

Winter Olympic Games as environmental problem

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Introduction

The Winter Olympic Games (WOG) are not only perceived as a sport competition on the international level, but simultaneously as a social event all over the world. New sport disciplines, an increasing number of participants (Fig. 1), and high demand for technical services for all sports venues are considered economic demands during the organization of WOG. The host country's expenses of organizing White Olympics are measured in millions of dollars. The environmental impact of Winter Olympic Games is also another important aspect after the economic and the sport one. This concept of Olympics as an environmental factor was also presented by the IOC previous president J.A. Samaranch. The environment was emphasized as the third dimension of the Olympic movement: sport-culture-environment. The issue of sport and its environmental influence were for the first time presented at the 1994, XII Olympic Congress in Paris. The need for environmental protection is included in the general principles of the Olympic Charter (Anonymous 1996). The countries competing to hold the WOG need to convince the voting members of the IOC and the general public, of both the economic and ecological success of the games. Norway achieved this in 1994 and the games in Lillehammer have the distinction of not

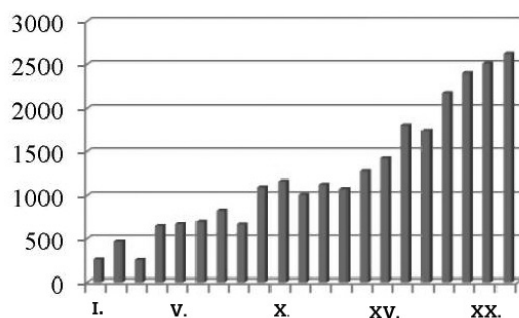


Figure 1. Increase of the number of competitors since the establishment of the WOG.

only being white but also green. This trend was reached due to the stand taken by the people of Norway when 65% of those surveyed chose the environment to be more important than gold medals of athletes representing Norway.

Environment and Winter Olympic Games

Damage to the countryside is often associated with often rushed construction of WOG facilities. Opposing this are zoologists, botanists, conservationists and forest rangers who are increasingly voicing their objections. Often the facilities developed for the Olympics are not accompanied by long term plans for their use. Same thing happens to the structures built for the sledging events. The construction of tracks for these sporting events is economically demanding. After the Olympics are over these facilities are often utilized only by professional athletes. Just the cooling of the tracks requires the construction of cooling mechanisms. Their appearance interferes with the esthetics of the countryside. As a result they are often designed to be constructed underground so this undesirable effect can be avoided. However even this has a negative effect in the form of disturbance of the soil during their burying. Issues such as these have spurred a movement concerned with organizing Olympic games with a greater focus on preserving the environment. Expansion of cross-country trails and building of new ski runs necessitates landscaping of the slopes using heavy machinery, often at the expense of the forest. Moreover, diminishing forests frequently lead to degradation of natural fauna as well as water and wind erosion because it can take centuries to establish new layers of vegetal growth in the alpine region.

The clearing of forest especially on steep and unstable slopes increases the danger of avalanches and provides a gloomy picture in the summer months. An additional problem with ski runs includes the need for snowmaking. Even though chemicals may not be used the effect of ski runs on the surrounding area is not small.

The following are number of ways in which the WOG impacts the environment negatively:

- High demand for water used by snow machines is complicated by the shortage of water at higher elevations. Snow guns require 50-80 liters of water per second. Small streams in the immediate surroundings usually have only a small amount of water during winter months, as their low volume results in freezing at sub-zero temperatures.

Furthermore, environmental pollution might be caused by leakage of oil from compressors.

- The lack of natural water resources requires the construction of man made ponds. This results in covering of the ground where they are built. Their presence affects local biodiversity of plant species and gradually changes the light regime in the area due to the light being reflected from the surface of the water.

- The artificially prolonged snow cover on ski slopes has an unfavorable effect on vegetation. The growing season in the alpine region is very short and artificially shortening it results in lower fertility of local flora.

- Ski lifts and runs disturb and intersect natural wildlife corridors inhibiting their free migration. The stress caused by a greater number of visitors and traffic does not benefit the animals.

- An additional environmental factor when considering the Olympics is that of Transportation. International transport consists of air, car and railway traffic, which provide transportation of participants and visitors to and from the WOG organizing country. Local transportation consists mainly of shuttles which transport visitors and athletes to and from sporting events and back to the Olympic villages. Sufficient parking facilities, as well as exhaust emission, dust, and additional noise are some of the transportation issues plaguing the WOG.

- New roads are often built to the detriment of the countryside. Their winter maintenance adversely affects the country. Even in the event that salt or any other chemicals are not used, more than two thirds of spreading material remains in natural surroundings up to 30 meters from the road due to the use of snow plows for clearing the surface of the road (Marenčák 1994).

- The securing of live telecast necessitates the use of helicopters. Their noise often disturbs grazing herbivores and spurs them onto avalanche prone slopes.

- Influence on the landscape and biota of the local national parks and reserves. For example, the plans for WOG 2006 in Poland located the sport activities to five national parks (Babiogorski, Gorcezanski, Pieninski, Tatrazanski, and Ojcowski NP) and 55 reservations (Komitet kandydatury Zakopane 1999)

- One of many other negative factors is the increased production of municipal waste and water waste, which requires building of new Waste Water Treatment Plants (WWTPs) and municipal landfills in affected regions.

Environmental situation after the Winter Olympic Games in the long-term

The WOG have taken place 21-times: twice in Japan, six times on the American continent and 13-times on the European continent; out of those 13-times 10 occurred directly in the Alps. The environmental problems were sorted out by the European parliament in 1992 after the end of the Winter Olympic Games in Albertville. The conservationists from all of Europe considered the development of the hotels and sport facilities that were built to support the WOG, as a devastation of the

Savoy Alps. The seriousness of the environmental issue in Albertville is ten fold, as the games were held at ten locations within the locale. Even today, after many years, the places where the games were held are still destroyed.

The Olympics not only interfered with nature but also with agriculture, infrastructure, economics and finances within the host country. From architectural point of view, infrastructure that was erected has not become an integral part of the region. Buildings were erected in inconvenient locations because only short term financial gains were expected. Numerous agricultural farms were expropriated without any regard of coherent governance. Important regions were destroyed that will not be able to be used for the purpose of agriculture or tourism in the near future. Hundreds of cut trees, leveled hills, and obstructed rivers completely changed the original landscape. Animal's lives were disrupted due to installations to supply drinking water and waste management. Clearings caused landslides, resulting in erosion. Most of the sport facilities were designed just for the duration of the games and at the present time stand unutilized. Some buildings were used only during the opening ceremony. Maintenance of ski runs is expensive, and many of them were completely eliminated after the Olympics. After the approval of a candidate, road constructions were sped up and time to consult was shortened. A typical example is the A43, a highway route between Pont-Royal and Albertville. It is considered to be the most damaged route from an environmental perspective because valuable wetlands for amphibians and reptiles were destroyed, and damage was done to coastal woods, which has improperly influenced the breeding, migratory birds and mammals. Building of additional highways and motorways also has resulted negative impact on the landscape. On the other hand, in an effort to make the countryside look green an attempt was made at reforestation which only gives it an artificial feel. The Olympic ski area needed over 1 million m³ of ground work, around 30 ha of deforestation and 320,000m² of urbanization (Mountain Committee FRAPNY 1992). The pollution of the lower river Nant Rouge was the result of huge ground work needed for the stadium in Les Saiseies. The ground work on the slope of Bellevarde near Val d'Isère increased the risk of avalanches. The bobsled track ground work near La Plagne led to the settling of the ground and the settling of the foundation for the ski jump near Courchevel – St.Bonhave triggered a landslide.

More in depth discussions and longer planning would help to avoid those negative environmental and added financial issues. The village Sainte Foy Tarentaise was finally able to develop its ski area "Bonconseil" after plans for the ski area were not realized for many years. This area was the last undeveloped ski area in Tarentais and Bonconseil now covers 80,000 m². The village of Les Menuires-Val Thorens because of the protection of its property, made the glacier Chaviere available to the public, which is situated in the Central Zone of The Vanoise National Park. Moreover the cable car, Grande Motte, was allowed to be built for the Olympics polluted a lake and allows people access to the glacier. The sports events alone led to the degradation of the environment.

Les Saisies – Cross-country skiing and biathlon

The region was vulnerable because of the presence of a large area of alpine peat marsh and an exceptional flora. Cross-country ski trails run through this rare, fragile natural habitat. Black grouse (*Tetrao tetrix*) and woodcock (*Scolopax rusticola*) seek out silent forests and meadows, which are not available to them due to the cross-country ski trails. A stepped amphitheatre was built to accommodate spectators; 12,000 seats to watch the biathlon and 14,000 seats for cross-country skiing. The ground work to do this covered an area of 110,000 m³ and had an adverse hydrological impact. Overall 300 hectares were generally accessible and 27,000 m² were urbanized. The hotel complex (the area of 7,000 m²) with a swimming pool and golf course has been polluting the environment with pesticides and other fertilizers.

Les Menuires-men's slalom

One of the negative effects of the men's downhill slalom course on the environment is the work that was necessary for the installation of the snowmaking equipment and television cables. There were 190 snow guns in the area. A separate artificial water reservoir was built for their use.

Brides les Bains – visitor accommodations

The village was successful in building a lift to the Meribel valley, which resulted in:

- declassification of Bois de Cythere (protected territory)
- cutting of the forest corridor (1,500 x 30 meters)
- an average 200 lifts crossed the forest daily
- 3 car parks were built

La Plagne – bobsled

The construction of the bobsled meant cutting 6 hectares of forest, which has been a hiding place of the black grouse, other types of birds and during the winter months, was the home of chamois (*Rupicapra rupicapra*). Unstable terrain, together with the storage of liquid ammonia, which is used as a coolant, has made this area the most controversial area accessible during the Olympics. At the time of the public survey, authorities were warned against the storage of 45 tons of ammonia in the proximity of 15,000-20,000 visitors. To solve the problem they did not allow the visitors entry to the area and provided local people with gas masks. However athletes were allowed to train there.

Courcheval – Saint Bon – ski jump

The ski jump in a forested area looked attractive; however it took up 5 hectares of meadow in a forest.

Pralognan curling, speed skating

Pralognan tried to build a connection between Pralognan-Courchevel after the Olympics, which was theoretically possible, but more importantly, that would have ruined NIEFF (a zone of great ecological interest in terms of fauna and flora).

Tignes – (freestyle and acrobatic skiing) Aerials and Moguls

100,000m³ of rock was removed to build the runs for moguls and aerials. A new cable car was constructed to satisfy Olympic needs, which replaced the ski-lift Grande Motte during the games. However it caused familiar damages already seen during the Olympics such as the pollution of Lake Tignes. This area has always had problems with supply of water. In spite of that the Olympics meant urbanization of additional 16,000 m² of the soil.

Val d'Isere – Men's downhill

In order to build a down hill run on the slope Belvedere, 40,000 m³ of soil had to be removed. In order to protect the local flora the ski run was built with a detour. The risk of avalanche on this slope has increased as a result.

Les Arces – One kilometer long runway for take-off

The area under construction to build this runway covered 200,000 m³ which had many serious negative effects on local alpine zone. Removal of local vegetation resulted in extensive erosion. The wide concrete runway does not allow drainage/seepage of all natural rainwater, which might cause floods in the future.

La Tagna (or La Tajna)

No sporting events were held at this location. An area of 27,000 m² was rebuilt for the purpose of parking and cross country skiing. For this purpose 12,000 ha of meadow was used.

For the objective assessment of the WOG Albertville 1992 one must also include positive outcomes, which the Olympics brought to the locality, especially the provision of basic services. The existing sewage system was widened, which in the end was not sufficient enough and a new one was constructed afterwards. Population may increase by 20-30% in each of these renovated areas during high season. For example Tignes did not have any sewage infrastructure and the waste water was discharged into local streams. At the same time they had 30,000 tourists and visitors during the winter season in comparison to 1,200 permanent local residents (Mountain Committee FRAPNY 1992).

Environmental burden versus economic benefits associated with the organization of the WOG is many times the topic of discussion in each country, which wants to organize Olympics. For example, the Japanese Olympic Committee planned a construction of new sports facilities needed for the WOG in Nagano in 1998 on top of hill Iwasuge; which is the highest point of the national Japanese paradise. "The Society to think about Mt. Iwasuge" argued that Nagano has many other locations suitable for the construction of ski runs; therefore it is not necessary to destroy Iwasuge. Other alternatives were presented so that organizers could choose other hills in the mountain chain of Shiga Heights, where most of the necessary ski runs and services were already available. There remain just three natural wildlife locations untouched by people in the Shiga

Heights mountain range: Akaishi, Shiga and Iwasuge. Moreover, the Shiga Heights was declared a UNESCO World Biosphere Reserve. In spite of the protest, the WOG eventually took place on top of Iwasuge, which lead to the destruction of important ecosystems. Some species of monkeys and bears were almost eradicated during the construction. They started to descend to lower elevations in search of food and fed on crops in local villages, where they often caused damage to the crops. This gave rise to setting of traps and snares. The Iwasuge was the home of many protected and endangered species: *Erebia nipponica*, *Capricornis crispus*, *Selenarctos thibetanus*, *Aquila chrysaetos*, or *Betula ermani*, and *Abies mariesii*.

The most critical point of conflict between the environmental protection groups and the commercial committee was the question of ski runs and cross-country trails. In many countries, public debates resulted in preference being given to preserving natural environment over hosting the WOG.

1972 Sapporo (Japan)

The construction of ski runs on Mt. Eniwa near special-ly protected area in the Shikotsu- Toya National Park.

1972 Calgary (Canada)

the plan to hold the WOG in the Banff National Park was not favored by the members of IOC. In the end the Olympic Games held in Calgary in 1988 were built without any interference in the Banff National Park.

1974 Denver (USA)

Plans to integrate Mt. Evergreen in the games had to be turned down as an overwhelming majority voted against it in a public vote. A destruction of a forest was prevented. In the end Denver was not able to organize the WOG, because they did not have enough financial capital for the event. The games in Denver were replaced by games in Innsbruck in 1976.

1992 Berchtesgaden (Germany)

The government declined to host the WOG in their country because it would have required the construction to be done in their National Park Berchtesgaden. Many Germans compare this park to the US Yellowstone National Park.

1994 Lausanne (Switzerland)

This nomination was turned down; nomination was not sufficiently supported by the people in a referendum.

To date the Norwegian Olympics are considered to be the most environmentally friendly. However even these games didn't occur without some damage to the countryside and the environment. It took two years to build The Cavern hall in Gjøvik where only 16 ice-hockey matches were played. Nowadays it serves as a concert and congress hall and as a nuclear shelter. The Cavern Hall's dimensions are 61x91x24 meters and its capacity is 500 seats. During the construction 170 tons of dynamite was used and 29,000 truckloads of rock was removed (Anonymous 1994a).

The WOG as an economic factor

The West Carpathians – Poprad, Zakopane

When applying to host the Olympic Games often the actual competitive component of the games is of less focus than the promotion of the country and economic benefits.

Some candidate countries tried to hold the WOG in their national parks, e.g. Poland (see above) and Slovakia. The Poprad-Tatry (Slovakia) Olympic organizing committee conducted themselves by the slogan "the games are not the aim but a vehicle to achieve the speedy development of a specific locale". They tried to persuade not only the government of the Slovak republic, or potential sponsors, but also the general public that the games were their only chance to build tourist centers in the Tatra Mountains. The Olympics would also help in erection of necessary infrastructure and it would speed up the construction of highway D1. At the same time the Olympics were supposed to mediate world wide publicity of the region surrounding the Tatra mountains and the country as a whole. They supported their affirmations by arguments that on the bases of the economic analyses, the Olympics should be profitable.

The originally planned referendum to investigate the opinions of the residents of the area affected by the 2006 WOG was replaced by a poll lasting two weeks. The organizing committee rendered this decision as they were apprehensive that the required percentage of over 50% of affected voters would not be involved in voting. However 58,252 legitimate voters from the region participated in the referendum, this represented 64.4% (Simo 1997). Out of those, 97% voted in favor of the games. Most of the supporters were in towns of Kežmarok and Svit, but none in the village Old Smokovec. The residents of the Tatra region succumbed to promises of future prosperity by the organizational committee's campaigns with respect to the referendum dealing with WOG. Almost 200 million was funded by the Ministry of Education and an additional 17 million from the state budget was allocated to the WOG project in hopes of an 800 million profit from sale of broadcasting rights (Anonymous 1997).

"A perspective for our children, honor for Slovakia and happy games for the world!" - this slogan expressly states the view of the Olympics by ordinary citizens. People believed the Olympic Games would bring to their region many new job opportunities. The Olympic campaign promised 10-12 thousand of new jobs (Žilka 1994), and the construction of new accommodations. Flats built for the needs of the Olympic village were to be sold to young families afterwards. All this just for the price of sacrificing a "piece" of nature. In an answer to the question from the reporters as to what will the Olympics take back in return, the representatives of the organizational committee answered using choice words "Nothing, just a few people in the world that don't wish us well". The total cost to organize the WOG 2002, including the cost of completion of infrastructure, was 27 billion SKK (Anonymous 1994b). The state budget should have contributed about 3 billion crowns towards financing of the project (Bartečková 1994) and organizers

also counted on credits from international banks. The organizer alleged that with the help of sponsors they would be able to make, thanks to the WOG, 13 billion crowns in profit for Slovakia. If we were successful in the selection process the Slovak government would contribute, for the purpose of the Olympics, 6.5 billion SKK from the state budget. From that 2.04 billion would be assigned for ecological projects and 3 billion for completion of the highway. The government guaranteed 458.9 million dollars in budget for games in the public sector and 249.9 million dollars to cover being budget overruns and any other deficit. Guarantee of this magnitude of capital investment would exceed 15% of the state budget in the period of seven years (Buzinkay 1995). Seeing that the government by contractual protocol took over all the guarantees for holding the games, including the financing, all citizens of Slovakia would have to bear the loss. At present we know that the Slovak candidacy for WOG 2002 was unsuccessful. Following a corrupt affair, Salt Lake City won. The whole candidacy cost 15 million Slovak crowns, which also included the cost of projected study – 2 million (Račko 1995).

During 1997 the government of the Slovak republic released 20 million SKK for the WOG 2006 candidacy. Its approximate cost was 150 million SKK (Šimo 1997). This was spent mostly on Olympic advertisement and propaganda. The financial burden, apart from the contribution by SOV and Slovak government, so far rested on the shoulders of large Slovak private businesses- e.g. U.S Steel Kosice, Bank for Investment and Development, Slovak Gas Industry – S.P.P., Slovak Savings Bank. Their contribution was 30 million. Beside the state's budget and sponsors also the towns and affected regions, including public collections should have been a financial source. In the event of the games 17,067 milliard SKK should have become available. Out of that 13,386 billion was to be for the sale of broadcasting rights. The net profit was to come to 804 million crowns (Šimo 1995).

The total cost to organize the WOG 2006 in Zakopane (Poland), including the cost of completion of infrastructure (including the reconstruction of highways in the region Malopolska), was 2.215 billion USD (Komitet kandydatury Zakopane 1999). Without the traffic ways reconstruction, the official budget of the games was calculated with 855 million USD.

The Apls - Albertville

The first official financial budget of the games was calculated with 600 million Euros and additional 213 million Euros, for the security alone, during the course of the Olympics. The budget did not contain reconstruction and building of necessary infrastructure calculated to be 1.2 billion Euros. Sale of broadcasting rights should have brought a profit of 280 million dollars and 230 million Euros. Out of that, the American television company CBS paid a staggering sum of 242 million dollars. Ticket sale generated a profit of additional 152 million Euros. Organizers during the planning of the games were banking on a financial loss of 43 million Euros. The final budget consisted of 1.8 billion Euros out of which 640 million was swallowed by the lone process of the games and the rest was required for

infrastructure. The price of the WOG Albertville Sports Grounds:

- Establishment of sports facilities - 140 million Euros,
- structure of media center - 152 million Euros,
- accommodations - 68 million Euros,
- and other costs - 23 million Euros.

After the Olympics 5,000 people remained without a job. The capacities of newly built Olympic stadiums were declining. The hockey stadium that had the capacity of 9,000 seats after the white games served as a center for outdoor sports. In 1993 the attendance declined to 6,000 seats and into the next year they reduced the capacity to 1,500 seats. Similar fate awaited the bobsled and toboggan skeletons. The number of seats was reduced from the original 10,000 to permanent 4,000 seats. The areas holding ski jumping competitions and speed skating during the Olympics was completely shut down in 1994 due to rental problems (www.informaworld.com 2008).

Lillehammer

Olympic budget was calculated at 1.7-2 billion dollars, which was about 11-12 billion NOK. Just the town of Lillehammer contributed to that sum in the amount of 270 million NOK. It worked out that every Norwegian paid 48 dollars towards the cost of the games. It was the first time that the entire planned budget had not been spent and they saved 14 million dollars at the end of games (www.american.com 1997).

Nagano

The Olympic budget was 103 billion Japanese Yen. The organizers counted on profits from marketing activities (sale of broadcasting rights, sponsorship, ticket sales) – roughly 69.9 billion JPY and additional 33.1 billion JPY from lottery and local attractions. Overall investment connected with the games should have been 1,500 billion JPY, which comes to 12.5 billion dollars (exchange rate of 120 JPY = 1 dollar). Expected profit should have been 19.2 billion dollars.

Expected profit wasn't supposed to be realized immediately after the games were over, but invested money were suppose to return in the course of next few years as a so called ripple effect. For building and repair of highways they reinvested 300 million dollars. After the Olympics, social problems awaited Japan. Olympic projects such as sports facilities, accommodations, and the speed train were built by poor illegal workers from India and Thailand. It is estimated that their numbers were in the tens of thousands. From 1990 the figure of illegal workers had increased from 10,450 to 33,000 people (Anonymous 1998). During the final preparatory phases hundreds of people lost their jobs. Japanese offices, which had ignored the issue of illegal workers for three years, strived to expel these non essential workers. 520 Japanese lost their jobs (www.mofa.go.jp 1997).

Salt Lake City

The planned budget just for organization of these games consisted of 1.3 billion US dollars. While an additional 4.5 billion dollars were reinvested in tourism, 1.3 billion ended up in federal funds and

40 million was swallowed by local government. The Utah state government invested 450 million dollars in the games, but they only got back 374 million dollars. The town itself lost 20.4 million dollars (it invested 119.9 million, but got back only 99.5 million). According to other sources, the town lost 55.5 million dollars. From year 1996 to 2002, 35,000 people were able to find jobs, but after the Olympics in most cases they were left without one. Unemployment increased by 5.1% (www.pages.drexel.edu 2002).

Turin

The final budget was 1.2 billion Euros (1.45 billion dollars). The Italian National Olympic Committee received 29 million Euros from the government to finance an Olympic lottery. 3.6 billion Euros were used for building and reconstruction of new sports facilities. Overall investments in the games consisted of 12 billion dollars and the expected profit was 17.4 billion Euros in the three years from the actual beginning of the Olympics (www.omerio.unito.it 2006).

Vancouver

The Vancouver Organizing Committee (VANOC) had a consulting firm, InterVISTAS Consulting Inc., validate and improve the economic impact estimates that the committee predicted. The current operating budget that was forecasted by the VANOC was 1.63 billion (Canadian Dollars or CAD), with an estimated 580 million (CAD) of it budgeted to new venue construction and renovations to existing venues ("Business Plan and Games Budget"). These numbers represent the financial burden that a country/city must undertake to host the Olympics. The substantial amount of funds is provided by both private and public donors. Thus far, 74% of the Vancouver games have been funded by private funding. One of the biggest economic effects on Vancouver, just like every other Olympic host nation, will be the increased volume of tourism before, during, and after the Games. Revenues from tourism, as an effect of the Olympics, are expected to start three years before the Games and are projected to continue five to six years after the Games. This doesn't mean that tourism will not continue to occur in Vancouver; it means that the Olympics will probably only influence increased tourism for about five or six years after the Games. Tourism spending according to InterVISTAS Consulting is predicted to peak around \$1.5 bil-

lion (CAD) in 2010 and remain steady around \$250 million (CAD) for the five years after the Olympics. (www.omerio.unito.it 2006).

Conclusions

The Table 1 summarizes individual information about WOG by number; sums of money are written in million dollars and represent each country's budget only for the mere provision of the Olympics. They do not contain financial amount, which was used for modernization or construction of needed infrastructure.

In almost every study, the economic calculations of individual Olympics are denoted as great sums of money. Individual documents actually don't agree either if individual games in the end were profitable or not. In some way all Olympics profit. Unfortunately the profit is often not felt by the residents in the area the Olympics touched; it is felt only by a narrow circle of interested corporations. Without question, what remains, is that during the construction of centers for WOG, the impact on the environment is underestimated and the negative impact is often irreversible.

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	Lake Placid 1980	Sarajevo 1984	Calgary 1988	Albertville 1992	Lillehammer 1994	Nagano 1998	Salt Lake City 2002	Turin 2006
Expenses	115.36	72.93	590.00	859.00	868.00	no	1,32	1,33
Gains	97.60	277.81	626.00	800.00	525.00	1,05	1,26	1,30
Profit/loss	-17.76	204.87	36.00	-59.00	-343.00	48.00	-54.00	-33.00

Table 1. Summary of expenses and revenues of the past eight Winter Olympic Games in millions of USD (www.omerio.unito.it/?download=OMERO_WP_1_2006.pdf).

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