

# Plan of Action Against the Fire: Educational Programme "Bombi, the Firefighter"

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#### Abstract

Between 2005 and 2010, within the framework of the Policy of Wildfire Prevention implemented by the Government of Córdoba Province (Argentina), the "Primary School Sessions on Prevention of Fires of Hills and Grassland" took place.

This educational plan of action was jointly carried out by the Department of Preschool and Primary Education (Ministry of Education), the Bureau of Environment of Córdoba and the Foundation of Environment, Culture and Development. The complexity of the issue of fire required an approach that integrated institutions related to prevention, fighting and remediation of fire; therefore, a jointly work was coordinated.

This social marketing programme not only attained awareness increase within the population, but it also eventually allowed to diminish fire hotbeds in the province.

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<sup>&</sup>quot;Bombi" is the name chosen in a contest for a little fox, the pet of the Provincial Plan of Fire Management. It can be considered a short form of the word firefighter in Spanish (*bombero*).

#### **Learning Objectives**

The pedagogical aims of the case are:

- To value the role of sensitization and social awareness about the issue of fire and the forest fires through children educational programmes that seek to reach families and the general community
- To evaluate the fulfilment of the objectives and the quality and scope of the Programme "Bombi, the Firefighter", an animated cartoon that protects nature and the native forest
- Discuss different social change strategies as from the behavioural profiles identified in relation to the caretaking of the forest and the risk of forest fires

# Introduction

Once upon a time, there was a little fox from Córdoba that lived very, very placidly in the mount with his lovely family. One day, the little fox noticed a lot of smoke near the stream and came closer to see what was going on. At that moment, he saw that smoke changed into a big campfire due to some glass left on the grass by some neglected people. What a scare! He immediately put his tail in the water to splash it onto the fire. As he realized that he could not put the fire out, he run to the village looking for help... When he reached the fire station, he signalled for help to the firefighters and asked them to follow him. The firefighters acted quickly and put the fire out; then, they talked about how courageous the little fox had been and decided to name him the official pet of the fire station... his name would be BOMBI, the firefighter fox faster than a fire engine! (Efraín Osvaldo Rost, 6 year old, from Alcira Gigena, Córdoba, Argentina, winner of the 2004 contest "A name for our little fox")

Between 2005 and 2010, within the framework of the Policy of Wildfire Prevention implemented by the Government of Córdoba Province (Argentina), the "Primary School Sessions on Prevention of Fires of Hills and Grassland" took place.

This case addressed the complexity of the issues of fire by integrating institutions related to prevention, fighting and remediation of fire, such as the firefighters, the police, schools and the overall community.

First of all, this work presents the situation of the fires in the province, the risks, causes and consequences of fires. Then, it describes in detail the educational programme "Bombi, the Firefighter", its characteristics, its pedagogical proposal and how families and the community can be involved. Last, this work shows the results of the educational programme and its impact on fire management.

# **Case Development**

#### The Province of Córdoba

Córdoba is one of the 23 provinces that constitute the Argentine Republic. It is located in the Centre Region, 710 km from Buenos Aires; it has a surface of 165,321 km<sup>2</sup>, and it is the fifth largest province of the country and the second most populated one.

As regards its geography, two morphologically well-defined areas can be observed: a hilly area to the west and a predominantly flat area to the east. Thus, plains, hills and valleys characterize the landscape of Córdoba.

For the above-mentioned reasons, Córdoba is a classical tourist destination of Argentina. The hilly systems with rivers and streams surrounded by unique natural landscapes invite tourists to enjoy nature, the typical gastronomy and cultural events, like the outstanding festivals during summer. The dams and the reservoirs of Córdoba are visited by fishing and water sports lovers; adventure sports like trekking, climbing or parapenting invite those who enjoy the adrenaline while the peaceful Jesuit *estancias* or farming estates and churches allow to discover the Spanish and Jesuit legacy.

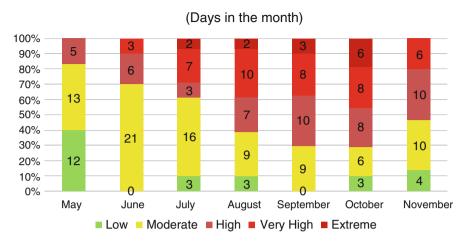
Furthermore, Córdoba is an important economic, financial, educational and cultural centre. International events like the Rally Dakar and the Rally of Argentina attract argentine and foreign visitors (900,000 visitors). People from Córdoba participate in these events with a lot of passion and fanaticism while having the traditional *asado* or barbecue at the side of the road.

On the other hand, it is worth mentioning the diversity of plant formations of the native forest composed of the Chaco forests, the espinal forests and upland forests. Though this natural richness, Córdoba has a sad record: it has recorded one of the highest deforestation rates of the native forest of the world. During the last century, Córdoba lost 95% of its native forest (Fundación Vida Silvestre 2016) due to numerous factors: agriculture growth, unsustainable forest exploitation, unplanned urbanization and uncontrollable forest fires.

# Care for the Forest: Fire Risk and Issue

The fires of forests, scrubs and bushes due to natural causes or human actions have always been present in the geography. Deforestation as a result of urban development and agricultural production, the logging for forest use and the overgrazing of fields have contributed to the dramatic reduction of the area covered by forests. At the beginning of the twentieth century, there were approximately 12 million hectares of native forests; in 2012 there were only 594 thousand hectares left (Groshaus 2015).

The fire season in Córdoba coincides with the dry season, from the beginning of winter until the end of spring. It is characterized by the presence of abundant plant material that becomes dry because of frosts and drought. Moreover, the frequent winds of August and September worsen the fires. The combination of these factors



**Fig. 1** Fire weather index. Source: Guía de prevención de incendios [Guide for the prevention of fires] (2007)

allows to forecast, through the fire weather index, the seasons of highest fire risk, as indicated in Fig. 1.

Moreover, the following deep-rooted human habits are added to the abovementioned natural conditions that may cause fires:

- To light a fire intentionally to weed, ward off rodents, collect firewood and get regrowth of grazing land to feed livestock
- Accidental fires because of not extinguishing embers after the preparation of a barbecue in the open air and the tossing of hot cigarette butts and the disposal of wastes from residues that act as combustible material in a rural or forest area

Forest fires cause severe damage to the ecosystem, thus having a negative impact on nature. The main effects are shown in Table 1.

# The Plan of Fire Management of Córdoba

The mission of the Provincial Plan of Fire Management involves preventing forest fires, extinguishing them in a fast, coordinated, efficient and secure way and reducing their environmental and social impact by helping the affected places.

The authority in charge of implementing this plan is the Former Bureau of Environment of Córdoba (the current Secretary of Environment). The secretary works together with the Department of Firefighters of the Córdoba Police, the Federation of Volunteer Firefighters and the Provincial Department of Civil Defence in the elaboration of the Annual Plan of Prevention and Fight against fires. This plan is financed by the funds for prevention and fight against fires which consist of the resources from the General Budget of the province of Córdoba, collections that come from the payment of fines and sanctions, donations and other taxes collected by the enforcement of the law.

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Ecological problems	The flora and fauna habitat is destroyed; old trees are burned; naturally originated seeds and seedlings are lost; animals die; biodiversity is reduced; levels in the trophic chain are eliminated (plague can appear); forest fires contribute to soil erosion; the regulatory capacity of water diminishes (high risk of floods); waterways are contaminated, the atmospheric humidity diminishes; gases are released, which increases the greenhouse effect	
Economic problems	Destruction of forests for forest production; loss of harvest or pasture and livestock; loss of farm facilities (perimeter fence, posts, stockyards, houses) and reduction of livestock production	
Social problems	Impoverishment of the population due to the gradual loss of farm productivity; reduction of quality of life	
Health problems	Respiratory diseases; burn injuries; traffic accidents caused by the loss of visibility; loss of human lives	

**Table 1** Problems of the rural fires

Source: Elaborated by the authors

As mentioned above, prevention is one of the aims of the plan. The legal prevention comprises all those legal norms that regulate, prohibit or punish the use of fire. At federal level, the National Penal Code establishes this in its 186 Article. At the provincial level, the Provincial Law 8751 of Fire Management, in its Article 4, states that "it is forbidden to use fire in the rural and/or forest environment", the infringers will be punished with a fine, notwithstanding the penal responsibility for the commission of the crime. In addition to legal prevention, an effective power of control to enforce the law is crucial; this enforcement authority is represented by the Environmental Police (which reports to the Secretary of Environment).

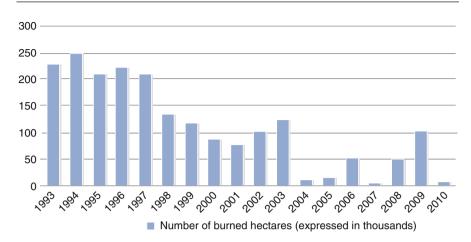
Cultural prevention involves both influencing the population so that it has an active role at the issue of fire and managing to change inadequate behavioural patterns in relation to the use of fire. In order to raise awareness about the prevention of fires and the importance of having an active role in its early warning, different means are available: (a) approaching the problem from the educational system; (b) dealing with the topic in the mass media; (c) placing signposts at roads, information posters at stores and stickers at vehicles; (d) distributing flyers to neighbours and to toll stations; and (e) raising awareness in an individual manner among local producers and vehicle drivers during the critical season.

Within the framework of the cultural prevention and taking into account the need to increase society awareness as to the prevention of fires, the "Primary School Sessions on Prevention of Fires of Hills and Grassland" and the educational Programme "Bombi, the Firefighter" herein presented were developed and implemented.

# The Educational Programme "Bombi, the Firefighter"

# Aims and Basis of the Programme

In order to reach the substantial reduction that can be observed in Fig. 2 in relation to the number of burned hectares, the support of the educational system was crucial since it allowed to deal with the issue in a systematized manner and on a large scale.



**Fig. 2** Fire statistics: burned hectares. Source: Guía de prevención de incendios [Guide for the prevention of fires] (2007)

Furthermore, the unconditional support of 50 volunteer firefighter brigades located in the risk areas, the participation of 29 lookout posts of fires and the power of control of the Environmental Police by verifying compliance with the legal regulations were added.

Furthermore, working with children was key to the educational programme "Bombi, the firefighter", since the teachings received during the first years of education are kept until later years. In addition, these teachings have a multiplier effect because each child spreads their knowledge at home, thus becoming little "teachers" and guardians of nature and making it possible to spread the message to the local community.

# **Characteristics of the Programme**

Materials were distributed to 2148 provincial and municipal primary schools (public and private) so as to reach 400,000 children and 20,000 teachers. The materials kit for each student, teacher and school consisted of:

- The booklet for children: Do not burn our future!
- The games: "Bombi Firefighter" and "Firebusters"
- A three-page leaflet for parents, teachers and the school library
- The book 2005 Educational Sessions on fire prevention of hills
- Posters with information about fire prevention to hang in the classroom and in other places of people flow (town hall, supermarket, grocery store, filling station, etc.)
- The video "Bombi Firefighter" and the Chest of Prevention
- A circular and assessment sheet of the educational "sessions" for each school

The educational sessions lasted, at least, 3 days and covered two situations: one working with students and the other one with the community through extension activities. At the end of the session, the participants filled in a form to evaluate the activities.

# The Educational Session Dynamics: Suggested Activities

It was proposed that, before carrying out the "session" at the school, teachers thoroughly studied the following materials so as to know them and to plan the classroom activities: the booklet for children *Stop the fires!*, the games "Bombi Firefighter" and "Firebusters 2", the video "Bombi Firefighter", the Chest of Prevention and the guide to "Sessions on Prevention of Hill and Grassland Fires from Primary Schools".

In the first place, at the beginning of the "sessions", it was suggested to work with the students on concepts related to fires with the help of the booklet for children. This began by the motivating and triggering reading of each concept with "The story of Bombi" and "The Fourth Element". Once the concepts of the booklet were taught, it was necessary to integrate and internalize such concepts. At this point, the games "Bombi Firefighter" and "Firebusters 2" were used, the first one intended for younger children, the second for older children. Before playing them, the students had to make a dice and cut the cards and game pieces that made up the game. The opposite side of the "Firebusters 2" game cards had a simple puzzle for younger children. In order to present or integrate the topic, a video titled "Bombi Firefighter" and a Chest of Prevention were also available. In summary, at this point the aim was to reinforce concepts related to fires: causes, consequences and prevention.

Once the previous aim was achieved, the next objective involved sharing these learnings with the family. To do this, a three-page leaflet was given to each student so as to take it home and share it with parents and other members of the family. The family also participated in filling the last pages of the booklet. This stage was very important because the school invited adults to actively participate in the process of fire prevention with the purpose of changing deep-rooted behaviours and local habits related to fire management. In order to accomplish this objective, the activities mentioned below were suggested to be carried out at the school:

- The community was invited to a theatre play performed by the students.
- The volunteer firefighters were invited to give demonstrations and deliver informative talks.
- Parents and neighbours were invited to constitute a "Committee for the prevention and early warning of fires".

# **Pedagogical Material: Stories and Tales Written**

The kit of pedagogical materials used in the sessions included the stories, tales and theatre plays described below that were especially written for this programme by specialists.

# The Story of Bombi

By the end of 2004, the contest "A name for our little fox" was organized by volunteer firefighters with the purpose of inviting children and teenagers from 6 to 15 years old to create a story and name for the pet of the plan. One thousand, four

hundred and fifty children and teenagers participated in the contest, and the winner was Efraín Osvaldo Rost, of 6 years old, who named the little fox "Bombi" and wrote the story included at the beginning of this case.

# The Story "The Fourth Element (Land, Water, Air and ... the Fire")

This story for children and adults was written by the teacher Fanny Pérez.

Life exists in the world due to three elements that can be touched: earth, water and air. However, for life to be possible, another element outside earth is needed: the sun. The fourth element is fire.

This element has something in particular: though fire was far from the reach of men, it is the only substance that can be manipulated. Fire seems to be alive, it gives light and heat but it can also consume everything. It can cause suffering and death.

For this reason, it is said that, at the beginning of the creation, fire was owned by the gods and that it could only be manipulated by them. You may remember that the first men did not know how to make fire. There were neither matches nor lighters. They are raw food or they used the heat of the sun to cook certain food.

Fire was present in the sun, in the lightning of storms, in the heart of Earth that shows through volcanoes. It was always far from the reach of mankind.

Words has it that when the Greek god Zeus got angry with human beings, he threw bolts of lightning over the Earth without rain, which caused fires. But, that only happened when Zeus got angry. In their early imagination, men attributed fire to the gods because they were aware of its danger.

Today, we can make and use fire. It would be difficult to think about our civilization without the use of fire. However, this element can cause fires. We know that these are rarely caused by nature; lightning might strike and burn trees, but it rains immediately after this, or humid weather may prevent burning from happening.

But, we also know that we need to be "careful with fire" because it can get out of hand and cause a catastrophe and, this time, the guilty ones will not be the gods.

# Performance of the Theatre Plays

Table 2 summarizes the theatre plays written to be performed within the framework of the educational sessions.

# Videos of Bombi, the Firefighter, and His Friends

A series of cartoon videos that included episodes of fire prevention was made. By using the cartoon characters "Bombi, the firefighter and his friends", these videos incorporate a playful and entertaining sense. In addition to Bombi, the characters that appear are his friends Verón, Sandro and Bola, an old firefighter called Anatoli and Flame (the fire). The structure of the cartoon follows the logic of programmes for children: the fight of good and evil, the triumph of good, the reestablishment of order and a moral teaching. Table 3 presents a synopsis of each of the seven episodes, which last 4 minutes in average.

Play	Description
"Fear at the forest of the mistol"	Bringing the world of nature nearer 5–7-year-old children and being capable of distinguishing characteristics of the native flora and fauna were the main objectives  The story takes place in the forest. The talking parrot brings rumours about a fire that is burning near, which causes concern. At the end of the play, the little fox, Bombi, the firefighter, appears; he looks tired after extinguishing the fire and tells the audience about the causes of the disaster
"Luciano and the Time Machine"	Luciano and his group of friends are fans of scientific experiments. They invented a machine to travel through time. The play is divided into three scenes  Scene 1: Trip to the prehistory. They learn how fire was invented Scene 2: Trip to a forest on fire. They observe the dreadful consequences and sadness caused by a fire  Scene 3: They travel to the moment before the fire starts to find out its causes and prevent it from happening
"The Explorers"	This plays tells the story of some explorer boys who learn to identify when there is danger of fire and to act accordingly. This proposal is intended for children between 8 and 10 years old

**Table 2** Theatre plays for the educational sessions

Source: Elaborated by the authors

The prevention campaign was also addressed to a more general and undifferentiated public through the mass media. The presence of Bombi was omitted from these actions. Some of the actions and messages transmitted are emphasized below:

- (a) Campaign of alert signs: a thermometer that warns of the level of fire risk, depending on weather and atmosphere conditions, was made known.
- (b) Road alert signs, warnings and recommendations in areas that are prone to fire risks due to their environmental characteristics. It can be noticed that these signs are placed all through the province of Córdoba, mainly in the hilly departments of the province.

# **Conclusions**

# The Results of the Programme and Its Impact on Fire Prevention

Santesmases Mestre et al. (2007) indicate that social communication has to be measured in relation to the change it can cause not only in behaviour but also in attitudes. The implementation of the Provincial Plan of Fire Management and the Sessions on Prevention of Fires provides very positive results which can be measured in terms of the reduction of the number of burned hectares, the number of fires recorded by year and the important levels of participation and achievement of the activities proposed in the plan.

**Table 3** Synopsis of the episodes of the cartoon Bombi, the firefighter

Episode	Title	Synopsis
1	The Brigade	Bombi meets the Flame again and remembers the fire that affected his family when he was a child. He can confront him now together with his friends Verón, Sandro and Bola so as to protect our hills. Due to Bombi's efficient way of fighting the fire and, above all, due to his courage, the firefighters name him Chief of the Brigade of Animal Firefighters  Youtube Link: https://www.youtube.com/watch?v=MXe83qIgkis
2	A new fire station	The members of the Brigade meet their new fire station and discover the equipment available: fire engine, firefighting plane, intercom equipment and all that is needed to fight forest fires. Their first mission takes them to talk to their neighbours so that these people become aware of the burning of grasses. The Brigade also faces their first challenge against fire which they successfully overcome Youtube Link: https://www.youtube.com/watch?v=jfxR_KT-900&t=45s
3	Anatoli	This episode brings a surprise. A quiet night at the fire station is interrupted by a strange visit: the legendary Anatoli. He is a great firefighter from a different time who will join the team to share his experience and to collaborate in the following missions, thanks to his deep knowledge of the hills of Córdoba Youtube Link: https://www.youtube.com/watch?v=Gh1C1MRHVfQ&t=1s
4	Ninja cigarette butts	Bombi and his team have to deal with various incipient fires caused by hot cigarette butts in an area of complicated access. The confrontation is tough, but our friends successfully overcome another challenge. At the same time, they teach us that starting a fire in an unauthorized place is forbidden by law. Link Youtube: https://www.youtube.com/watch?v=p-ZYf15h1X0&t=2s
5	Children and the fire	A group of children are playing firefighters just when a fire caused by an unextinguished campfire starts close to the children. Fortunately, Bombi and his friends will arrive on time to extinguish the Flame. Together we learn that fire is not child's play and that, above all, we must call a specialist Link Youtube: https://www.youtube.com/watch?v=w7mxfmaw0CY&t=1s
6	Rally in Argentina	The firefighters prepare themselves to work for a new edition of the Rally in Córdoba. Our friends achieve the objective by avoiding risks that are not usually taken into account and by providing information about how to behave and prevent fires in the hills from happening  Link Youtube: https://www.youtube.com/watch?v=AA-sj3TFgxE
7	The ambush laid by the Flame	After a fright, Bombi, Sandro, Bola, Verón and Anatoli analyse how to deal with difficult situations by reflecting on the importance of teamwork and organization to face each challenge. They arrive to the conclusion that we must all help in prevention by taking all the precautions we have learnt Link Youtube: https://www.youtube.com/watch?v=Uon-7UQH45k

Source: Cabás and Viale Linares (2010)

Córdoba has gone through years of devastating fires. In the last years, it can be noticed a decreasing trend: with 9800 burned hectares, 2016 is the year with the smallest surface burned by forest and rural fires. Nevertheless, the task of prevention should not be considered over at all. Statistics show that there were periods of increase in the number of fires, like the devastating fire that took place in 2013 at the area of Calamuchita, where 152 thousand hectares were blazing (a hilly area of high forest and environmental complexity).

Although the comparison of burned surfaces by year gives relevant information for making a diagnosis, it does not show a key data: the environmental and economic impact, since the affected areas take years, or decades, to recover from fires.

The economic costs derived from fires are usually estimated by taking into account the losses recorded in terms of burned forest resources (natural or planted), livestock or fodder resources and the costs incurred to extinguish the fire (in relation to human and technical resources), among others. However, these costs, as a whole, represent only 10% of the total losses since these estimations do not measure the recreational or the ecological value caused by the fire (Kopta et al. 2005).

Human beings are responsible for 95–98% of forest fires. In addition, the members of the community itself are the ones who can prevent these fires from happening. Educational and prevention actions (physical, cultural and legal) performed through the educational sessions on fire prevention has proved to be the adequate path to prevent Córdoba from even more fires.

During these sessions, a great participation of the community (parents, volunteer firefighters, neighbours, police officers) was recorded; almost 100% of the participants considered the results of the sessions as positive (excellent, very good, good). Moreover, the constitution of committees for prevention and early warning of fires was achieved from the schools, which involved an increased commitment of adults to organizing themselves so as to contribute to the solution of the problem. In addition, teacher's great commitment to deal with the topic was stressed. An example of this is the percentage (70%) of schools that performed the plays proposed. On the other hand, a positive evaluation of the distributed materials was obtained, with an average evaluation of 95% (excellent and very good). All these indicators show that there is a great interest, willingness and concern of the whole community in relation to the issue of forest fires. They also reveal that joint actions among the different social participants can be coordinated so as to have an active role and, as a whole, to manage the prevention of future hotbeds.

# **Discussion Questions**

- 1. Which is the importance of cultural prevention in relation to forest fires within the Integral Plan of Fire Management?
- 2. In order to change undesirable behaviour in society, different actions from social marketing are proposed. One of them is education and information. Do you consider that educating children so as to reach adults is an effective and productive action to raise social awareness in the community?

- 3. Throughout the case, attitudes, behaviours and actions of citizens that can provoke forest fires are described. (a) According to those behaviours, can you create or define different citizen profiles? (b) For each of the above-defined profiles, identify their attitudes (positive or negative) and their behaviours (desirable/undesirable).
- 4. Based on question 3, what strategies of social marketing are relevant to implement: reinforcement, rationalization, induction or confrontation? Why?
- 5. In your opinion, which profile (question 3) matches the programme "Bombi, the firefighter"? To which strategy of social change (question 4) corresponds the programme? Explain.

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