhibit for animals in zoological gardens

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Abstract: Water as main element of landscape of exhibit for animals in zoological gardens. The paper undertakes the basic issues connected with the role of water in exhibit’s landscape for animals in zoological garden. The issues were considered mainly on examples of exhibit for aquatic-terrestrial animals especially for common hippopotamus. It also was stressed how important role to plays water in exhibit for terrestrial and arboreal animals. It was taking a note of the water importance playing role in: design process, construct an exhibit, animal’s behaviour, educational transmission, arrangement and aesthetic reception of exhibit. There were described the main factors and requirements connected with water which should be fulfilled, for proper function of exhibit for animals in zoo. Animal’s needs were taken into consideration and also visitor’s expectations. Finally it was shown the interconnections which cause water between individual factors.

Key words: exhibit for animals, aquatic-terrestrial animals, enclosure, designing zoological garden, landscape immersion, fence (moat) of exhibit for animals.

INTRODUCTION

Water is not only one of the main elements of landscape but it is also an important element of exhibits. Water increases the aesthetic impressions of visitors and enables the occurrence of many behaviours of animals. By creating complex ecosystems composed of: water, land environment, animals and interactions between them the animals’ living conditions in a zoo can be significantly improved. Another benefit is the increased educational value of such exhibits since not only the animals are presented but also it is possible to observe how they function in their natural environment.

Except for aquatic animals presented in zoos, including mainly fish and certain mammals, another group for which water is a significant factor is aquatic-terrestrial animals. Those animals reside permanently in two different environments: aquatic and land. The presence of water in their exhibits is a crucial element and designing a properly functioning and good looking complex is a major challenge for designers. Creation of the exhibit’s landscape involves both water and land. In this work, the author attempts to present the role of water in the landscape of exhibit of amphibious animals and the main example is hippopotamus amphibious.

EXHIBIT DESIGN AND CONSTRUCTION

Past decades have shown the enormous change in the perception of animals and their exhibit. Several implementations and new projects have been carried out...
including modern arrangement of exhibit areas for animals inhabiting zoological gardens. New implementations hale a major goal, which is care of the animals, possibility to show the whole range of natural behaviours and neutralizing the conflict between humans and animals. Nature and documentary programs have vastly contributed to the development by presenting the life of animals, their natural behaviour, social hierarchy or manner of preying. One of the results of the changes is the fact that nowadays the public not only wants to see the animals in an environment resembling their natural habitat but they also want to have the impression that the animals are happy and their situation is at least normal for them. Exhibits of aquatic-terrestrial animals are among the most difficult to create due to the presence of land and aquatic environments which the animals inhabit. Significantly limited area of exhibit, as compared to the area occupied by the animal in nature, and complex ecosystem interdependencies are very hard to recreate. Only few new implementations meet the assumed goal. Unfortunately, the conditions in old complexes in which the animals have to live are far different form the natural conditions (Shepherdson, 1989).

Exhibits of aquatic-terrestrial animals require construction of a water reservoir. Generally, it merely satisfy the existential needs of animals which are reflected by legal requirements. Polish zoological gardens are bound by Regulations of Minister of Environment Protection dated December 20, 2004 concerning breeding and keeping certain animal species in zoological gardens. Unfortunately, legal requirements concerning animal exhibits in zoological gardens compared to the natural conditions in which the animals live are significantly different. Those discrepancies are best illustrated by the guidelines of the legal regulation defining the conditions of keeping hippopotamus amphibious. Zoological garden must ensure 150 square meters of external enclosure for a pair of hippopotamus and 30% more space for every next animal. Internal enclosure must be at least 50 square meters large for a pair of hippopotamus plus additional 20% of space for every next animal. The regulation only mentions that it is necessary to build a reservoir but it does not define its parameters. The average natural population density in a lake amounts to 7 hippopotamuses per 100 meters of lake bank, and 33 per riverbank length. An adult male hippopotamus which started a family needs 50–100 meters of river or 250–500 meters of lake banks (Laws, 1984). In Africa hippopotamuses most eagerly occupy sandy beaches with a mild approach to water. Water depth next to the bank should not exceed 1.5 meters. They prefer waters with slow current which allows unrestrained swimming (Estes, 1991). Legal guidelines do not include the above information.

Recently completed projects which proved to be functional in the reality of a metropolitan zoological garden could serve as guidelines, which would partially solve the problem. They facilitated the creation of several project guidelines. The water reservoir should be placed in the vicinity of viewing points so that the visitors can observe a variety of interesting behaviours. In many cases, enforced glass in the walls of the reservoir is used (3–4 joint glass panes, total thickness
Water as main element of landscape...

8 mm) which allows the visitors to watch animals underwater. One of the best hippopotamus amphibious exhibits can be found in the Berlin Zoo. Four hippopotamuses can be watched underwater through a large glass window with total length of more than 10 meters (Fig. 1). The use of highly efficient filtering systems makes it possible to maintain sufficient water transparency to watch the animals under the surface. Moreover, water cleanliness allows for birds (ducks) and fishes (carps) to be kept in the reservoir.

ANIMALS BEHAVIOUR

Behaviour of aquatic-terrestrial animals is one of the most important animals determining, whether appropriate conditions of water environment have been created. Clean water in reservoirs within the exhibit of hippopotamus facilitates the occurrence of many behaviours. Favourable conditions allow for relations between hippopotamuses and fishes to be established. Carps can feed on old epidermis and clean the mammals’ skin. Such behaviours can be observed only in two zoological gardens in Europe (Berlin and Hanover). In nature, in Mizima Springs in the Tsavo West National Park in Kenya there are even more advanced biotic interrelations of commensalisms and protocooperation. To maintain hygiene hippopotamuses visit the so called “wash” where different fish species clean respectively individual body parts. The fishes flocking there have specialised in skin cleaning services for hippopotamuses and feed themselves at the same time. Hippopotamuses actively take part in those services by spreading their fingers and legs to provoke cleaning and allow the fishes to penetrate places on their bodies which are not easily accessible. The main cleaners are Epalzeorhynchos, from the carp family, which mainly clean

FIGURE 1. Zoo Exhibit for common hippopotamus in Berlin Zoo (author)
the hippopotamus’ sides and mouth. Hippopotamus opens its mouth wide and the fishes fearlessly swim inside eating food remains between the teeth. Other fishes, Barbus Barbus, feed on the dung and clean slots in hippopotamus foot soles. Tiny fishes from the Cichlidae family feed in the hippopotamus’ bristle while other tiny fishes – Garra clean skin scratches (Deeble and Stone, 2001) (Fig. 2).

In most water reservoirs within hippopotamus amphibious exhibits the level of water cleanness prevents the existence of any fish and facilitates the development of putrefactive bacteria (Wolański and Gereta, 1999). Research conducted between 1999 and 2005 in 13 zoological garden in Europe: Antwerp, Basel, Berlin (Berlin Zoo), Emmen, Hannover and Vienna) and traditional exhibit (Frankfurt am Mein, Cologne, Łódz, Warsaw, Verona (Bussoleango), Whipsnade, and Wrocław) indicated that hippopotamuses are by far more active in reservoirs with filtered water than in traditional exhibits where the water reservoir is periodically emptied and refilled (Zubkowicz 2009). This is best illustrated by an example comparison of two etograms of hippopotamus behaviours in modern exhibits: Antwerp, Basel, Berlin (Berlin Zoo), Emmen, Hannover and Vienna) and traditional exhibit (Frankfurt am Mein, Cologne, Łódz, Warsaw, Verona (Bussoleango), Whipsnade, and Wrocław) (Fig. 3).

In the case of modern exhibits with filtered water are visible higher level of behaviours like type: swimming, diving even material behaviours or locomotion. It keeps a even record lack of agonistic behaviour. It is probably cause of greater of opportunity environment create for animals. However “traditional” exhibits

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FIGURE. 2. Fish clean the hippopotamus’ skin at the same time feeding on it (Deeble and Stone, 2001)
keep a record of lower activity of animals, which are displayed higher level of behaviour type: sleeping and lying.

EDUCTAION TRANSMISSION

One of the most important roles of zoological garden is education which may include environment protection by presenting threats to different species and relations between economy, lifestyle and the environmental conditions and resources (Olech, 2003). The most important educative role of zoological gardens is presentation of animals and their behaviours in an environment close to natural conditions. Water is an inevitable element of the exhibit landscape not only of aquatic or amphibious animals. It also has an impact on the natural appearance of land animal exhibits including even tree animals. For example, a bathing elephant or a reservoir arranged as fencing of orang-utan enclosure in Müster Zoo is really impressive for the visitors. In a realistically arranged scenery resembling a jungle it is possible to observe interesting relations between the tree monkeys and otters. Not only does water create boundaries between the visitors and animals but it also completes the landscape image.

The importance of water in exhibits is illustrated by results of study carried out in American zoological garden. During an average visit to the zoo, which lasts for 2 hours, the visitors spend about a third of the visiting time (about 40 minutes) watching the exhibit, another third of the time walking and the remaining third on other activities (eating, playing with children in a playground, sitting on a bench) (Joslin et al., 1986). It is estimated than American zoological gardens are visited by 104 million people (AAZPA, 1992) while 14 Polish zoological gar-
dens are visited by more than 2.5 million people (Topola, 2005). When watching the exhibit, visitors are exposed to a vast amount of information which they remember either consciously or subconsciously. Assuming that the visitors are exposed to one message a minute, the amount of information in American zoos amounts to 12.5 billion messages (Coe, 1987), and 300 million educational opportunities in Polish zoos. It should be mentioned that the above is a true and authentic experience and not TV fiction and water significantly contributes to the visitors’ perception. Other studies also illustrate this as the proved that exhibits containing water attract much more visitors’ attention as they can watch numerous animal behaviours (Zubkowicz, 2006).

ARRANGEMENT AND AESTHETIC RECEPTION OF EXHIBIT

Arrangement of the enclosure is related to aesthetic reception. A proper design not only satisfies the animals’ needs but also creates an illusion of natural environment. In case of metropolitan zoological gardens one of the significant problems is construction of fencing around exhibits. The construction usually includes creation of a structure which strongly interferes with the landscape. A possible solution is the so called “landscape plunge” when visitors are located within the same landscape as animals but not within the same area. Visitors can hardly notice the barrier or fencing which separates them from the animals. Landscape of the exhibit and the visitor area seems to be

FIGURE 4. Boarder between visitor’s zone who are located in boat and exhibit for common hippopotamus in Hanover zoo (author)
a whole (Coe, 1994; Polakowski, 1987). His can be achieved by designing a creek, stream, water canal or fault with naturally arranged edges/banks. The visitors think that they are separated from the animals only by the natural barrier. Actually, the size of fencing prevents the animal form escaping from the exhibit. Arrangement of the whole exhibit area and the visitor zone makes the visitor enter a landscape area in which the animals are located (Fig. 4).

Another advantage of such solution is psychological benefit for the animals and visitors who witness behaviours reflecting the natural ones. The visitors learn more respect for the animals. This is achieved by rearrangement of the social hierarchy in which humans entering the animals’ domain become subordinate to the dominant animals. The animals feel unrestrained and are not intimidated by constant presence of people. Visitors as viewers entering a theoretically unfamiliar area do not feel confident. On the one hand it may cause anxiety or excitement and cognitive driver on the other hand. Being theoretically dominated, the visitors are preconditioned to accept orders and learn at the same time. Therefore, proper arrangement brings not only aesthetic benefits but also encourages cognition (Coe, 1985).

CONCLUSIONS

Lack of detailed regulations covering all needs of animals allows for exposures which are not only harmful to their inhabitants but also bring along false educative messages. It is especially noticeable in case of amphibious animals since water has a key role in the relations. Most information included in this work is of basic character. It merely illustrates the importance of water in exhibit landscapes and the variety of factors it affects. Based on the examples presented herein, the relations between individual factors may be identified. Presence of water influences animal behaviour, exhibit design, aesthetics of the arrangement and even education opportunities. Water initiates many behaviours which the visitors can witness. This facilitates entertainment, cognition of animal species and education. The analysis of legal regulations and environmental conditions in which the animals exist in natural environment highlighted the differences.

REFERENCES


POLAKOWSKI K., 1987: Zoo design: The reality of wild illusions – Excerpts. The University of Michigan School of Natural Resources.

Rozporządzenie ministra ochrony środowiska z dnia 20 grudnia 2004 roku w sprawie warunków hodowli i utrzymania poszczególnych grup gatunków zwierząt w ogrodach zoologicznych. Poz. 32.


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