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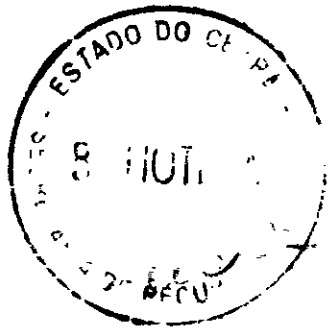
UBALDINHO PUBLIC RESERVOIR
ENVIRONMENTAL IMPACT STUDY
SUMMARY



CEARA STATE GOVERNMENT

CIRO FERREIRA GOMES

GOVERNOR

SECRETARIAT OF URBAN DEVELOPMENT AND ENVIRONMENT

MARFISA MARIA DE AGUIAR FERREIRA

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SECRETARIAT OF WATER RESOURCES

JOSE MARIA DE ANDRADE

SECRETARY

CEARA STATE BANK

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PRESIDENT

CEARA STATE PROJECT FOR URBAN DEVELOPMENT

PRO-URB/CE

MARCONI MARTINS MORONI DA SILVEIRA

GENERAL MANAGER

1 - Presentation

The report here presented is an informative synthesis of the Environmental Impact Study of the São Miguel Dam, which intends to recognize the environmental viability of the proposed project, through the identification and analysis of the major socioeconomic and environmental impacts deriving from its implementation and operation.

2 - Legal, Political and Administrative Framework

In attendance to the effective legislation (Resolution No 001/86 - CONAMA), an Environmental Impact Study and a respective Report shall be submitted for approval by SEMACE, due to being the construction of a reservoir considered an activity which modifies the natural environment.

Shall the authorization for the implementation and operation be granted, according to the Decree No 88.351 of 1 June, 1983, the following measures shall be adopted: implementation of the protection measures recommended by EIA/RIMA; the establishment of an ecologic reserve surrounding the reservoir (Resolution No 004/85 - CONAMA); rational deforestation of the water basin (Federal Law No 3.824 of 23 November, 1960); classification and control of the water qualitity (Resolution No 020/86 - CONAMA) and the protection of the fauna to be remanaged (Law No 5.197 of 3 January, 1967). The financial resources necessary to the implementation of such measures are ensured by the Decree No 95.733 of 12 February, 1988, which destinates 1.0% of the work's budget to this purpose.

Since the lands to be impounded belong to third parties, the SRH has already undertaken the official register of real estate for expropriation finalities, however, a complementation is needed due to the enlargment of the spillway to a 500 year discharge.

Regarding the management of the water resources, the State Law No 11.996 of 24 July, 1992 and the State Plan of Water Resources already existent shall be observed. A Reservoir Code shall also be established, engaging the municipal power in its enforcement, adapting its legislation to the proposed guidelines. An environmental education program to be carried out with the communities living in the lake's surrounding shall also be set up.

The resources necessary to the implementation of the reservoir will be granted by the State Government and by the World Bank The undertakers are SDU, SRH and BEC, having the work been forseen in the Ceara State Urban Development Project (PROURB - CE)/ Water Resources Infrastructure.

3 - The Project

The São Miguel Dam will be formed by the obstruction of São Miguel Creek, affluent of Salgado River, in Ubaldino - 25,0 Km away from Cedro City. The access to the axis of the dam, from Fortaleza, is made through the Federal highway BR-116 and the State highways CE-084, CE-113 and CE-272. The work's major purpose is to serve as fountainhead for the water supply of Cedro, playing second role in the hydroagriculture development and fishery activities.

Three out of four eorge alternatives which were studied, were rejected soon after the field studies for not presenting adequate technical and/or economic conditions for the implementation of the work For the chosen alternative, an analysis of the work itself, in various quotas (quotas 287.5; 290.0; 292.5; 295.0; 297.5; 300.0) was carried out as to analyse the barrier's efficiency pursuant to its size. We reached the conclusion that the São Miguel Dam, in the 295.0 m quota, with an accumulated volume of 32 hm3 is the one of lowest cost per m3 of water.

In defining the work , the topographical, geological and geotechnical state of the implementation site, as well as the hydrological conditions, which were obtained from the basic studies carried out, were taken into consideration. The general situation plan of the work comply with the following description: homogeneous earth massif, with a maximum hight of 16.5 m, 560.0 m long, 6.0 m wide, 308,592 m3 of compact volume and cresting in the 295.0 m quota. The spillway, labyrinth type, will be located in the left side, having been dimensioned for a 500 recurrence period, allowing for a 32 x 10 m3 storage and a regular discharge of 0.35 m3/sec. The water intake will be located in the right side consisting of an entrance box with a strainer upstream, a penstock, a dissipation basin and two cast iron automatic valves for discharge control. The pipeline located in the 286.5 m quota will have a 600 mm diameter and 60.0 m extension. The reservoir's hydraulic basin will occupy a 560.0 ha area. The estimated implementation cost is CR$ 253,560,548.28. A 14 month period was estimated for the construction of the dam.

Within an economical distance of the work, a mine of earthy material, a sand pit and a stone-quarry were selected. It is important to point out the fact that the entire sand pit and 30% of the earthy material mine will be flooded when the reservoir is filled.

As for the various uses of the reservoir, the water supply of Cedro City, the development of fishing activities in the dam and the hydroagricultural development in the downstream areas, as well as in the reservoir's surrounding areas have been forseen. To accomplish the Cedro water supply system, a 200 mm diameter and 5,872.0 m extention cast-iron ductile water main will be

constructed dimensioned to meet the needs of an estimated population of 13,763 inhabitants, considering the "per capita" consume of 150/inhab/day. The implementation cost of this work reaches CR$ 78,893,176.80.

The proposed fishery program forsees the process of populating the reservoir with native especies, initially using 546,000 young fish and 14,000 samples of shrimp ("camarão canela"). Every two years thereafter, there shall be new populating processes with the species which do not reproduce in the reservoir. Fishery for commercial finalities may be carried out in the reservoir one year after it is filled, generating 320 jobs for fishermen and 640 indirect jobs. The total receipt, during the stabilization year, is CR$ 25,200,000.00. The necessary investment reaches CR$ 5,061,830.00 distributed in the first three years after the reservoir is filled.

For hydroagricultural uses, exploitation models to be implemented in three distinct areas have been anticipated. The Agricultural Unit Type "A", located downstream from the barrier, in Recanto, was destinated to the ressettlement of the 58 families which will be removed. It consists of a communitary unit of 58.0 ha irrigated by gravity (furrows) and a plot of not irrigated agriculture land of 100.00 ha, distributed in individual lots of 1.72 ha, of which only 1.0 ha will be reserved for agricultural exploitation being the remaining area, 0.72 ha, available for housing and for raising small animals. We have anticipated a yearly production of 182.7 tons of grains, 580.0 tons of olericulars, 580.0 tons of fruits and 36.3 tons of fibre, generating a yearly receipt of CR$ 39,265,681.00, in the stabilization year. The estimated investment with infrastructure of individual and communitary use is CR$ 20,050,405.00. The Agricultural Unit Type "B", located in the dam's surroundings, has a total area of 246.0 ha, distributed in lots of 3.0 ha to be irrigated with diesel kits. It aims at indemnifying, through the reactivation of the economy in the area, the 82 families which will remain in the remanent part of their properties. Complementing the agricultural model, fishery activities with commercial finality will be developed in the lake to be formed A yearly agricultural production of 344.4 tons of grains and 164.0 tons of fibre, generating a receipt of CR$ 25,520,860.00, in the stabilization period. The investment at agricultural parcels level reaches the total sum of CR$ 100,944,952.00. The estimated receipt generated by fish breeding is CR$ 6,457,500.00, in the stabilization year, and the necessary investment reaches the amount of CR$ 1,194,593.94 distributed in the first three years of the exploitation. The Agricultural Unit Type "C", located downstream from the barrier, with a total area of 262.0 ha, aims at demonstrating the income which may be generated by the exploitation of the irrigated soils downstream by the private iniciative, through irrigation kits with electric motorpump.The betterment of vicinal roads along São Miguel Creek and also the installation of power lines of 13.8 Kw and 13.0 Km extention have also been anticipated. For this Unit we have estimated a yearly production of 746.7 tons of grains, 2,080 tons

of oreliculars, 2,100 tons of fruits and 262.5 tons of fibre, generating a CR$ 138,855,188.00 income, in the stabilization year. The necessary investmert was estimated at CR$ 71,768,300.00.

4 - Environmental Diagnosis

The Study comprehended the reservoir's area of physical influence consistent of its hydraulic basin, the protection strip the borrowed material area, the jobsite and the waste deposal area, as well as the area of functional influence represented by Cedro City, the downstream areas and the lake's surroundings, which will be beneficiaries of the water supply, and of the discharge regularization/hydroagriculture and fishery development, respectively.

4.1 - Abiotic Environment

The region being studied is geologically covered, in its majority, with crystalline based rocks (Caicó Complex and Ceará Group), also occuring, with less significance, two sedimentary units - the Aluvium and the Antenor Navarro Formation. In the barrier's axis there is a gneiss-granitic association, covered, in its sides, with a thin coping of soil of alternation and in the lower parts with the aluvium. As for the structural behaviour of the stones, two important faults are regionally distinguished: the Tatajuba Fault and the Farias Brito Fault. The region presents relief from plane to slightly wavy with altitudes varying from 200 to 600 m. As for the mineral resources, we only verified the presence of small brickyards and the exploitation of crystalline calcarious rocks, for selfconsume. Regarding the occurence of seismism, we believe there are no risks once the reservoir is small and is totaly based upon the crystalline complex As for hillside instability and/or areas propense to accelerated filting, although the soils which surround the reservoir are deep, the presence of a relatively dense vegetal coping significantly reduces this risk.

The area's predominant soils are the Podzolic followed by the Aluvium and the Alfisols. They are generally deep soils of average and high natural fertility. As major limitation to the agricultural use of these soils we can mention the lack of water, which requires the adoption of irrigation practices, and, in the Aluvium case, the risk of floods during the rainfall period. As for the current use of the soils, we verified that the aluvium strip is intensely cultivated with rice, bean, corn and cotton plantation and hayfields, being the remaining area covered with hiperxerophilous vegetation

The climate is carachterized by a rainy season (annual average of 1,016 mm), from December to May, the rest of the year remaining dry, and by high temperatures (annual average of

27.4o C). The high levels of the potencial vaportranspiration (annual average of 2,020.0 mm) induce a humidity defcit in the majority of the months.

The São Miguel Creek's watershed basin drains a 634 Km2 area, running a total course of 71 Km in the SW/NW direction when it disgorges into the Salgado River. It has a superficial draining regime of high variability, with intermitting water courses, which makes the water storage in reservoirs of great importance. The basin's damming level is little developed, not existing great dams which allow perenization. The public water supply is fairly defficient, with its productive systems vulnerable to the droughts which devastate the region. The presence of public projects of irrigation was not verified nor was the process of populating dams within the basin. As for the subterranean water resources, there is predominance of crystalline aquiferous in the reservoir's hydraulic basin, which occupies 60% of the area, being the remaining part occupied by sedimentary aquiferous represented by the aluvium

4.2 - Biotic Environment

The area to be occupied by the reservoir presents a dense shrubby hiperxerophily "caatinga" (a stunted sparce forest) vegetation, where remanent arboraceous especies are found. On the hillsides which surround the reservoir the vegetal coping is relatively preserved, while in the valleys it is almost totally degradated by the anthropic action. There are still some elements of the ciliary forest, found to be rather modified by the subexistance culture and by the cultivation of fructiferous and hay especies. This community is constituted of the following species: "aroeira" (Schinus terebinthifolius Raddi), "braúna" (Schinopsis brasiliensis Engl.), "angico" (Piptadenia macrocarpa Benth.), "jurema preta" (Mimosa acutistipula Benth.), "carnaúba" (Copernicia cerifera Mart.), "oiticica" (Licania rigida Benth.), "relógio" (Sida rhombifolia Linn), "matapasto" (Cassia sericea Swartz), "mofumbo" (Cobretum leprosum Mart.), "vassourinha" (Stylosanthes guianensis Swartz), among others. Regarding the aquatic flora, the following species were found: Pistia, Lemna and Nynphae, among others.

The floristical composition of the reservoir's banks, with predominance of arboreous size, dense shrubby species have benificiated, in a relevant way, the fauna, which is quite diversified in the area. Among the mammals there are species which play an important role in the dietry of the country men, as well as species which transmit diseases, such as hematophogous bat, which transmits rabies. Some species are at serious risk of extinction: ounce, red cat, "maracajá" cat, maned wolf, "garapu" dear, "mambira" anteater. The birds, be it for their ornamental or canorous value, be it for their nourishing value, have been hunted, leaving many species at risk of extinction. The reptiles are relatively abundant, various species of poisonous snakes,

lizards and small lizards of the genus Anisolepis The fresh water and land turttles are about to be extinct. Among the amphibian, the frogs and toads, important controllers of insects of aquatic habits, can be pointed out Among the fish, we can point out the existance of various species such as "tucunaré", "piau" and "curimatã". The invertebrata are numerous and abundant, on one side, the presence of melliferous bees, and on the other, the presence of insects which transmit Chagas diseases ("barbeiro") and which cause plague ("bicudo" and "mosca de chifre").

4.3 - Anthropic Environment

4.3.1 - Beneficiary area (water supply)

Cedro City, with an estimated population of 8,867 inhabitants in 1991, has long been suffering from the lack of a regularized water supply system. Under the current circunstances 60% of the population is forced to use, in precarious condition, low quality water from wells and small peripheric dams, which is distributed by tank truck for water.

4.3.2 - Beneficiary area (hydroagriculture practices)

Presenting adaquate relief for irrigation and fertile soils, around 1,450 ha of aluvium, the entire area located downstream the reservoir indicates great pontential for hydroagriculture practices. Regarding the population, we found the area is densly populated, with 1,122 inhabitants divided into 225 families. Agriculture is the major local economic activity, where rice, corn, bean and cotton plantations can be pointed out. The area's agrarian structure indicates predominance of 10 to 50 ha properties (50% of the total number of real estate). As for the area's infrastructure, the access can be made by carriageble roads, found in good state of conservation and is provided with electric energy coming from a 13,800 Kw network, which supplies the small village of Recanto .

4.3.3 - Beneficiary area (psiculture and fishery practices development)

The development of fishery practices will beneficiate the municipalities of Cedro and Várzea Alegre, located in the reservoir's surroundings. The fishery activities in these areas is carried out at workmanship level, very little commercialization having been identified. The fishery activities in the dams in the mentioned municipalities is under no control by DNOCS whatsoever.

4.3.4 - Area of physical influence

There are 649 people distributed into 140 families

currently living in the properties to be expropriated, among owners and dwellers For ressettlement finalities, only the population whose properties will have over 50% of the area expropriated and who will have their living standard significantly reduced, which is 256 people living in 58 families were considered. In the ramaining properties, which area to be expropriated is less than 50% of the total land, the families will be removed to the remanent part of their property.

The population's expectations regarding the dam's construction may be summarized as follows: the majority (85.5%) is for the construction as they judge the undertaking will bring various benefits to the region, 11.0% think that despite the benefits, it shall not be constructed due to the fear they have of not receiving fair or in time indemnization, and because they fear the impoundment of fertile soils, and the remainig 3.6% are against, but did not state their reasons. Regarding the future housing, 34.3% of those interviewed chose to continue living in the remaining part of the property, 3.6% intend to buy property in the dam's banks, 2 1% chose to abandon the agriculture and cattle raising, and 60.0% intend to purchase land downstream, preferably in public irrigation project areas.

The area's economy is centered in the unirrigated land agriculture, which corresponds to 56.5% of the area's VBP *(raw production value), being the rice, corn, bean, and cotton plantations the most representative. The level of utilization of the soil is very low (19.2% of the entire area). The dairy production, which is responsible for 32,0% of the VBP, comes in second. The handicraft and extractive activities are insignificant. The liquid assets per hectare and per capita reach the average amount of CR$ 5,317.00(US$ 48.12)/ha and CR$ 24,354.00 (US$ 220.39)/year, respectively Regarding the monthly minimum wage, the per capita income reaches only 21.1% of the effective value in September, 1993. As for the agrarian structure, there is a predominance of properties less than 20 ha big (47.9% of all properties), which occupy only 14.3% of its total area.

5 - Description and Evaluation of Environmental Impacts

The environmental impact evaluation was carried out according to the ponderal evaluation method developed by BIANCHI et alli, which resulted from the evolution of the matricial method proposed by LEOPOLD. The technique used involves the weight attribution over the forseen impact attributes, being the evaluation carried out under two points of view, "with" and "without" the adoption of the environmental protection measures. The analysis is carried out sectorially for the abiotic, biotic and anthropic environments of the areas suffering physical and functional influences, and in a global manner, considering the two areas as a whole

The global analysis of the work demonstrated that, in

its original version, the project presents a total of pondered benefits inferior to the whole of the adversities and of its indefinitions, what carachterizes it as indefinite and poorly conceived. However, the incorporation of the environmental protection measures (MPAs) can invert this picture, directing the project's carachterization to the area of beneficial undertakings. As for the sectorial analysis, the evaluation of the project's area of physical influence revealed that the implementation and operation of the work will imply damage to the natural environment as well as to the anthropic environment, typical of this kind of work. The application of the MAPs makes the project advantegous to the natural environment, although the same does not happen regarding the anthropic environment, due to the involvement with emotional matters. As for the area of functional influence, the evaluation indicated that the reservoir's operation is adverse to the natural environment, being this picture inverted by the adoption of the MAPs, while for the anthropic environment, the results were highly favourable even without the adoption of such measures

The major adverse impacts identified were: impoundment of 560 ha of soil, 40% of which are found apt for agricultural use; damage to the flora's genetic patrimony and to the fauna's habitat, resulting from the rational deforestation of the hydrographic basin; interruption of the migration of fish in the spawning time, allowing for future extinction of some species; total interruption of all of the area's pruductive activities implying a consequent raise of the unemployment rate; the disturbance or even dissolution of social and family bonds, as well as cultural shocks between the native population and the workers who will undertake the job, or latter on, the guest population who will arrive in the ressettlement areas; generation of mini-inflation in the area, generation of pressure over the complex of pre-existing public services, among others.

6 - Mitigatory Measures Plans

The best use of the benefical impacts and the mitigation or absorption of the adverse impacts resulting from the implementation of the work, will only be made possible through the adoption of preconized environmental protection measures (MAPs), which implementation shall be undertaken by the Secretariat of Water Resources (SRH)

Rational deforestation plan and fauna management: aims at clearing the area to be impounded, as to maintain the quality of the dammed up water. According to CONAMA's Resolution No 004/85, the ecologic reserves shall be preserved as well as the areas considered necessary to the protection of the ictifauna and the reserves indispensable to guaranteeing the pisculture. The use of the serviceable forest resources shall be promoted, as well as the protection of workers and of the peripheric population against animal atacks, specially poisenous animals.The scientific entities

and alike shall be in charge of the floristic researches activities and the creation of an herbarium. We shall be aware of the formation of escape corridors - refuge area of the fauna, and also set up an operation to rescue the less mobile fauna. The deforestation method to be adopted is the traditional (manual) one, and shall begin during the dry period, due to the larger availability of workers. This operation's cost was already included in the dam's construction budget.

Recuperation of the borrowed material area, material storehouse area, and waste deposal: aims at reestablishing the landscape of the borrowed material area, which will not be impounded (13.0 ha), through the regularization of the topographic surface, spreading of the vegetal soils correspondent to the clearing, and latter on the reforestation with native species. The sand pit is found totally within the reservoir's hydraulic basin, thus not requiring attention. As for the flintstone mine, little can be done to minimize the impacts resulting from it. However, the area shall be railed as to prevent accidents and the population shall be notified of the time when explosives will be used. Special attention shall be given to the control of waste deposal, to the control of hillside sliding, and the establishment of a draining system. In setting up the jobsite, the deforestation shall be the strictly necessary; the use of septical cesspools located faraway from the water courses shall be adopted; the direction of the dominant winds shall be observed when installing the concrete factories and the flintstone mine, as well as adopting the Army's guidelines for the location of powder magazines. The jobsite facilities shall be latter used for the reservoir's monitoring unit, or for the establishment of schools, health posts, etc. The total cost with recuperating the degradated area was estimated at CR$ 1,677,000.00, calculated in September, 1993, when the cruzeiro/dollar exchange rate was CR$ 110.50.

Transfer/reacommodation plan for the existing infrastructure: aims at eliminating the active or potential pullution factors found in the area to be impounded, thus preventing that the environmental conservation becomes too onerous. The existing infrastructure components to be removed and/or receive adequate treatment are: housing, brickyard ovens, fences, domestic cesspools, vegetable-garden remains, pigpens, stables, and domestic waste, among others. The removal work and deforestation activities shall take place simutaneously as to make a better use of the local manual work. As for the infrastructure of public use, the transfer of some schools, health posts and small parts of vicinal roads which constitute the access to some properties will be necessary. The total cost of the clearing of the hydraulic basin were estimated at CR$ 560,000.00, calculated in September, 1993, when the cruzeiro/dollar exchange rate was CR$ 110.50.

Population Ressettlement Plan: has as objective the reacommodation of the 58 families to be driven out of reservoir's hydraulic basin area. A 158.00 ha area located in Recanto, a small village downstream the axis of the barrier, was chosen for the

implementation of the ressettlement project. The hydroagricultural use of this area through the implementation of a communitary irrigation project of a 58.0 ha area, where each family will have the right to one irrigated hectare (1 0 ha) was anticipated. As to complete the model there will be a not irrigated plot of 1.72 ha, of which only 1,0 ha will be destinated to the agricultural exploitation - being the remaining part destinated to housing and raising small animals During the project's elaboration it is indispensable that we count with the participation of the target population or of their leaderships as to reduce the level of rejection to the adopted measures. The indemnization for the expropriated land and the betterment of the area, as well as the population's remotion to the new area will be of SRH's (Secretariat of Water Resources) responsibility. The SRH will also be in charge of supporting the ones who don't receive indemnization - be it through transferring their belongings, paying for their belongings, donating material and giving technical assistance to the construction of new homes in collaborative effort regime. The hiring of the local workforce for the undertaking shall constitute a clause in the contract between the SRH and the Undertaker and the installations of the jobsite shall be latter used for the establishment of schools, health posts, etc. For the implamentation of the Ressettlement plan, including the irrigation project, CR$ 24,902,920.00 (US$ 225,365.79) will be needed, that is, US$ 3,885.00 per family. An ex-post monitorization and evaluation system was offered by the undertaking organ.

7 - Environmental monitorization, management, and training

The management of the water resources, as well as the environmental monitorization and training will be of SRH's responsibility, making it necessary that this Secretariat make agreements with other related governmental organs.

Water resources management: the administration model shall provide the relationship manners to be adopted between the users and the administrative entities, comprehending the duties and rights deriving from the use and derivation of the water. The municipal public health systems, as well the population itself, shall have their participation in the management of the water resources promoted.

Monitoring plan of the water's quality and piezmetric level: aims at a systematic control of the quality of the water to be dammed up, thus guaranteeing the undertakings located downstream and the control of polluting activities in the watershed basin. The monitorization shall be carried out in the future reservoir, as well as in the watershed sub-basins and in the water resources located near the communitary irrigation project. At least four samples in the reservoir's area and two samples in the proximities of the irrigation project shall be collected, *monthly*. The quantities, the parameters for the water classification, and the classification itself are part of CONAMA's resolution No 020/86. As

for the control of the water level, a network of wells shall be monitored, including the ones which already exist, located in a 2.0 Km strip around the reservoir and in the São Miguel Creek's banks, for a period of two years. The annual cost with these activities were estimated to be CR$ 4,399,005 00, calculated in September, 1993, when the cruzeiro/dollar exchange rate was CR$ 110.50.

Monitoring plan of sedimentation in the reservoir: aims at analyzing the quality and quantity of the sediments which may be deposited in the reservoir, allowing for the recognition of the activities undertaken in the basin, which may influence the quality of the natural environment. The kind of analysis shall be granulometry, organic metter content, heavy metals and pesticides components. The samples shall be collected *twice a year*. The total cost forseen for the monitoring activities reach CR$ 608,856.00, calculated in September, 1993, when the cruzeiro/dolar exchange rate was CR$ 11.50.

Ecologic reserve management plan: In observing CONAMA's Resolution No 004/85, an ecologic reserve in the lake's sorrounding , aiming at hindering activities that may cause any damage to the lake itself, to its banks, and to serve as barrier to the filting. The agroculture and pasture activities shall not, by any means, be tolerated within the reserve. The fish warehouses (entrepôt), water resorts and piers shall have their areas limited by fences. A team of forest rangers shall be set up to carry out an educational program with the population besides repressing hunting in the area. The establishment of rules to be followed by the population will be of SEMACE's responsibility. The annual cost with these activities were estimated at CR$ 464,100.00, calculated in September, 1993, when the cruzeiro/dollar exchange rate was CR$ 110.50.

Environmental education and soil conservation practices trainings: aims at preparing the productors to absorb the new technology which will be used in the irrigation areas, including, in a special manner, the necessary capacitation to use and handle agrochemicals with no harm to their health and to the natural environment, and the adoption of practices of conservation of soils. The target population is constituted of the 58 productors engaged in the communitary irrigation project and the 82 productors which will remain in the remanent areas of their properties, and who will be beneficiary of the distribution of irrigation kits. The trainings shall take place in the irrigated areas, starting with the implementation of short cycle agriculture, and through lectures and debates. Five events with 28 participants each shall take place. The training cost reach CR$ 1,555,180.00, calculated in September, 1993, when the cruzeiro/dollar exchange rate was CR$ 110.50.

8 - Conclusion

The objective of this study was to evaluate the environmental viability and implementation of the São Miguel Dam.

From the view of the economic effects evaluation of the work, it is important to mention the low cost of opportunity of the area to be impounded, since only 19 2% of the area is currently used for agriculture, due to the limitation imposed by the lack of water resources. On the other hand, the use of the water resources from the reservoir will favour the water supply of Castro City, the exploitation of 566.0 irrigated hectares, and will yet promote the development of fishery activities and psiculture. Besides all that, there will be protection against floods downstream, making the economic development viable in this region. However, there is a great concern regarding the great espacial concentration of the negative impacts, incurring, specially, upon the anthropic environment of the area of physical influence. Indeed, the ressettlement of 58 rural families constitute a local impact of great intensity, which depends on the effectiveness of the measures to be adopted for the minimization of the disturbances resulting from the affected population, can raise doubts upon the merit of the work. As for the changes imposed upon the natural environment - due to the regoin's carachteristics, these impacts, although relevant, don't imply any sereous consequences. By adopting the proposed MAP's, great part of the adverse impacts incurring upon the natural environment are mitigated, beneficiating not only the natural environment itself, but also the works's integrity.