

AMS EDUCATIONAL PROJECTS IN BAJA CALIFORNIA SUR, MEXICO  
 "REACHING OUT TO RURAL COMMUNITIES OF  
 DIFFICULT ACCESS OR WITH A MIGRANT POPULATION"

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## 1. INTRODUCTION

Through workshops, visits to the Weather Station, experiments, and the dissemination of AMS instructional materials, CONAFE and CNA have been, during the last two years, promoting a meteorological, oceanographic, and water cycle education to preprimary and primary teachers and students in rural communities of difficult access or with a migrant population in Baja California Sur.

This paper reports the activities done, as well as the results achieved.

## 2. GENERAL ASPECTS OF BAJA CALIFORNIA SUR

### 2.1 Geographical Situation

The state of Baja California Sur is in the southern part of the peninsula of Baja California, in northwest Mexico. It is a long and narrow state practically surrounded by the sea, with an area of 73,680 square kilometers and a shoreline of 2,220 kilometers.

Baja California Sur is traversed, from north to south, by a mountain range that has different names; San Francisco, La Giganta, and La Laguna.

The climate in Baja California Sur is mainly dry and warm, yielding a desert vegetation. However, the highest parts of the mountains are cooler and more humid.

Because of the climatic conditions, the streams in Baja California Sur are arroyos that only have water when it rains heavily, especially in summer during the short rainy season or when a tropical cyclone hits land or comes near. Because of the lack of surface water, groundwater constitutes the main water source in the state.

### 2.2 Population

The population in Baja California Sur reached, in 2000, 423,516 inhabitants (INEGI, 2000). This state has the lowest density in the country, 5.7 inhabitants per square kilometer. The topography, the climate, and the

hydrology have caused an irregular distribution of the population.

The internal migration in Baja California Sur is mainly characterized by the movement of people from rural areas to the cities. The immigration to Baja California Sur from other states of the country is also high, caused by the increase in labor opportunities, especially within agriculture, mining, and tourism.

Eighty-one percent of the population in Baja California Sur is urban. It is concentrated in the main cities like La Paz, Constitución, Cabo San Lucas, San José del Cabo, and Guerrero Negro, which generally have a high population growth.

Though the rural population in the state has decreased during the last decade, it is still extremely dispersed. Ninety-eight percent of the 2,743 locations in Baja California Sur are small communities with less than 500 inhabitants (INEGI, 2000). The dispersion of the population prevents both the construction of basic facilities and the supply of some services like potable water, electric power, sewage, schools, paved roads, and health centers for so many small communities.

### 2.3 Communication and transportation

The geographical configuration of Baja California Sur, long and narrow, and the lack of communication and transportation that lasted for a long time, have contributed in keeping many communities, both on the coasts and in the mountains, isolated.

The terrestrial communication system is mainly the transpeninsular highway that, since 1974, has allowed communication within the state, and with the state of Baja California. Other than some few secondary paved roads, most roads are unpaved or dirt that communicate to the dispersed locations.

The extensive shoreline of Baja California Sur, with multiple bays and islands, and the abundance of marine resources have favored the establishment of numerous

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fishing communities and maritime transport, especially of small boats.



Instructors accessing a Community



Instructors accessing a Fishing Community

### 3. “CONSEJO NACIONAL DE FOMENTO EDUCATIVO” (CONAFE) - NATIONAL COUNCIL OF EDUCATIONAL DEVELOPMENT

#### 3.1 CONAFE

CONAFE was formed as a public decentralized organism of the Ministry for Public Education, with its own legal status and resources. To its original charge of obtaining technical and financial resources for the better development of education at small rural communities, some other duties were gradually integrated. A well-known one is the creation of innovative educational programs (CONAFE, 1996).

One of the characteristics of CONAFE’s work is to leave the responsibility of educational actions in the hands of young community instructors, who generally come from rural areas and from secondary or high schools. Their formation is in charge of other young supervisors and technical groups, who through a reflexive, constant, and participating process, prepare and help them in their teaching.

#### 3.2 Operative Regions and Service

To improve the operation service and to get closer to the communities that CONAFE serves, the state has been divided in 3 regions (Table 1).

Regions	Schools	Community Instructors	Super-visors	Tutorial Class-rooms
North	66	66	4	3
Center	82	82	6	5
South	75	75	6	6
Total	223	223	16	14

TABLE 1. OPERATIVE REGIONS

The community instructors who make a two-year educational social service at CONAFE receive training in three ways; intensive, permanent, and intermediate. The first, from July to August, lasts seven weeks; the second is received once a month during three days at the tutorial classrooms set in each region. The intermediate training lasts ten days in December.

This preservice will qualify the community instructors to receive a scholarship from CONAFE that will give them the opportunity to continue with their studies.

The rural communities where they make their educational social service lack in general the basic services; hence one of the main obstacles they face is the adaptation to the places assigned for making their service.

The first year as a community instructor in any rural community is needed to make an educational service as supervisors or tutor supervisors.

To give the timely assessment needed by the community instructors, the tutor supervisors travel to each one of their assigned communities.

All the parents of the community compose the Association of Educational Community Development (APEC). They are responsible for giving meals, lodging, and security to the community instructor assigned at their community. The community constructs the educational spaces with materials from their own region, and at the same time they have the requirement to make a good use of the materials given by CONAFE.



Outside a CONAFE School

### 3.3 Intercultural Education

CONAFE's curricular programs and projects are designed to offer new answers for specific situations like the difficulty of access, the constant mobility, the difficulty of having boys and girls of different ages, cultures, and school backgrounds in the same classroom.



Inside a CONAFE School

The pedagogical proposal of programs and projects is incorporated in the Intercultural Education perspective. The school is the place where the diversity is revealed in all its intensity, however this is considered a pedagogical advantage rather than an obstacle.

CONAFE's pedagogical proposal of programs and projects breaks with the traditional organization of the curricular areas. A curricular network has been proposed, in which the various areas of knowledge are contrasted with the everyday reality of boys and girls,

sharing the conceptual and instrumental tools for a more effective solution of the problems that the students face. The **Curricular Axis** (CONAFE, 1998) are

- Comprehension of the Natural, Social, and Cultural Environment
- Communication
- Logical Mathematics
- Attitudes and Values for living together
- Learning to learn

## 4. ACTIVITIES

### 4.1 Workshops of AMS Educational Projects

After having had the great opportunity of participating in the Educational Workshops and Courses (Atmosphere, Maury, DataStreame, and WES) of the American Meteorological Society (AMS), there was both a need and a desire to share this knowledge. Thus, since 2000, CONAFE and Comisión Nacional del Agua (CNA) have organized, in Baja California Sur, some workshops for the community instructors and supervisors who are in charge of the preprimary and primary schools in the rural communities with difficult access or with a migrant peasant population.

The main objectives of these workshops include some of the AMS Educational Projects goals, as

- The promotion of meteorological, oceanographic, and the global water cycle education,
- The participation of science educators and teachers in atmospheric, oceanographic, and hydrologic educational activities, and
- The dissemination of scientific and pedagogical educational materials directed toward teachers.

First, the AMS instructional materials were translated into Spanish, which in time were given during the different workshops to each one of the CONAFE supervisors and community instructors.

As of now, we have conducted 15 workshops in the city of La Paz (Table 2). The main topics have been hurricanes, clouds, and El Niño, and especially the one about hurricanes because this area has a high tropical cyclone risk.

Topic	Year	Type of Teachers	Teachers Benefited		Students Benefited
			Directly	Indirectly	
1. The Atmosphere Aloft	2000	Supervisors Preprimary and Primary	16	160	640
2. Hurricanes	2000	Community Instructors Preprimary	29	-	435
3. Hurricanes	2000	Community Instructors Primary	28	-	280
4. El Niño	2000	Community Instructors Preprimary	22	-	330
5. El Niño	2000	Community Instructors Primary	30	-	300
6. Sunlight and Seasons	2001	Supervisors Preprimary and Primary	8	120	720
7. High and Low Pressures	2001	Supervisors Preprimary and Primary	11	165	825
8. Clouds	2001	Community Instructors Primary	24	-	240
9. Clouds	2001	Community Instructors Preprimary	21	-	315
10. Clouds	2001	Supervisors Preprimary and Primary	7	105	525
11. Hurricanes	2001	Supervisors Preprimary and Primary	9	135	675
12. El Niño	2001	Supervisors Preprimary and Primary	8	120	600
13. Hurricanes	2002	Community Instructors Preprimary	25	-	375
14. Hurricanes	2002	Community Instructors Preprimary and Primary	24	-	360
15. Hurricanes	2002	Community Instructors Primary	16	-	160

**TABLE 2. WORKSHOPS (2000-2002)**

A total number of 59 supervisors and 219 community instructors coming from the three regions of the state have directly received training and instructional materials.

These supervisors, in turn, have trained the other community instructors, and altogether have reached the 925 preprimary and 463 primary boys and girls who study at CONAFE's schools.

Besides the AMS instructional materials provided to the teachers, two weather-related leaflets (Clouds and Hurricanes) were prepared and distributed to most of the CONAFE schools.

#### **4.2 Visits to the Weather Station**

To enrich the atmospheric and water-cycle knowledge, we have organized some visits to the Weather Station (CNA) of La Paz. Here, teachers and students coming from difficult access and migrant communities were able to see the surface and upper-air weather instruments, and the weather satellite images. The visits included

1. The students who won in 2000 the state contest, called "Olimpiada del Conocimiento" (Olympics of Knowledge).
2. One Hurricane Workshop in 2001 for 9 supervisors.
3. Six sessions of the CONAFE Project "Conoce tu Ciudad Capital" (Get to Know your State-Capital City).

#### **4.3 CONAFE Project: "Conoce tu Ciudad Capital"**

This pilot project, implemented in 2002 at a national level, was directed to the primary students served by CONAFE so that they will get to know the capital city of their state. During the week that the visit lasted, the groups were taken to different places, including the Weather Station.

This project seeks the development of basic capabilities. The didactic strategies are oriented to achieve the curricular axis of Communication, Comprehension of the Natural, Social, and Cultural Environment, and Learning to Learn.

The objectives of the project “Conoce tu Ciudad Capital” are

- That, from their learning experiences, the primary population served by CONAFE gets to know, estimate, and respect the different patterns and styles of life.
- To give attention to their rights and needs for entertainment and recreation, through cultural, artistic, educational, and recreational activities that the cities offer to all Mexicans.
- To promote the exchange of experiences and the interaction between the people from the rural communities and the cities, to respect the knowledge of, and appreciate and respect other cultures, which are mutually developed, expressed, and enriched.
- To understand that the different cultural, educational, scientific, artistic, and entertainment activities offered by the cities contribute, in both tolerance and respect, to diversify the life expectations of the people from rural areas and the cities.

In 2002, from January till June, we received at the Weather Station the visit of 6 groups of students, their teachers, and some parents. Each group had approximately 30 primary students. Besides getting to know the weather instrumentation, we did an experiment of making a cloud in a bottle for them.



CONAFE students looking at the sunshine recorder

## 5. RESULTS

### 5.1 Workshops

The evaluation of the supervisors and community instructors toward these workshops showed that as a whole the sessions and their content were good, and in particular that

- The difficulty level of the AMS instructional materials was right.
- The sessions had a great deal of new information.

- The AMS teacher’s guide and some of the activities will be used in their future teaching and in some activities like the CONAFE radio programs.

The participants also were enthusiastic about these sessions and responded positively to the AMS materials.

### 5.2 Visits to the Weather Station and Project “Conoce tu Ciudad Capital”

The visits to the Weather Station of La Paz caused great expectation in the boys and girls who participated in the project. Their lives go by in the middle of nature and within direct contact with the natural phenomena, which they try themselves to explain.

Because of the geographical and climatic conditions in the state, one of their main interests is to know how rain is formed. Thus in their communities, they interpret in an empirical way the types of clouds.

Before the visits took place, the community instructors worked with the boys and girls to generate some questions that, through experimentation and direct contact with the different measurement instruments, would lead them to the answers.

During their visit, the experiment of making a cloud was done in three phases. First, we explored the previous concepts; then, once the experiment was performed, it helped the children to confront their previous ideas with the new ones, generating a new understanding; and finally we looked for a practical application of what they learned.

At the end of the day, the students were asked to write their experiences, some of these include:

*“... I liked how the water was measured, I liked how the wind was measured and the instrument was called anemometer.” (Lupita, 10 years old).*

*“... The sunshine recorder is used to measure the sun and the other was called rain gauge and is used to measure the rain that falls.” (Gervasio, 8 years old).*

*“... we saw how a cloud is formed, it needs a bottle, water, matches and it is pushed down and released...” (Angelica, 10 years old).*

*“... I learned that the vane points with an arrow to where the wind comes from.” (Guadalupe, 9 years old).*



CONAFE students looking at the rain gauge

### 5.3 Community Impacts

Since the beginning of this project, supervisors impressed to the community instructors, students, and parents the importance of sharing with the community the experiences gained. Also they were asked to organize some activities that, from the experiences gained, would be more significant, emphasizing that this will favor the development of competencies for living.

One of the commitments established by the students was to present in the monthly meetings with the parents of the community what they had learned on the trip.

After the visit took place, one of the comments was

*"... in my community I will share it with all the family parents and I will put it in the community newspaper so that all the boys and girls will know about our trip."*

During the visits, the community instructors recorded the following observations in their logbooks:

*"... also doing the experiment of making a cloud, this motivated them very much, to know how a cloud is formed and how it rains in their community." (José Luis Regalado).*

*"... Here I saw how surprised the children were knowing what was needed to form a cloud and the reflection they had to make to change what they thought before." (Jonathan González).*

*"... the experience at the weather station was very nice because we learned many interesting things that as Community Instructors are useful, from these we can design activities to work with the students, for example; for the water cycle, the experiment can be done in a meeting and let the children and parents do it..." (Gladis Rodríguez).*

The parents also gave their opinions toward the development of the activities of the Project "Conoce tu Ciudad Capital":

*"... I felt a great satisfaction being able to accompany my son and all the children from the region of my community." (Mr. Pilar Alvarez).*

*"... the visit to CNA, I liked very much the participation of the people who work there, with the enthusiasm to explain the children, and the instrument that measures the hours of sunshine, among the other important instruments, and the way of explaining the way of making a cloud..." (Mr. Matias Espinosa).*

#### **What happened at the Community?**

The main goal of the monthly meetings, called Assemblies, is that the boys and girls have a chance to share with their community what they have learned.

Before the Assembly takes place, the boys and girls decide and prepare what to present at the meeting. The community instructor helps them decide and organize.

One of the most important moments at the Assembly is when the participants and the students make some games and experiments together.

Boys and girls, who participated in the Project "Conoce tu Ciudad Capital" and in the cloud experiment at the Weather Station, programmed the development of the Assembly for their parents at the community.

One of the student's comments was:

*"... At the beginning I felt nervous and then very well, because we did the assembly and we had lots of fun and at the welcoming we sang the Noah's Arch. I liked it. I spoke in front to the public and we could do the cloud experiment with the parents."*

One of the parent's comments was:

*"... We feel very happy in this assembly, we participated with the children, we played with them, they explained to us what they have learned. We were very pleased to know that they are learning. Many thanks to professor Benjamin for supporting our children in the assembly and during all the class days." (Father from the Community of Batequi).*

Finally, the community instructors were able to design new learning experiences concerning two principles: the importance of the water and its cycle, and the machines and instruments of measurement.

## 6. CONCLUSIONS

CONAFE and CNA joint activities have been a positive experience that has helped attain some of our educational goals.

The workshops and the AMS instructional materials offered to the community instructors and supervisors have given them new and adequate information that is already been used in their teaching, designing activities and in the CONAFE radio programs.

The visits to the Weather Station and the experiment of making a cloud have enriched the knowledge of both teachers and students toward the importance of water and its cycle, and the instruments of measurement.

These activities also have favored the student's development of certain basic capabilities, such as Communication, Comprehension of the Natural, Social, and Cultural Environment, and Learning to Learn.

By sharing with their communities what the students have learned both in the classrooms and on their trip, communities have been benefited also positively.

Finally, because community instructors change every two years, we consider it important to continue with

these activities. Even more, we are planning to include some other meteorological, oceanographic, and water cycle topics, as well as new experiments.

## **7. REFERENCES**

- CONAFE, 1996: La Educación Comunitaria una Experiencia Mexicana.  
CONAFE, 1998: Guía para el Instructor Comunitario MEIPIIM.  
INEGI, 2000. Anuario Estadístico. Baja California Sur. Instituto Nacional de Estadística e Informática. Gobierno del Estado de Baja California Sur.