

Effects of Ceará Hydroenvironmental Development Project (PRODHAM) on the Leading Role of Communities in Cangati River Hydrographic Microbasin in Canindé-CE¹

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Abstract

PRODHAM actions in Cangati River HMB started in 2001 and were completed in 2009. They included the introduction of hydroenvironmental preservation, water and soil management, environmental monitoring and control techniques, all supported by the participation of local population. At the same time, the project encouraged the strengthening of local farmer organizations, and sensitivity, mobilization and preparation of local social actors to act in a sustainability scenario.

Institutional development, awareness and environmental education of Iguaçú community allowed an environmental recovery and preservation process to start in Cangati River microbasin. That effort joined together the environmental preservation, economic development and improvement of local population's life quality. With that experience, representatives of community associations and several institutions involved in Project actions, through the microbasin Management Board, identify, establish, implement and monitor the actions and related results. After seven years of field work, 53 events were held to strengthen the human and social capital, a new position of local population in relation to care with natural resources and full citizenship exercise was observed.

Their leading role is also highlighted in perennialization of hydroenvironmental practices implemented under the Project, as communities are mobilized not only to maintain the existing works, but also to transfer their experience to other semiarid regions in Ceará. It is noted that, after the departure of PRODHAM technicians, communities have continued to care with the environment, especially by preventing ground clearance by fire and felling of ciliary forest trees, treating waste and promoting sustainable economic activities. Leading role was responsible for solidification of PRODHAM techniques in heart and mind of population living in all four HMBs assisted by PRODHAM.

Key words: Local leading role; Canindé-Ce; Semiarid region; Hydrographic microbasin; Social development; Institutional development.

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1. INTRODUCTION

This article is structured into two parts. One refers to PRODHAM, its full design and operation in four selected hydrographic basins. The second part, in turn, focus only on Cangati River HMB, which was the area where the Project had a more extended and systematic intervention. In that HMB, socioeconomic (FRANÇA, 2010) and biophysical (SRH-CE, 2010) monitoring activities were performed, where Project results and impacts were scientifically recorded. Availability of that information was decisive for the selection of Cangati River HMB to be analyzed for the leading role of its communities involved with the Project.

1.1 Ceará Hydroenvironmental Development Program (PRODHAM)

The Hydroenvironmental Development Project – PRODHAM was implanted by the Superintendence of Hydraulic Works (SOHIDRA) in partnership with FUNCEME for supervision of socioeconomic and biophysical monitoring systems. Its objective was to promote hydroenvironmental recovery in four hydrographic microbasins (HMB) located in Ceará semiarid region, with active involvement of local populations.

PRODHAM actions started in 1999 and completed in 2009 comprise the introduction of hydroenvironmental preservation, water and soil management, and participatory environmental monitoring and control techniques in selected areas. At the same time, the project encouraged the strengthening of local farmer organizations, and sensitivity, mobilization and awareness of HMB social actors.

PRODHAM constituted a pilot, experimental project developed in four areas of the semiarid region of the State of Ceará. Selection of PRODHAM operation areas was based on a participatory diagnosis made in 1999. The four selected areas included the hydrographic microbasins of Cangati river in the municipality of Canindé; Batoque River in the municipality of Paramoti; Pesqueiro River in the municipality of Aratuba; and Salgado/Oiticica Rivers in the municipalities of Pacoti and Palmácia.

The original design of project included the evaluation of works carried out aimed at a far-reaching diffusion of tested methodologies tested and adapted to different areas of the State of Ceará semiarid region. Thus, in addition to the implantation of technologies and hydroenvironmental practices, participatory socioeconomic and geoenvironmental monitoring of PRODHAM actions was performed by FUNCEME.

Activities performed under the Project that were most supported by the leading role of communities living in Cangati River HMB, in the district of Iguaçu, included:

a) Environmental education

- Making the benefited population aware, informed and knowledgeable of environmental issues that are most related to HMB reality, and developing small associated community programs;
- making sector-related socioenvironmental and physical-environmental diagnoses to guide Project actions;
- disclosing the results of such diagnostics during actions for sensitization and environmental education of associations, schools and general population;

- implementing actions for mobilization and capacity building of associations' human resources to make small community programs on socioenvironmental and productive matters feasible.

b) Community Development

- Making the local association entities consolidated, provided with leadership and skilled human resources, and able to develop small joint, coordinated rural community development programs;
- supporting the improved performance of associations through a transparent operation, including incentive to the adoption of strategies for social inclusion, rendering of accounts, and consultation and information among their members;
- establishing entrepreneurial partnerships for the implantation of joint actions among several HMB associations, in addition to encouraging the creation of local discussion and experience exchange forums, and the constitution of jointly managed financial resources;
- supporting the organization of dweller/producer associations and the capacity building of their members (managerial, accounting, technical, etc.) for community use and maintenance of hydroenvironmental infrastructure network constructed by PRODHAM.

2. PRODHAM WORK METHODOLOGY AND ACTION STRATEGIES

Methodology adopted by PRODHAM included the effective participation of involved populations and assimilation of new forms of procedures that allowed those populations to fully feel co-authors of environmental recovery processes. That also led to the development of a work focused on awareness of populations and agents involved in project operation areas, with respect to their permanent responsibility for preservation and multiplication of that hydroenvironmental recovery and preservation experience.

Joint work with communities aimed to ensure an effective participation of social actors in project planning and management, and a greater transparency of actions and application of financial resources.

This way, a work system was developed, where leaderships and representatives of several communities became aware of the scope of Project, the importance of creation of discussion forums, and electing representatives that were committed to the community development and the participatory management process.

To ensure the correct application of funds allocated by the State to associations, all leaderships participated in training in basic accounting, which allowed the selection of "community accountants" that are today responsible for the whole management of HMB associations. This action accredited the communities with bank institutions and ensured a better promptness in release of funds from other governmental projects.

To further strengthen that co-management action, training/monitoring of activities was developed for several local community associations and informal groups, with the main objective of supporting their organization and provide them with instruments for transparent operation, by encouraging the adoption of strategies for

social inclusion (gender equilibrium and youth participation), rendering of accounts, population's mobilization, and consultation/information among members. Aiming to increase the self-esteem of population residing in the area, strengthen the speculative mind and redeem the local cultural identity, the project supported the formation of cultural groups.

Discussion on the interrelationship between environmental degradation, poverty and socioeconomic development led PRODHAM to formulate an intervention proposal aimed to encourage the general population to adopt sustainable practices consistent with the environment where they lived.

Simple actions, such as: reforestation in urban areas and ciliary forest, selective waste collection, composting, adequate handling and use of water resources available for human consumption (cisterns, wells, etc.), animal management, change of inadequate agricultural practices, and adoption of clean technologies, among others, were encouraged.

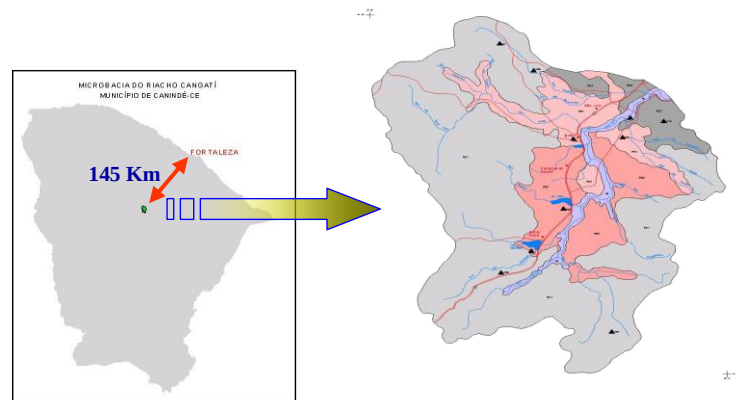
Operation took place in communities with the assistance of municipal school teachers and environmental overseers, which acted on risk factors to which the population is subject, by giving priority to family and establishing ties between the community and the government. A substantial improvement of environmental conditions monitoring was immediately sought, especially with respect to waste issues, to reduce significantly the pollution of water resources and damages to drinking water supply.

3. CHARACTERIZATION OF CANGATI RIVER HMB

Information provided in items below were extracted from the Report on Cangati River HMB Starting Point, SRH-CE (2005), and from the Socioeconomic Evaluation of that basin included in FRANÇA (2010).

3.1. Location and Extension

Cangati River HMB is located in the municipality of Canindé, State of Ceará, between south parallels 04°35' and 04°42', and meridians 39°21' and 39°26' west of Greenwich. It is inserted in Choró River hydrographic basin in the Metropolitan Region of Fortaleza, and covers a surface area of 7,565.30 hectares (See Figures 1 and 2).



Source: SRH-CE (2010a).

Figure 1 – Map of Cangati River HMB and its location in Ceará map

It is fully included in the District of Iguaçu, the seat of which is located on the margins of federal BR-020 road, 35 km from the seat of the municipality of Canindé, 104 km from the capital city of the State, Fortaleza. The District of Iguaçu includes more than ten communities, five of which are located in Cangati River HMB: Barra Nova, Cacimba de Baixo, Iguaçu, Lages and São Luiz.

3.2 Socioeconomic Profile of Cangati River Hydrographic Microbasin

a) Population

Cangati River HMB located in the District of Iguaçu has a population of 871 inhabitants distributed over 213 families. Microbasin surface area is 75.65 km², corresponding to a demographic density of 11.51 inhabitants per km².

In 2005, 26.64% of total population was pure illiterate. That percentage is reduced to 15.31% when the age range of 0-6 years old is disregarded. Functional illiterates accounted for 5.86% of total population, being 4.85% in the male gender, and 6.95% in the female gender.

b) Social infrastructure

In 2005, most families dwelled in masonry houses (81.43%). Other types of houses include mud house (16.67%) and improved mud house (1.90%).

In general, dwellings have more than one water supply source. Such sources were grouped into cisterns, water holes and wells used by 83.57% of families; reservoirs and clay pits by 57.75%; collective CAGECE and local government's systems by 52.11%; other infrequently used sources included desalinator, individual piping system, and tank trunk, which were together used by 2.35% of families.

Sewerage was quite deficient in most dwellings. In 53.52%, sewage is disposed on ground surface; 51.64% have not toilet in the bathroom; and 31.92% have no bathroom. Domestic waste destination was still a concern, as 24.64% of families disposed waste on vegetation or on the margins of BR-020 road. Most common practice was burning, adopted by 64.93% of families.

As means of transportation, families used especially bicycles (69.01%), tamed animals (45.07%) and motorcycles (8.92%). Other means of transportation that are less used include: motor car, cart or light cart, and truck.

c) Farming production

Main use of landed estate soil was agriculture, mentioned by 89.20% of properties; 23.00% use soil for pasture; 3.75% for forests or reforestation; and 28.17% of properties have fallow land.

Main agricultural products in Cangati River HMB included maize and beans mostly explored in integrated crops, although some independent crops have been identified at a lower scale. Such crops as: broad beans, rice and cotton also occur, although their yields are low. Yields are very low due to lack and poor distribution of rains and inadequate crop management, as no technical assistance is available.

Livestock and small animal production was significant and comprised apiculture, fowls, bovine, ovine, equine and porcine cattle. Main product sold was milk,

accounting for 31.89%; followed by swine (19.93%); beef (18.80%); eggs (11.68%); honey (7.60%); chicken (5.50%); caprine animals (4.01%), and sheep (only 0.60%).

In addition to agriculture and livestock, Cangati River HMB dwellers perform extractive activities to obtain recipes. Extractive activities included coal production, manufacture of barbecue spits, and fishing.

Some producers used agricultural defensives, veterinary products and selected seeds supplied by Ceará Secretariat of Land Development.

d) Economic infrastructure

Infrastructure was divided into two segments, as follows: water resources and accessions. Water resource infrastructure comprised household clay pit, water hole (piezometric well), cisterns (rain cisterns) and artesian wells, and accessions comprised sheep pens, warehouses, flour houses, pigsties and stable/corral.

Water resource infrastructure was constituted of 111 units distributed over the communities. Productive accessions included 29 pieces of equipment (tractor, cultivator, sprinkler, forage machine, motor pumps, etc).

Agricultural defensives, veterinary products and selected seeds supplied by Ceará Secretariat of Land Development were used.

e) Associativism

In 2005, there were five (05) associations in the microbasin, one in each community, as follows: Association of Small Farmers of São Luiz Farm, Association of Small Producers of Iguaçú, Association of Population Settled in Lages, Association of Small Producers of Barra Nova, and Association of Small Producers of Cacimba de Baixo. Four (4) of them were in full operation, and one (1), although duly organized, was waiting for CNPJ issuance. All of them were small producer associations.

It was noted that all associations derived from local leaderships, except for Barra Nova, which had a collective nature and also recorded the presence of female leadership.

As such, objectives of those five associations included: eligibility to apply for governmental incentives, performance of HMB territory governance, way to make access to bank loans easier, community improvement (sickness and maternity allowance and retirement), seeds for plantation, and representation to public bodies.

All of them were focused on assisting small producers, most of which are engaged in farming production. It was also noted that many activities typical of urban-rural sector occurred in communities.



Source: PRODHAM

Figure 2 - Air view of Iguacu district, Canindé-CE.

4. PARTICIPATION INSTRUMENTS

One of the basic aspects of the methodology developed by PRODHAM is the intervention in environmental, social, economic and educational activities with total involvement of local population, which were implanted in an integrated and simultaneous manner. For that, it had to establish several participation levels, the most important of which included: constitution of a management board with an executive collegiate, agreements with local associations, which allowed the participatory implantation of actions, intervention planning and monitoring, the strong capacity building of producers and other social actors in several activities, and the implementation of other participatory management instruments, such as: focal groups, collective work groups, financial funds, community handicraft factory.

From that perspective, PRODHAM performed the following activities in Cangati River HMB in the period of 2001 through 2009.

Table 1 - Results obtained by PRODHAM in 2001-2009 period, in Cangati River microbasin in Canindé-Ce.

Description of actions	Unit	Completed
Hydroenvironmental works		
Sediment retaining dams	Each	828
Underground dams	Each	8,0
Plate Cisterns	Each	165
Ciliary forests	Hectare	13,18
Edaphic works		
Dead cover	Hectare	7,10
Dry-farming system	Hectare	2,20
Surrounding Stone Barriers	Meter	28.691
Level vegetation barriers	Meter	2.914
Terracing	Meter	44.576
Reforestation		
Implantation of forest reserve	Each	1
Seedling production	Each	46.843
Reforestation	Hectare	2,15
Reclamation of degraded areas	Hectare	3,0
Production system		
Demonstrative technical unit – DTU	Each	5
Environmental education and technical capacity building		
Events of environmental education	Each	16
Events of technical capacity building	Each	17
Organizational Strengthening		
Events of organizational strengthening	Each	20
Dissemination of successful experiments		
Technical-scientific books	Um	6
Academic dissertations	Each	3
Instructional textbooks	Each	11
PRODHAM information gateway	Each	1

Source: SRH-CE (2010b).

4.1. Start of Leading Role upon the Constitution of the Management Committee

During PRODHAM works, the primary role of the management committee constituted of representatives of community associations and other local governmental institutions (schools, etc.) was its involvement as a participant of the Project strategic planning.



Source: PRODHAM

Figure 3 – Organizational capacity building event in Iguaçu, Canindé-CE.

In addition, the committee gave assistance to project management and decision making process on implementation of actions and mechanisms in the respective operation areas. It also supervised the accounts related to the agreement with the selected community association, to monitor the use of funds. All actions were strongly discussed and decisions were made by consensus (See Figure 3).

The committee was constituted of three (3) or four (4) representatives of each community, including the president of an association and his/her alternate, and a leader of Project team. It also included a secretary to draft the meeting minutes. Meetings were scheduled regularly and included a great mobilization and involvement of community.

The executive collegiate was a sector in the management committee, which implemented all actions and rendered accounts.

4.2. Introduction of a PRODHAM “Culture” in Farming Activities and People’s Behavior

PRODHAM methodology created a kind of “culture” for local population’s *modus operandi*, with respect to their position on the matter of care with natural resources, by preventing deforestation, reducing the use of wood to make coal, replanting the ciliary forest, using the soil by adopting contour line planting method, and caring with waste and other sustainable practices.

They became aware of the fact that their survival depends directly on their care with what is most important for them, that is, the land. By caring with the land, it may achieve a better yield, as evidenced by the experience with stone barriers (See Figure 4), terraces and contour line cultivation, which have provided a continuous improvement in crop yields.

Local population's positive position on care with waste and the best form of explore it was disseminated. Avoiding deforestation and replacing the ciliary forest have become a habit for Iguaçu community.



Source: PRODHAM

Figure 4 – Iguaçu farmers constructing a stone barrier

4.3. Association Strengthening

PRODHAM is an innovating project that adopts new methodologies for treatment of environmental degradation in the microbasin, by using new methods or works in rural environment, such as those focused on addressing problems generated by floods, through the implantation of hydroenvironmental and edaphic works, new forms of cultivation and especially the form of addressing the problem through the collective awareness of local reality, strengthening of association organizations and continued capacity building of all stakeholders. Therefore, participatory methodologies were adopted as a strategy to ensure the involvement of local populations in the resolution of problems.



Source: PRODHAM

Figure 5 – PRODHAM managers and technicians, and leaderships of Iguaçu district at an organizational strengthening event.

At the beginning of activities, a work was carried out to select an association to manage the Project, which was given the name of Mother Association, for which the Community Association of Small Producers of Iguaçu was elected. That association was selected because it was the most organized of all, had a better structure and was able to assume the project management responsibilities.

Following the signing of the agreement with Iguaçu association, the capacity building of its officers was scheduled (see Figures 5 and 6), with emphasis on control of accounts, through accounting courses. In addition to courses, several activities were performed by the association, where no actions were taken without the involvement of its board and members.



Source: PRODHAM

Figure 6 – Detail of a capacity building workshop in Iguaçu, Canindé-CE.

4.4. Target-Public Participation

A proposal for work jointly with communities was formulated to ensure an effective participation of social actors in project planning and management, and a greater transparency of actions and application of financial resources.

A work system was developed, where leaderships and representatives of several communities became aware of the scope of Project, the importance of creation of discussion forums for the project and other activities occurring in the area, in addition to the importance of electing representatives that were committed to the community development and the participatory management process (see Figure 7).

To ensure the correct application of financial resources allocated by the State, all leaderships participated in training in basic accounting, which allowed the selection of “community accountants” that are today responsible for the whole management of associations. This action accredits the communities with bank institutions and ensures a better promptness in release of funds from other governmental projects.



Source: PRODHAM

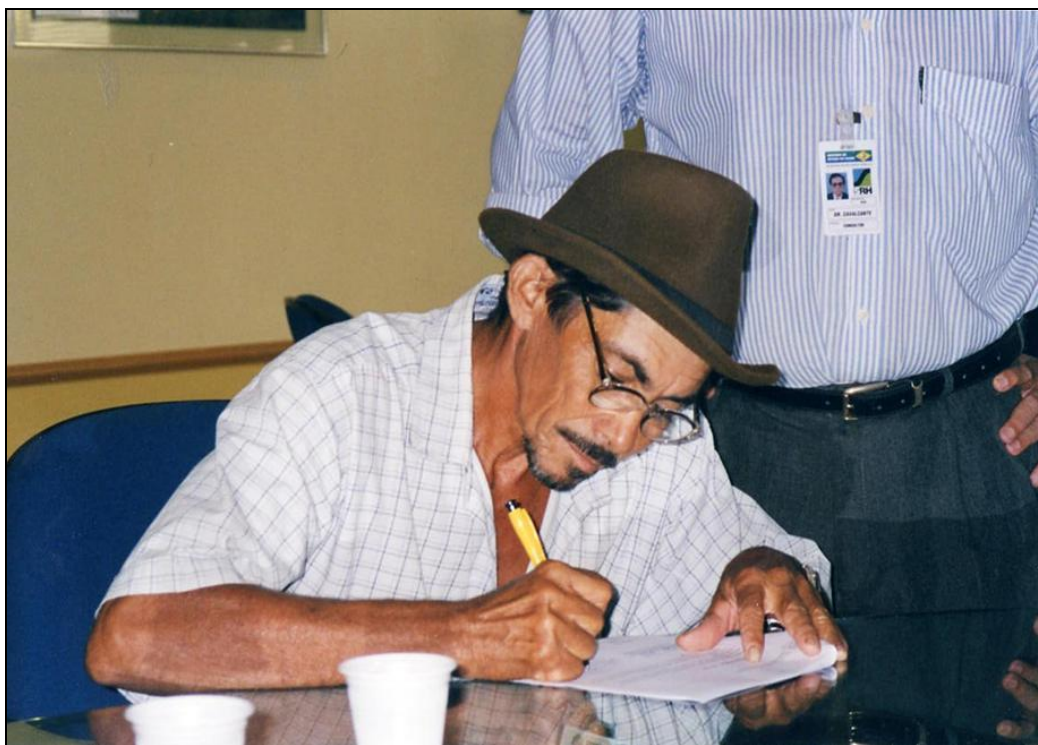
Figure 7 – Photo of a capacity building event closing in Iguaçu, Canindé-CE.

In close partnership with municipal education secretariats, a literacy system was implanted for all adults involved in project activities, which led to knowledge democratization and social inclusion process.

Aiming to increase the self-esteem of population residing in the area, strengthen the speculative mind and redeem the local cultural identity, the Project supported the formation of artistic and cultural groups.

4.5. Spontaneous Adherence

Work success was not dependant on the technical project team or some local leaderships only, but also on the interest and full spontaneous adherence of several partners and local institutional and social actors (families/producers, community organizations, governmental entities, corporate entities, etc.).



Source: PRODHAM

Figure 8 – Signing of agreement between SRH-CE and Iguaçu Community Association in Canindé-CE.

5. RESULTS FROM LEADING ROLE

5.1. Organizational Strengthening

Most expected effects of that component refer to the creation of conditions for the occurrence of changes to the behavior of Cangati River hydrographic microbasin producers with respect to the use of technologies for soil and water preservation, construction of hydroenvironmental infrastructures, and the adoption of that proposal by producers as a daily habit.

In this sense, a full work of capacity building was developed for leaders and other social actors able to mobilize the communities toward an awareness work to recover and preserve natural resources (water, soil and vegetation), as well as the techniques for use of such resources, aiming to improve the microbasin population's life conditions and their replication in other areas where natural resources are at a degradation process.

Capacity building courses were also offered to association officers (see Table 1) to increase their skills to manage them, by establishing participatory standards and methodologies and provide them with conditions to replicate such techniques in other areas in similar conditions. Also, several courses on association techniques were held, which were attended by representative of several local communities. In addition to such courses, other courses for exploration of 'pet' bottles, apiculture and other courses were offered.

5.2 Socioeconomic and Environmental Effect

The socioeconomic effect of this work was the participatory process that provided the local social actors with the understanding of community's reality and planning of actions, as well as their participatory implantation involving several social segments of Cangati River microbasin.



Source: PRODHAM

Figure 9 – Detail of public event supported by PRODHAM in Iguaçu, Canindé-CE.

New economic activities emerged from several PRODHAM actions. Among them, the productive use of sediments and water accumulated in successive dams, cultivation in underground dam areas, contour line cultivation, control of ground clearance by fire, and dissemination of apiculture in several communities for income generation in several communities stand out, in addition to 'pet' bottle use for broom production.

6. MAJOR DIFFICULTIES FOUND

Major constraints that limited the leading role in PRODHAM areas included:

a) Population's education level

The great problem of communities in Northeastern semiarid regions is the population's low education level. In Cangati River microbasin, education level is also low and the population is unwilling to improve that situation. Under PRODHAM, an attempt was made to combine community activities of hydroenvironmental work implantation with attendance to adult literacy courses, but many workers resisted to that, notwithstanding some progress was achieved.

b) Lack of incentives to adopt recommended edaphic and agricultural practices

In fact, the lack of incentive derived from many factors, including the lack of financing for crop implantation, high cost of implantation of some agricultural practices, such as agrosilvopastoral system, and the existence of a great number of landless producers. Overcoming such structural problems will depend on the implantation of

land tenure reorganization to give everybody access to land and the creation of financing sources to make local economic activities feasible.

c) Discontinuity of PRODHAM actions

Another great problem was the discontinuity of PRODHAM actions due to government changes. During the years of Project implantation changes in the government occurred, which caused the appointment of four different Project managers in only 10 years, bringing serious consequences to Project implantation and monitoring, and generating discredit in local communities.

d) Lack of financing to implement actions not included in the Project

Most producers have no access to land tenure, and therefore, have no access to credit. PRODHAM, on the other hand, did not anticipate the financing of productive activities that had been identified and could be disseminated and strengthened to give the families an income alternative and ensure stability. As this is a pilot project, many actions were not anticipated, one of which was financing such productive activities. If funds to finance such productive activities had been available, probably the economic effect would have been more visible.

e) Irregular precipitation

Another significant factor that made activities difficult, causing therefore a greater impact on the economic performance of PRODHAM works, was the several years of drought. In 2005 and 2007 rains were scarce in the region, what greatly affected the economic exploration of implanted infrastructure and edaphic practices, such as contour line cultivation, dry farming, and agrosilvopastoral system.

f) Discontinued capacity building

PRODHAM works were adversely affected by institutional and administrative changes that interfered with the development of works and generated some discontinuity of capacity building actions, as a result of delayed release of funds to the mother association.

g) Restricted participation of other institutions

Several institutions had been invited to participate in PRODHAM works, both for affinity matters and similar objectives between such institutions and PRODHAM, but that was not possible. There was always some constraint that precluded their participation. In the case of Ematerce, allegedly there were no funds available for its effective participation in the microbasin area. Therefore, the Project had an insufficient technical assistance. It appears that the unavailability of financial resources precluded the institution's participation. That problem could have been overcome if the project had anticipated resources for signing an agreement with the institution including the allocation of funds, what would have made its participation obligatory.

h) Deep-rooted habits

Adoption of some techniques introduced by the Project was restricted by deep-rooted habits of HMB farmers. Techniques transferred from father to son, generation after generation, constituted the main factor that restricted the implantation of new techniques.

7. CONCLUSIONS

Leading role induced by PRODHAM was a factor that enabled the implantation of a diversified quantity of oil, water and vegetation preservation works. That leading role led to the emergence of local leaders who became the great defenders of implemented actions, as they acknowledged by the day-to-day practice the effectiveness of several local actions, such as the reduction of water erosion action by the construction of stone barriers and terraces, as well as the retention of sediments by successive dams. In production terms, there was an expressive increase of dry crop productivity as a consequence of a greater soil and water retention enabled by introduced cultivation techniques, such as: dry farming, contour lines, stone barriers, terraces, etc.

Leading role is also highlighted in perennialization of actions implemented by the Project, as communities are mobilized not only to maintain the existing works, but also to transfer them other interested producers. It is noted that, after the departure of PRODHAM technicians, communities have continued to care with the environment, especially by preventing ground clearance by fire and felling of ciliary forest trees, treating waste and promoting sustainable economic activities. Leading role was responsible for solidification of PRODHAM techniques in heart and mind of population living in all four HMBs assisted by PRODHAM.

At the closing of these conclusions, excerpts of a journalistic article produced by the Press Advisory Office of the Secretariat of Water Resources are transcribed below:

“Mr. Antônio Napoleão de Sousa Furtado, 61 years-old, no longer teaches his nine grandsons what he had learned from his father and grandfather about how to work in the land. Now he teaches what is right. Until six years ago, he had seen the soil ‘melting’ at huge erosions. Corn leaves and beans were thrown to the fire in ground burning before replanting. The land was left clean and sand became dark. He thought that it was the best way to clean the soil. Mr. Napoleão, like his father and grandfather, cultivated down the slope. When it rained, he waited for flood some minutes later. Water runoff carried everything down and all crops were lost.”

Also, according to Mr. Napoleão,

“At the beginning of the project, there were erosions that opened room for people to get inside. But now this is hardly seen. To me, PRODHAM is a farmer educator. Today, people know that if they fail to care for the environment it will be worse. At least here productivity has increased.”



Source: PRODHAM

Figure 10 – Photo of closing of a focal group meeting in front of PRODHAM house in Iguaçu, Canindé-CE.

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