

**Ecologically-Based Participatory Implementation  
of Integrated Pest Management and Agroforestry  
in Nicaragua and Central America  
(CATIE-IPM/AF)  
Phase III**

Final Program Evaluation Report

By

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## 1. EXECUTIVE SUMMARY

*This summary begins with general impressions of the CATIE IPM/AF Program and key conclusions on Program design, relevance and effectiveness. Main points follow from an economic evaluation of the Program, an assessment of the sustainability of Program achievements and a brief appraisal of a set of proposals encapsulating some of the Program's ideas for possible future directions. We close with several recommendations related to future work and sustainability.*

### **General impressions**

The CATIE IPM/AF Program developed in response to the weakening of the extension function within national agricultural systems in Central America with IPM and Agroforestry as entry points rather than goals in their own right. The Program has contributed to a reorientation of the prevailing linear transfer-of-technology model in favour of a more holistic approach that supports innovation as a process involving multiple actors. CATIE IPM/AF recognizes and works with the multiple actors who contribute to the process of rural innovation, and with the contextual factors that can stimulate or inhibit this process.

The CATIE IPM /AF Program has created excellence by combining clear goals, a conceptual framework that articulates its principles and values, its participatory methodology and the high level of technical and social competence of its staff. The success and impact of the Program derives from:

- 1) the synergy created by articulating talent that was dispersed among many national organisations,
- 2) the focus on increasing the capacity for learning among farm families, extensionists, researchers and trainers and decision makers; and
- 3) from the way it stimulated trust, confidence and self-esteem at every level.

It should be recognized that the Program has focused on developing empowerment through participation rather than using participation as an instrument for achieving the adoption of improved technology. This distinguishes it from the vast majority of agricultural research and extension programs. Other key strengths of the Program include the emphasis on the poor and on families; the participatory planning and public monitoring of results, inter-institutional cooperation and the creation of multi-institutional platforms; the role of ecological reasoning as a practical tool for improving decision-making among farmers, extensionists and researchers; the importance of farmer training in ecology, observation methods and data collection as supports to innovation and the organisation of farmer training by the phenological stage of the crop.

### **Conclusions related to Program design**

It is unclear at the end of the third phase and in the highly fragmented institutional environment (of Nicaragua) how and who will continue the role that the Program has played as facilitator, motivator and social glue for the multi-institutional networks which have been created, supported and strengthened. Likewise, it is unclear who will ensure that farmers will continue to have access to updated information as an input to local innovation processes and who will support the

process of participatory technology development and adaptation.

The continuation of the high level of institutional and farmers' participation is also uncertain since the Program has not focused enough on the consolidation of the networks or on ensuring an adequate organisational structure for their continuation. With weaker networks the synergistic effect of collaboration and joint learning will be reduced in the future as will be the spread of innovations.

As an organisation focused on research and higher education, CATIE has not previously been involved in widespread implementation programs intended to reach large numbers of farmers and it is debatable whether CATIE ought to have such a role. The positioning of the Program as a "widespread implementer" of IPM and agroforestry approaches created some unrealistic expectations and led to some lost opportunities. By positioning itself this way the IPM/AF Program raised expectations of massive implementation of IPM/AF by many and led to concerns that it was impinging on "national territory" by others. In retrospect the Program's intention appeared to be that of working at a scale significantly larger than that of most pilot programs, but one that still fell short of massive implementation. The focus could have been more clearly articulated as one of creating a pilot experience with a relatively wide scope of coverage.

The way the Program involved and linked numerous counterparts in giving and receiving training must be seen as successful both in itself and also because it has facilitated networking for rural development. However, the involvement of the decision-makers (especially in the upper management levels) of many counterpart organisations, especially in Nicaragua, could have been much stronger. The participation of specialists and extensionists in Program activities was often based on their own interest, and this sometimes resulting in friction between counterpart staff and their supervisors, and also between decision-makers and the Program.

Paradoxically, the decline in coffee price and reduction of pesticides subsidies has actually favoured the spread of the Program ideas and approaches because farmers were in need of alternatives that could reduce their reliance on income from coffee and reduce their cash expenditures. The effect of the contraction of public expenditures in the extension services is more complex. On the one hand, it has made institutional anchoring more difficult as very few (state employed) extensionists are employed at local levels at present. On the other hand it has also paved the way for a variety of organisations and actors who are trying to fill gaps in different ways and who have different levels of competence, coherence and success. It could be concluded that the collapse of the public sector made it easier to implement a more experimental model with non-traditional methods and approaches.

#### **Conclusions related to relevance and effectiveness of the Program approach**

The Program has had a significant positive impact at the farm level in Nicaragua, Costa Rica (though with much more limited coverage) and to a lesser extent in the Trifinio region of Guatemala, Honduras and El Salvador. The Program estimates that 15-21% of small farmers in Nicaragua are using IPM practices, and attributes this to the cumulative impact of a number of IPM-related projects.

The work in Trifinio has been much more difficult. In contrast to Costa Rica the farmers are poorly organized and as in Nicaragua in all three countries the extension services have been drastically cut by structural adjustment and donor-driven privatization and there has been massive out-migration of farmers driven by economic crisis. In Costa Rica the Program has been successful in reducing the use of agrochemicals and in achieving significant diversification of coffee plantations leading to restoration of food security, which was threatened when the coffee crisis was at its peak. This has occurred in a limited pilot area.

Families adopting more IPM and AF options were significantly more secure with a 61% lower probability of suffering total crop loss than those who did not participate. A substantial proportion of the coffee, vegetable and basic grain producers attended by the Program report reductions in pesticide use and expenditures along with yield and quality increases in coffee and vegetables, with by far the greatest impact on coffee. This difference makes sense because there is a greater level of organisation among small coffee producers and a number of emerging niche markets that have generated enthusiasm for working with the Program among farmers who hope to be able to access these markets in coming years. Such farmers correctly perceive that IPM-produced coffee paves the way for entrance to the organic and other niche markets. In contrast vegetable and small grain growers are not well organized and vegetable growers are being swept away by market forces and ecological disasters. While the Program has clearly made substantial inroads in terms of the use of alternatives like homemade biological fertilizers and insecticides, the use of chemical products still remains high.

The greatest contribution of the Program has clearly been methodological. Program approaches offer great promise to be applied in many other aspects of rural development and beyond the borders of Central America. The investment by NORAD (and SIDA) has permitted the creation of a “lighthouse” or pilot experience that clearly shows that there are better ways to stimulate rural innovation than the traditional linear and supply-driven research and extension approaches. It is now critical to consolidate and continue developing these approaches in Central America and to disseminate and adapt them to other regions of the world.

The family focus in capacity-building activities motivated farmer participation and also motivated extension professionals who are often faced with the scepticism of farmers towards one-size-fits all technological recipes that are inappropriate to their particular circumstances.

The ecological reasoning approach emphasizes participatory ecological analysis and assessment of each family’s farm and includes a process of planning and re-design to maximize the role of synergisms and ecological processes in reducing pest, disease and weed incidence, enhancing crop vigor and maintaining soil fertility, thus reducing costly dependence on inputs. Data collected through the public monitoring and evaluation component of the Program clearly shows that significant learning about complex ecological relationships has occurred in participating families (in both women and men).

As farm families move from a passive role to one of active experimentation they are increasingly better prepared to face future challenges and uncertainty. The Program’s results show that it is more important to establish a dynamic process in which families take control over

experimentation than it is to transfer a single technology or package of technologies in a static way that assumes the world is unchanging. The evidence supporting the strength of this approach is that about twice as many participant families are using IPM and AF options than non-participant families.

The Program innovated a new approach for bringing dispersed actors together and encouraging collaboration and mutual support. The key features at the institutional level are:

- 1) Regional Groups, which bring together public, non-profit and private sector actors to meet, discuss and jointly plan how to address the problems faced by farmers and extensionists in their region;
- 2) Specialist Groups, which bring together scientists and other specialists from similar organisations at a national level to address specific sets of issues, like vegetable production, or gender in extension;
- 3) Extensionists and the farmer-experimenter groups they facilitate.

These groups are integrated at the national level via the National IPM Committee (CN-MIP).

The Program has been able to generate several good cases where these actors have meshed together. In the best cases, extensionists facilitate farmer groups who experiment to develop solutions and options. Unresolved questions are transmitted via the extensionists through regional groups and specialist groups (whose members also occasionally visit farmer groups), where their input defines formal research agendas, and the results of formal research are fed back to farmer groups. The focus at every stage is to promote “learning institutions,” accumulate experience and change accordingly. Unfortunately many of the Regional groups and Specialist Groups are not fully consolidated, and have tended to weaken as the Program has withdrawn gradually over the final phase.

Educating decision makers was emphasized late in Nicaragua and became a weakness that was addressed too little and too late. The large time commitments to the Program of extensionists and specialist researchers were often misunderstood by supervisors who had not been educated sufficiently about the Program. Nevertheless the Program successfully educated many mid-level managers on the importance of participatory approaches. This was particularly notable in INTA where managers researchers and extensionists alike saw that a shift from a “transfer” to a “facilitator” mentality enabled their organisation reach farmers much more successfully.

The experience in Nicaragua informed Program strategies in Trifinio and Costa Rica. Decision-makers were involved directly from the outset and relationships with decision-makers were handled much better. Acceptance at the director level is notably better than in Nicaragua.

At the institutional level in Central America, policies like the privatization of extension have hindered the ability of this and other programs to achieved desired impacts. Private technical assistance companies – with a few notable exceptions -- are plagued by corruption, low salaries, short-term contracts, and other problems that render them ineffective. Rural families have lost the access to credit they once had, research programs have been virtually shut down, and extension



offices are being closed. High staff turnover rates in most institutions are limiting the potential for staff to assimilate concepts transmitted by the Program, and for effective follow up. In this context it is noteworthy that the universities, such as the UNA in Nicaragua, offer more stability.

On one hand the creation of networks was a key factor in the successes of the project, but on the other hand these networks are weak and vulnerable and the consolidation of these is a key issue for the future.

The future of the Regional and Specialist networks is particularly uncertain. These have operated as “public goods” that require sustained support. The inclusion of some farmer organisations and NGOs (like ATC/CIPRES, and Campesino a Campesino in Nicaragua) that address the needs of the poorest of the poor has not received sufficient attention.

It should be noted that the Program has many other achievements that were not explicitly included in the Terms of Reference for this evaluation. A partial list of these can be found in section 4.2.5.

### **Economic evaluation of the Program**

#### Program cost structure

In general there is good accordance between budgets and actual expenditures; and costs have generally been in line with agreed plans.

In the Nicaraguan coffee component, main deviations from the budget are related to less (15-20%) expenditure on farmers groups and more on training technicians (3-4 times budget), more to CATIE national staff (some 40-50% more than the budget) and more to office operations (3-4 times more). Total overspending of the Program component amounts to 12-14%. As some 5% of the total budget for the Program, this is a minor deviation, although it means that somewhat fewer farmers have been trained than could have been. For the regional coffee and vegetable food grains components there are unspent balances of around 10-15%.

The overspending in CATIE’s regional teaching and training component is mostly for international staff salaries and travel (some 100%). These deviations were accepted at the annual CATIE/NORAD meeting, and the budgets revised accordingly.

The spending on collaborative research has been less than 50% of the amount budgeted up to 2004.

The total training component constitutes some 2 million USD or some 25% of the total budget with most of these funds allotted to farmer’s training groups. Keeping in mind that this is a research and development program with substantial degree of knowledge dissemination, one may accept that less than 20% of the budget actually goes straight to small scale farmers in terms of training, advice and capacity building, however, an alternative program design basing the Program in a national institution, would have increased the resources available for direct benefits to local farmers.

Concerning deviations between budgets and expenditures, farmer training groups have received less than allocated and technician groups more; salaries for local staff and support staff are far beyond budgeted amounts, but our general impression is that the deviations have not significantly affected the main Program goals and outputs; and these changes have been accepted in annual meetings between CATIE and NORAD.

Most of the Program funds are routed through the CATIE IPM/AF office. This means that substantial authority; power, financial governance and policy formulation strength is centred there relative to the other actors. Other actors have commented upon this and on what they see as overly dominant role of the Program's office. Given the emphasis on poverty alleviation in CATIE-HQ's mission more could have been spent directly on training farmers groups, perhaps also involving landless workers as a special target group.

The contribution of national institutions is large; amounting to some estimated 5.3 million USD. Very few direct Program funds have gone to these institutions. This may be positive, in the sense of not creating donor dependence; but their contribution should have been recognized more in Program documents.

#### Program cost-efficiency

**The cost effectiveness of capacity building** for producers (US\$35.33/person) is considerably higher than that of extensionists (US\$253.6/person) or specialists (US\$234.43 / person). The farmers' training is thus much cheaper per unit, which is not surprising. The balance of resource use between the three activities could be debated. However, from a long-term sustainability perspective; there is need for good extensionists and specialists. In a pilot capacity building program like this, the chosen distribution thus seems reasonable.

**The cost efficiency of learning by CATIE-HQ** from the IPM/AF Program goes beyond the scope of this evaluation. However, given the substantial financial resources that have been absorbed by CATIE (at HQ and by the Program) one could ask if the these costs ( in the range of 4-6 million USD for phase III) was worthwhile. CATIE's major role could have been phased out earlier, while phasing in national institutions and thus improving cost-efficiency by increasing the number of farmers trained and improving the livelihoods of more families.

On the other hand, CATIE plays an important role as a regional centre, so questions of how well CATIE is learning from the IPM/AF Program and whether the learning that has taken place in the temporary Program office in Nicaragua has been of use to CATIE-HQ are very important. Our impression is that there is room for improvement in the design of learning structures. It would have been better if CATIE-HQ and the Program had set up mechanisms earlier for integration of principles, practices and lessons learned by the Program in research, education, in internal learning efforts and in the development of publications.

**Publications:** A planned coherence is lacking in the documentation of research efforts. A more explicit planned research and documentation strategy would also have improved the cost-efficiency; especially in terms of potential for international publications. There could have been more continuous "action research or follow-research" activities to aid the Program, and also as a

way of documenting the results of the Program better; before and after; with and without; using a broader livelihood approach. The Program experience also offers a unique opportunity to follow adoption/adaptation processes among the different target groups. This could be done by CATIE's MSc and PhD students.

The number of international publications based on Program experiences and shared with the review team is below what has been planned and paid for. This is a matter of concern in itself; but also because the many useful experiences gained definitely deserve deeper analysis and a wider international audience.

**Education:** The total expenditure for the student education and CATIE's core administration costs is around 1.5 M USD or some 15% of the total budget. From a cost-efficiency perspective, it is surprising that that none of the MSc. students have worked actively on the Program. It could also be debated whether the funds used to fund students at CATIE, could instead have been used for (more) MSc. degrees at national universities. Clearly if CATIE's student fellowships contribute to coherent institution building and networking efforts in the region then there is added value from locating the students at CATIE.

**Process perspectives:** The Program started in 1989 as a pilot project, but later took on the role of widespread implementation in the case of Nicaragua. Such a transformation implies a change in perspective with cost efficiency implications. In a pilot program, quality is crucial and close monitoring and evaluation is important. In a mass implementation program more pragmatic approaches to the same concerns are necessary. It is our impression that such transformation or growth challenges may not have been explicitly planned for in the Program, which again would have cost-efficiency implications.

**Selection of groups for training:** It would have been useful to know if there were significant differences in learning and adoption/adaptation for farmers depending on the groups that facilitated the capacity building activities. Learning which kinds of organizations function best in this role would have important implications for cost-efficiency. Interestingly, the main implementers of small projects seem to be the private extension enterprises (35%), which are notable for their internal problems and high instability.

In general, the Program has performed very well, and there are substantial and good results to justify the use of the allocated funds. However, one could still ask if the project could have been more cost-efficient. In summary:

- Could more have been achieved by an early transfer of funds, responsibility and implementation to lower levels of the Program organisation?
- Could more have been learned and utilized in CATIE-HQ by creating mechanisms for this at an earlier stage?
- Should there have been a clearer plan for research and dissemination, especially for international publication efforts?
- Should more have been done to differentiate between the pilot and demonstration phase

and the mass-implementation phase in terms of what organisations to work with, what measures to work on, the diversification strategy and not least the economic dimension of the intervention at farm level?

- Could more students have received degrees by allocating more funds to national level institutions instead of to CATIE?

#### Economics of the IPM/AF options at the farm level

In the Nicaraguan case the following changes are documented at the farm level:

- The percentage of farmers using synthetic pesticides has dropped significantly; in coffee from 90% to 10-20%; for vegetables and food grains; from 95%, to 60-65%
- Farmers not been exposed to the training use on average 2-3 times more pesticides in vegetables than those who have been trained, and they use more toxic products.
- 43% of farmers have less damage on crops than before and use 4 times more pest control options
- Farmers have increased numbers of soil and water conservation measures substantially; 2-3 times and the number trees planted for shade increased by 20-40%.
- The use of fermented manure has increased from 20-50%, fermented cow-dung from 10-80% and lime-sulphur mixture from 10-30%
- Number of crops/unit of land has increased by 30%
- 82% of farmers report crop yield increases. Coffee increased some 10%, tomato 10-13%, sweet pepper 25%.
- 96% of farmers refer to quality increases in their crops and the quality improvement is reflected in increased commodity prices
- Yield increase are reported with increasing numbers of interventions
- Looking at relationship between the total number of interventions and incomes; the incomes increase 2-3 times for the different crops.
- The costs for labour also increase with increasing numbers of interventions; from 30-40% and up to more than 100% increase in production costs.
- Coffee prices have fallen so much that the gross incomes, even if yields go up, have still fallen over the project period. Incomes have declined even more for non-participants, even if there is scant documentation of this.

Similar results have been observed for the newer projects in Trifinio and Costa Rica.

It is not easy to assess whether the different farm level options promoted through the Program are economically viable as the relative prices for coffee and other products and prices of various inputs have changed in the same period, leading to substantial and complex variations both in production costs and incomes. From a farm economic perspective, it is not sufficient to assess whether the adoptions lead to increased yields per hectare or volume produced per farm; it is the overall farm profitability that is the object for attention.

In coffee, the yield levels have increased by as much as 10-25%, not only for coffee itself; but as the number of crops in the coffee fields have increased; total incomes from each unit of land

cultivated has increased even more, leading to higher gross output values for the households, influencing both cash and subsistence incomes. There is also the potentially higher price for an improved quality. For organic certified and fair trade coffee the price may be up to 50% higher, and agro-ecological products for local markets fetch up to 20% more. However, these increases in gross income of households need to be examined in the light of changes in costs at household level. Although costs for synthetic fertilizers have gone down, labour inputs have increased substantially (30-100%). The magnitude of this increase will partly depend on the prices used. Many, but not all of the households may have low alternative value of labour. Many households reported to use much more hired labour than before, especially in Nicaragua.

We have not found much good research data that carefully compares the total incomes and costs for farmers with and without adoption. Our feeling is that the farmers benefit economically from the adoption in terms of increased yields that comes at the price of increased family labour input. From an economic perspective, one could also argue that farmers would not do this, if they did not feel that it made economic sense.

Additionally, the widespread adoption can be explained in economic terms based the profitability of the options to farmers. Another reason is that the diversification strategy has contributed to farmers' broader household food security objectives. Diversification small-scale farmers more freedom in deciding on the extent to which they wish to participate in the market, providing them greater latitude in what they on several occasions referred to as "the insecure world of neo-liberal markets". The increased labour needs have probably also improved the job market for landless labourers -- in Nicaragua these may account for some 50% of the rural population.

#### Assessment of the economic studies conducted by the Program

We would have liked to see more comprehensive socio-cultural and economic analysis by means of livelihood approaches and thinking oriented towards economic modelling around the household adaptation and adoption processes. The crop approach that was the starting point for the Program has permitted some rough gross margin assessments. These do, however, not take into account that the farmer is part of a family household with both consumption and production needs and that he/she is not necessarily running a business enterprise. It would be interesting to study more closely how the adoption/adaptation patterns change in response to the diversification strategies and the new agroforestry options.

The economic study by Hermann Waibel, which was commissioned by the Program as part of its "Wider Lessons" studies, is well written and clear, and contains balanced discussions about the crucial problems with lack of good, consistent data, sample bias and the lack of data comparing the situation with and without the Program as well as before and after it. It is also quite sober in its conclusions and recommendations.

The crop gross margin approach used in the analysis cannot however, capture household level economic rationales adequately as the relative input constraints of different groups of households would form different optimal sets of adoption to the various measures. This is not meant as a practical critique of what has been done, as the access to information obviously did not permit the capture of such issues.

A more comprehensive or ambitious cost-benefit analysis could still be undertaken. The way the analysis has been framed, the quantitative part is an economic analysis of costs and incomes. There is little welfare economics attached to the valuations of (social) costs and benefits, and the results therefore most likely reflect a lower bound estimate of NPV.

Factors that could have given an even higher level of economic profitability would include; the inclusion of water and soil measures and diversification; with the increased yields and number of crops it would encompass. Waibel also assumed a rather short-term effect of the interventions and a high discount rate. The use of only traditional crop prices without including some percentage of organic/fair trade coffee underestimates both realized and potential values. There are furthermore many public goods, which were not included in his analysis, such as cleaner and more water in general, improved food safety for consumers and improved food security and more work opportunities for poorer households. Improved capacity and competence of rural development organizations at different levels is also a public good. All these factors point in a direction of economic sustainability of Program activities for the future.

The Program is very clearly economically sustainable when assessing all *social* costs and benefits. The various interventions are also clearly profitable for the farmers and as such are also economically sustainable. This is shown by Waibel et al (2002), but we believe that his figures represent a very low estimate of the NPV, and that the project is most likely more economically profitable (and sustainable) than he estimates.

## **Sustainability**

### Policy support and sustainability

The Program is in line with national and regional policies on agricultural development. However in practice the weakness of a public (or private) extension system, lack of credits and support to smallholder farmers and the general neoliberal contraction of state type of interventions limit institutional anchoring of the Program and constrain the potential for widespread success inherent in the Program's basic ideas. The future for small-scale farmers in Central America is uncertain, especially in view of the expected free-trade agreements. However, the diversification approach of the Program (which includes agroforestry elements such as citrus and high value timber) may offer some viable protection for farmers not able to compete in globalised and subsidised markets.

In Nicaragua, the possibility of complimentary initiatives are embodied in FUNICA (with World Bank funding) and the PASA-DANIDA program managed by INTA. However, these have a rather different approach than the IPM/AF Program; which in a sustainability context, may not be compatible. NORAD might seek clarifications about ways to harmonize these initiatives.

### Institutional sustainability

**For CATIE** institutional sustainability depends on how much has been learned from the IPM/AF Program and how much CATIE has benefited from the experience; both in terms of the pilot activities; and also in terms of lessons learned through operating a program of widespread implementation.

In our view CATIE has been better at the first than at the second. CATIE-HQ has learned about the different interventions, ideas, principles, methodologies of participatory implementation and monitoring; although it is clear that more learning could have been generated had more field research been carried out by CATIE's central staff and MSc and PhD students. The Program and its staff, however, are facing an uncertain future.

***Institutional sustainability of the Program:*** it is of great concern that no clear national anchor has been found for the Program upon its completion and it remains to be seen how far the 8000 farm households, 400 extensionists, and 70 specialists who participated in the capacity-building will be able to continue to move the process forward without a formal institutional anchor to support this. It has been difficult to clarify the rights and responsibilities of the different actors; in particular the relationship between CATIE-HQ, the CATIE IPM/AF office in Nicaragua, INTA, FUNICA and MAGFOR. If NORAD can help resolve this issue, the sustainability of the approaches and methods of the Program will be more assured.

***Sustainability of regional networks:*** The Program has left a legacy of regional networks that have the organisational, technical and methodological capacity to contribute to the implementation of future IPM/AF Programs and to develop a broader focus beyond this. However, the ending of the Program has led to heavily reduced activities among these, suggesting that the process of their consolidation is far from complete.

The institutions involved express interest in continuing with the process of implementation of IPM/AF but they are limited by lack of financial resources. In addition, the departure of the Program has left a leadership vacuum that needs to be filled in order to promote further development and consolidation of these. Part of such a role could be undertaken for example by the National IPM Committee, which is made up of representatives of a diversity of national organisations and which played an important role in the development of the networks during the life of the project.

There are strong debates in Nicaragua on the organisational structure, economic resources (source, management, priorities), membership, legal status etc. of future IPM activities PASA-DANIDA II is supposed to strengthen these networks but there is concern about INTA's role and capacity in bringing this about. There is a mutual lack of coordination between the National IPM Committee and INTA and also a concern about transparency. At the same time there is a desire on the part of both UNA and INTA to lead the National IPM Committee. So, in principle, INTA would be strong ally and an actor in the field to secure the ideas and experiences of the Program; but much will depend on its ability and willingness to move in the direction that the Program has pointed out.

***Sustainability at the level of support organisations;*** The Program has focused on production aspects of key farming systems. In the future it will be necessary to integrate other links in the production to consumption chain. This will require the commitment of organisations that can provide support and follow-up to the lessons learned and capacities developed. In developing this wider focus on the whole production chain it will be important to select entry points carefully; for example the more advanced organisation of coffee producers favours the development of a

production-to-consumption focus more than is the case in vegetable crops like tomato or potato. Promoting associations of vegetable growers is crucial and it seems pointless to continue to promote IPM without building and developing organisations.

It seems likely that support organisations will continue to spread Program approaches, but institutional instability, staff turnover and unfavourable policy environments such as the privatisation of extension, the lack of credit, pesticide and trade policies limit them.

***Sustainability at the level of Farmers:***

The innovations generated with the farmers involved in capacity-building seem robust and sustainable and particularly so in coffee. Plantains could go the way of coffee, but the present sustainability of the work in vegetable and basic grains may be lower.

The spread of approaches by farmers groups at the local level to new *groups* of farmers may be less certain. Farmer-to-farmer channels are widely recognized as the most robust mechanism for the spread of innovation, but enabling farmer-to-farmer contact beyond the community level requires organisation and resources.

There is no doubt that many of the innovations at farm level will spread, but it is more dubious that whole sets of concepts such as those related to ecological reasoning can be spread through farmer-to-farmer approaches in the absence of financial resources and support from rural service organizations.

***Summing up:*** The Program has successfully strengthened capacities in rural families to maintain and spread IPM/AF approaches, however the extent to which this will happen after the Program ends will depend on the level of local organisation and the support of key institutions.

After the Program ends, it is critical that a certain level of follow-up is maintained with farm families who have been involved in order to maintain and reinforce the ecological reasoning, to support the ongoing processes of experimentation and analysis and further diffusion of these. Without follow-up there is the risk that that the learning that has occurred will remain at the level of individuals or families or at best within small groups of farmers.

**Appraisal of proposals based on the baseline studies**

These comments are tentative as the proposals are not yet ready. They will require the development of a consolidated and coherent overall program design and better description of the study areas. This should be done prior to further scrutiny.

In general the proposals are highly positive and exciting, particularly in the exemplary way they have been developed in close contact with collaborative partners. They contain many good ideas and novel strategies and approaches.

The proposals are definitely relevant from a poverty focus, from an environmental point of view and from an agricultural production point of view. However, the particular role of sharecroppers, tenants and landless workers should also explicitly be dealt with in the final formulation.



Concerning program design, there is a need for a national institutional anchoring. This should be a precondition for support; At the same time it should be possible to develop a proposal that has been informed by the Phase III experiences on the relative strengths and weakness of collaborative partners.

In relation to this, there is also a need to try and think less of CATIE and more about national institutions for this new program; both concerning budget allocations, but also in planning and execution of future programs. This requires development of a broader vision of developing local partners as organisations in their own right; and not as instruments for particular project agendas. In this view organisations are seen as both objects and subjects for development.

The primary focus of the proposals needs clarification. It is not clear whether the proposed program has a pilot focus or whether there is some element of mass implementation. If the latter is the case, then the issue of national institutional anchoring becomes particularly important. The design of the program depends heavily on whether it is a “pilot” “beacon” or lighthouse” activity or a mass implementation initiative. A pilot program focuses on continuous innovation and change, and documentation of the experience is critical. This should be approached through an explicit research strategy developed cooperatively with CATIE HQ. CATIE HQ’s responsibilities as a regional manager of collective knowledge and experience generation cannot be emphasized too strongly. The new approaches could imply a need to strengthen CATIE-HQ’s relative capacities in the “empresarial areas” as well as employing national staff with experience and competence in rural business and co-operatives.

### **Recommendations:**

1. Consolidation of the networks facilitated by the Program is crucial. Continued support is required to provide future facilitation, motivation and social glue; but this process of consolidation needs to be led by national actors, with strong support from decision makers, and to be anchored in a national organisation. The evaluation mission has developed some possible scenarios for carrying this out (see section 5.3). We recommend that NORAD provide bridging funds to support the process of nationalising and anchoring the follow-up. This could be set as a precondition to funding new proposals emanating from the Program.
2. The networks facilitated by the Program are an invaluable public good and once their facilitation has been anchored in a national organisation, NORAD should consider continued funding and/or leveraging support from and other donors in cooperation with the governments.
3. In designing future outreach programs CATIE-HQ should pay much more attention to issues such as consolidation and nationalization of the capacity to lead and manage these.
4. In the future CATIE-HQ should continue the creation of beacons such as the IPM/AF Program via its outreach programs but at the same time it should give careful consideration to the positioning of these programs. CATIE-HQ has a special niche as a regional organisation and should be very careful to avoid situations that put it in a position of competing with or

supplanting the role of national organisations. CATIE-HQ and its outreach programs should also be constantly mindful of the importance of recognizing the contributions of counterpart organizations and giving credit where it is due. This is an important element when building constructive relationships with decision makers at all levels.

5. Future initiatives should invest more in developing effective strategies for working with national and local decision-makers. Decision-makers should be involved early in the process as was done in Trifinio and Costa Rica, and the relation with them should focus on reciprocity, which implies a much stronger role for them in the formulation of joint agendas, and management of resources.
6. Future initiatives aimed at sustainable livelihoods for rural families would benefit from a combined focus on both ecological and economic or empresarial reasoning, and by adopting a multisectorial approach. This implies a need to develop much more capacity for:
  - working with farmer and national support networks on market and commercialisation issues
  - creating the capacity to organise at the individual, group, community and higher levels, and on strategies for creating, strengthening and promoting farmer organisations.
  - Working with poorest-of-the-poor groups such as landless labourers and sharecroppers
  - involving actors from the health and education sectors.
7. Much more needs to be done to develop national policies favourable to IPM, organic and ecological agriculture and to harmonize program initiatives in the agricultural sector in Nicaragua and the other Central American countries so that they are aligned with putative national goals of agricultural products that are "clean" both in terms of the environment and their impact on human health. A step in this direction might be for NORAD to enter into a dialogue with donors such as DANIDA and the World Bank about need to harmonize the objectives of programs such as PASA-DANIDA, *Libra por Libra* and IPM/AF.
8. Gender needs to be incorporated more broadly in follow-up initiatives. It should go beyond to the collection of disaggregated data and inviting women to participate in capacity-building and experiential learning. Gender issues should be considered and appropriate strategies developed at every stage of the project cycle. Future activities should also identify and respond to other dimensions where the needs of farmers and other targeted groups are differentiated.
9. More effort should be placed not just on stimulating innovation by imparting ecological reasoning skills to farmers, but also on actively promoting local innovation through an array of farmer-to-farmer strategies and creating much closer relationships with organisations that have extensive farmer networks.

10. In designing future outreach programs CATIE-HQ should more carefully consider the balance between providing autonomy, which can stimulate creativity, and the need to internalise lessons from them as well as to ensure ample opportunities for contributions from a broader range of staff and the participation of MSc and PhD students.
  
11. Mass communication of Program experiences and results and projection of the results beyond the Atlantic coast of Nicaragua and the pilot sites in Trifinio and Costa Rica and beyond the Central America both need immediate attention in follow-up plans for the Program. This projection should include scientific audiences and the development community as a key targets. At the same time many kinds of important tacit knowledge is held by the people who comprise the Program and its collaborators. There is a danger that will be lost if there is no follow-up to the Program. To address these issues we recommend that NORAD provide funding to identify and develop key information resources that qualify as public goods. Among these could be the development of a conceptual framework on innovation processes in smallholder agriculture in the Central American context.

## **2. INTRODUCTION**

### **Purpose of the evaluation**

The purpose of this mission is to evaluate the advances made by the Program during The third phase of the 1998-2004 and to consider how well the Program has created an "exit strategy" in collaboration with national authorities, NGOs and regional institutions, in order to secure sustainability without NORAD funding in the future.

The mission has focused specifically on the following aspects:

- the degree to which the Program was appropriately designed to ensure its goal, objectives and expected outputs
- the relevance and effectiveness of the Program's approaches
- the sustainability of achievements in terms of economic sustainability of IPM approaches at farmer level, capacity among farmer groups and support organisations to spread Program approaches to other farmers groups, capacity among farmer and institutional networks for supporting future IPM/AF programs
- the cost-effectiveness of the Program including an overview of the results of the cost-benefit studies and underlying assumptions, and an analysis of how well relationships with counterpart institutions facilitate partnerships, networking and efficiency achieve to the benefit of multiplication (Nicaragua); and how the Program could have been more cost effective
- the quality and appropriateness of the results of base-line studies on national capacity for innovation and the quality and feasibility proposals arising from them, and the relevance of the results and the proposals to meet the evolving needs of the region for better governance, improved livelihood and conservation of natural resources.

The Terms of Reference are appended in the Annex.

### **Process**

The evaluation team consisted of two independent consultants, two representatives of NORAD, and a representative of the Program's Advisory Committee. The main elements of the evaluation included:

- Briefings and presentations by Program staff
- Visits to institutions, Program activities and participating farm families in Nicaragua
- A visit to CATIE headquarters (HQ) in Costa Rica
- Visits to institutions, Program activities and participating farm families in El Salvador, Honduras, and Guatemala
- A dialogue with the Nicaraguan members of the Program staff about their recommendations for ensuring the sustainability of the achievements of the Program.
- A visit to the NORAD office in Managua, Nicaragua
- Presentation and discussion of the main elements of the mission report to CATIE-MIP/AF staff

- Finalization of the evaluation report based on the discussions with NORAD and CATIE-MIP/AF.

The program of activities realized by the evaluation team is given in the Annex. Several adjustments to the initial program proposed by CATIE-MIP/AF were made in response to requests by the evaluation team. It should be noted that the interviews and visits were primarily concentrated on Program activities related to coffee and vegetables.

A list of documents consulted is presented in the Annex.

### **3. BACKGROUND TO THE EVALUATION**

#### **Historical overview**

##### Phase 1

The first phase of the Program was negotiated with NORAD (and SIDA) in 1988 with the research and extension office in the Nicaraguan Ministry of Agriculture and Agrarian Reform with a commodity focus on cotton, bananas, soybean, coffee, tomato and cabbage, all crops of economic importance with high levels of pesticide use, and prioritised in government planning. The Program proposed the integration of Nicaragua into the Central American IPM network supported by USAID with a sequence of activities similar to those found in other member countries. These began with crop loss assessments, continued with research to develop management components and ended with IPM packages to be transferred. Activities in training and technical assistance for national scientists followed a similar sequence.

As the Program became established the Central American IPM network lost its funding. At the same time a new government in Nicaragua (in 1990) began a multi-year reorganisation and restructuring of agricultural institutions to reverse the state intervention in the agricultural sector that had characterized the Sandinista period. Over the following two years agricultural extension activities were drastically reduced and attempts were made to turn over agricultural research centres to private producers' organisations. The cotton sector collapsed and programs for the promotion of soybean planting were discontinued. At the same time farmers faced a drastic reduction in credit, the liberalization of input prices, and liberalization of foreign and domestic input and output markets.

##### Phase 2

In 1991 the Program began a second phase. In-country IPM specialists from CATIE were eliminated and the network was reduced to a number of bilateral projects run by CATIE-HQ staff. A number of Program actions became particularly relevant in this environment and have been identified as lessons that continue to be relevant a decade later. These include:

- Diversification of counterparts as a Program survival strategy
- Working groups as a mechanism to build on counterpart experience, promote integrated approaches, and increase efficiency in use of scarce resources

- Work routine in which each meeting ends with agreement on follow-up tasks and responsibilities and a time and date for the next meeting
- Importance of direct farmer experimentation with technologies
- Limited utility of isolated training events without practice or follow-up

Drawing on lessons learned in Phase 1, the Program modified its initial strategy to incorporate participatory IPM technology development to involve a diversity of collaborative activities. The Program also worked in formal research on non-pesticide alternatives for pest management. Both participatory and formal research activities were coordinated through interdisciplinary, inter-institutional working groups with capacity-building events integrated into these activities.

In 1993 the National Agricultural Technology Institute (INTA) was created by the government. Although INTA's overall program includes a component called Asistencia Tecnica Participativa Masiva (ATPM) directed at farmers who can not afford to pay for extension services, INTA has had a strong focus on larger scale farmers who grow commercial crops. Given that service contracts for extension services are made on an individual basis, this has led to a one-on-one style of extension where a limited number of extensionists are serving a limited number of wealthier farmers. INTA's IPM program was designated as the official counterpart to the CATIE Program.

Lessons emerging from this period included:

- The value of multidisciplinary teams and collaborative working mechanisms for research and capacity-building in an environment where shifting national priorities and individual researcher preferences cause resources to be dispersed among many crops
- The key role of ecological reasoning as a practical tool for working to improve decision-making among farmers, extensionists and researchers
- The importance of farmer training in pest ecology, observation methods and data collection as prerequisites for participatory technology development
- The critical role of training and hands-on experience in enabling extensionists and scientists to go beyond their general knowledge of a crop to the development of specific crop management strategies that fit farmer capacities and resources
- The need for methods for working with institutions that do not depend on the level of commitment or capabilities of specific individuals, since staff turnover is frequent and often sudden.

In 1995 the Program initiated its first attempts at widespread implementation of IPM approaches. The Program maintained a focus on national capacity-building, however the partnerships (mostly scientists and professors from national institutions) were broadened to include farm families, extensionists and institutional decision-makers. Participatory working procedures developed in the first phase were expanded in the second phase. To respond to feedback from collaborators that the Program was too autonomous, a multi-institutional advisory committee was established and emphasis was placed on procedures for joint planning. An on-going issue was how to work effectively with farmers and farm families and how to transform extensionists from technology transfer specialists into facilitators. Lessons learned during the period from 1995-98 included:

- The importance of strengthening farmer capacity to manage the local variability created by diverse soils, weather, topography, distance-to-market and infrastructure as a critical prerequisite for the development of profitable, competitive and sustainable agriculture;
- The value of organizing farmer training by crop stage;
- The importance of a structured training process for extensionists to build skills in ecological reasoning and to overcome resistance to participatory methods;
- The importance of gender-sensitisation;
- The importance of methods for measuring impact;
- The importance of considering interactions with decision-makers as a capacity building process in which participants acquire new knowledge and skills.

By the end of its second phase the Program had trained 530 extensionists, 50 IPM specialists, and 70 institutional decision-makers; however only a relatively small proportion of those involved had participated in season-long processes. The number of the families reached by the extension workers topped 9,000 but there was no follow-up for the farmers from the Program. At this point the Program team felt far from realizing their goal of changing farmer practice. Furthermore, NORAD alleged that little evidence could be found at CATIE-HQ of institutional learning about participatory IPM implementation.

### Phase 3

During this phase the Program focused on more widespread implementation of IPM combined with Agroforestry. The national capacity-building process in Nicaragua drew on and expanded the lessons from the previous phases. Training and research focused on factors limiting crop profitability, sustainability and resource conservation, and adopted several new elements including:

- The use of the logical framework for Program planning, monitoring and evaluation;
- The use of small projects as a mechanism to stimulate collaborative planning, implementation, monitoring, and reflection;
- Greater use of discovery-based learning processes.

The third phase has also seen the expansion of the Program to include activities in Guatemala, El Salvador, Costa Rica and Honduras in response to demand from these countries after various institutions learned about the activities, results and impact of the project in Nicaragua.

The initiation of the regionalization process has involved consultations with national organisations and with the regional actors REDCAHOR (Red Regional de Hortalizas) and PROMECAFE (Programa Regional Centroamericana de Café) and the CGIAR Systemwide Program on Whitefly. Drawing on lessons learned in Nicaragua, consultation and joint planning with decision-makers from these institutions has resulted in the negotiation of different strategies in each country and with the formation of advisory committees.

The regionalisation process encompasses three pilot zones in Honduras, Costa Rica and in the Trifinio Region. Trifinio is an area of 7000 m<sup>2</sup> that spans parts of Honduras, El Salvador and Guatemala. The inclusion of Trifinio as a pilot area has provided an opportunity for developing

cooperation among the institutional actors from these countries.

Another key feature of the third phase has been the development and implementation of strategies for stimulating institutional learning at CATIE-HQ on participatory implementation of IPM/AF. The Program has invested in a one full-time and one part-time staff member who support the integration and socialization of this learning, drawing on the direct experiences of the Program in Costa Rica as well as those in the other countries. The Program has also made a concerted effort to improve communication and coordinate efforts with CATIE-HQ staff and to reach students through participation of Program staff as course instructors and through the development of new courses, which use materials from the Program

The third phase of the Program has developed in a context of institutional instability. Staff turnover in government and non-government organisations alike is very high and in Nicaragua a new wave of creation of private extension services by ex-INTA staff is presently underway, despite the fact that only four of the 18 initially created during the 1990s have survived. In all the countries where the Program has been working the crisis in the coffee sector has led to reductions in staff of the support organisations financed from coffee export revenues. Likewise NGO's throughout the region are highly dependent on external funding and the numbers and continuity of their staff is highly resource dependent.

Another contextual factor that impinges strongly on the Program is the policy environment, which is frequently characterized by contradictions. On the positive side IPM has become a specific policy area in Nicaragua as evidence by the recognition of the National IPM Committee (CN-MIP) through ministerial decree. On the negative side, it is not clear that the Ministry of Agriculture and Forestry (MAGFOR) and INTA are committed to a pro-poor, poverty alleviation focus. Although the National Development Plan calls for a strategy for rural development based on "clean" agricultural production, the acceptance of programs like the World Bank-financed *Libra por Libra* (Pound for Pound), highlights the contradiction. Through *Libra por Libra*, farmers receive hybrid seed, which they associate with use of pesticides and fertilizers.

#### The emerging context

*When evaluating the sustainability of the Program and the options for follow-up, it is important to consider the emerging context, which is characterized by the contradictions and instabilities previously mentioned, but also by increasing globalisation, changes in funding practices, changes within institutions that affect how they collaborate, and the emergence of new actors. A few of these are briefly described:*

*Central American Free Trade Agreement:* In 2003 Nicaragua, Honduras, El Salvador, Guatemala and Costa Rica signed a free trade agreement (CAFTA) with the United States, which are expected to be ratified in 2005. While for the most part Central American governments have supported CAFTA, this has been in the face of great opposition from parliaments and civil society groups in their countries. Contentious areas include the impact of trade liberalization on agriculture. Some Central American governments have taken hard negotiating positions on the terms of liberalization of sensitive agricultural products such as maize, rice, beans and dairy. Civil society groups in both Central America and the U.S. have raised vocal concerns regarding CAFTA. Coalitions of development, human rights, labour and



religious organisations have come together to protest lack of transparency in the negotiating process, and express concerns that CAFTA will represent a step backwards for human rights, development and democracy in Central America. Labour and agriculture, mentioned above, have been two of the primary civil society concerns. Groups have also lobbied on other issues, including development needs in Central America, investor rights under CAFTA, and gender and environmental impacts.

*Sector Wide Assistance Programs:* By 2005 Nicaragua will be adopting a new funding modality at the national level. The current project-based approach will be supplanted by Sector Wide Assistance Programs (SWAPs), ostensibly to reduce the fragmentation of development assistance, which occurs when a multiplicity of donor organisations pursue "their own" interventions, leading to insufficient attention to intra- and inter-sectoral issues and to recipient country needs and preferences. The general characteristics of a SWAP is that all significant funding for a given sector supports a sector-wide policy and expenditure program, under government leadership, adopting common approaches across the sector, and progressing towards relying on government procedures to disburse and account for all funds.

*Nicaraguan Foundation for Technology Development in Agriculture and Forestry (FUNICA)* was established in 2001 and entered its second phase in 2004. The foundation brings together institutional actors from, farmers associations, universities, private sector associations (e.g. agrochemical distributors), NGOs, and government organisations. The main source of FUNICA's funds has been the Programa Nacional de Tecnología Agrícola (PTA), which a 16 year loan of US\$180 M from the World Bank, divided in 4-year tranches and managed by MAGFOR.

FUNICA manages a competitive grants program intended to strengthen the capacity of multiple actors in the "national innovation system". It has two components:

- Fund for Technical Assistance (FAT), which makes grants to farmers, reversing the usual flow of funds. The grants can be used to access technical services, and also to develop or promote services,
- Fund for Assisting Technical Innovation (FAITAN), which makes grants to technical assistance services

*CATIE-HQ* has undergone substantial reorganisation, pruning four departments (Ecological Agriculture, Environment & Rural Development, Agroforestry and Forestry and Conservation) in 2002 down to two (Agriculture and Agroforestry; Natural Resources and Environment) in 2004. To stimulate interdisciplinarity, CATIE has created the following thematic groups:

- Coffee
- Cacao
- Agroecology
- Watersheds
- Global Change
- Forests, Protected Areas & Biodiversity
- Centre for the Competitiveness of Eco-enterprises
- Plant Genetic Resources
- Environmental Economics & Sociology

Another major change has been the replacement of the semester system with a modular calendar in the educational system. This allows for much more flexibility in course offering. Short courses of three or six weeks can now be developed.

### **Program description**

The Program engages multiple institutions in joint planning of activities and public monitoring of results. An annual work plan for the Program is developed based on feedback from farm households (from diagnostic activities and previous participatory training cycles) and the interests of institutional stakeholders. The institutional environment spans government organisations, public universities, national and local farmers organisations, non-governmental organisations and private technical assistance enterprises. Planning is organized on a regional basis, with 5 regional groups in Nicaragua and three in other Central American countries (one in Honduras, another operating the tri-national Trifinio region of Guatemala, El Salvador and Honduras, and a third in Costa Rica)

The multi-institutional planning process is carried out with several levels of actors, with institutions and levels linked.

Trainers (specialists from universities and research organisations) and farm households are linked through a mechanism or methodology known as the “Zig-zag.” (see Fig. 2) CATIE’s role in the Zig-zag is as facilitator, convenor and catalyst, and also through the development of content for participatory training.

Participants at all levels plan their activities within the framework of a small project with objectives that can be monitored and evaluated. These small projects are funded by CATIE and executed by counterpart organisations. They are not awarded on a competitive basis, but rather designed to create opportunities for counterpart organisations to judge the merits of participatory learning approaches by applying them themselves. Farmer experimentation with technical options is integrated within the training activities of each small project during a crop cycle. The CATIE IPM/AF Program actively encourages the participation of the whole farm family and the collection of gender-disaggregated data. The technical content of the training is designed to develop decision-making capacity based on ecological reasoning, integrating concepts related to diversification, soil, pest, disease, water and shade management concepts and practices. Typically the budget for a small project is on the order of US\$700-1000.

CATIE-IPM/AF staff collaborate with specialists, CATIE-HQ staff and CATIE technical offices in the region to develop support materials for training, and to carry out strategic regional research

based on feedback from the Zig-zag process.

## **4. MAJOR FINDINGS**

*In this chapter we address five key issues in accordance with terms of reference. We first look at the appropriateness of program design, and the relevance and effectiveness of the Program approach. Thirdly we analyse the economic structure, the cost-efficiency and a cost benefit analysis of the Program. We follow with a discussion of the several elements of sustainability of the Program. Lastly we offer a brief assessment of a new baseline study and a proposal developed by CATIE IPM/AF for a continuation of the Program.*

### **4.1. APPROPRIATENESS OF PROGRAM DESIGN**

*The Program design, based on a logical framework approach, consists of one main element related to goals and objectives of the Program, the expected outputs through the use of defined inputs such as training, assistance and funds. The other element relates to the project's organisational design; with main actors, resource and authority flows at different levels and various decision-making arenas. It is also important to see the Program in relation to the donor, and also to external factors that may impinge upon the Program.*

#### **4.1.1. Goals, objectives and expected outputs**

The following section looks at the appropriateness of the design of the Program to ensure its goals, objectives and expected outputs.

CATIE's stated mission is to improve human well-being through the application of scientific investigation and post-graduate education to the conservation and sustainable use of natural resources in tropical America.

The goal of the IPM/AF Program is to contribute to achievement of improved, more secure, diversified and increased farm production with improved resource conservation by small and medium farm households in Nicaragua and Central America, based on ecological reasoning for better decision-making in pest, crop and tree management.

The immediate objective is that national agricultural institutions, universities, NGO's and others from the agricultural sector in Central America as well as regional institutions employ their increased capacity in participatory implementation of IPM and coffee agroforestry to develop and organize further programs in IPM and coffee agroforestry with small and medium farm household producing coffee, vegetables, food grains or musacea. The objectives of each the stakeholders for participating in the Program varies from farmers focused on maximizing net income to extensionists focused on development and decision makers as ecological thinkers.

The Program document states four main expected outputs:

- Farm households use improved decision-making based on ecological reasoning and

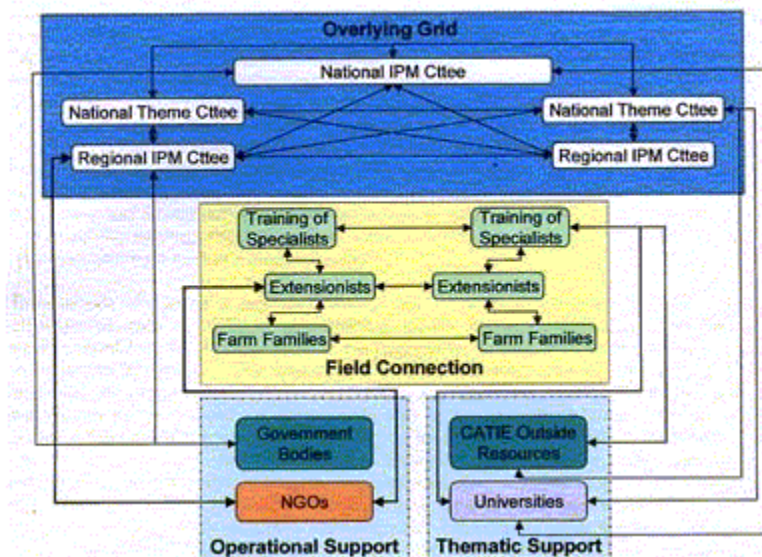
systematic observation for better crop, tree and pest management.

- All stakeholders in two pilot zones in three other Central American countries are aware of, understand, or use principles and practices of participatory IPM and agroforestry implementation.
- Participatory IPM field implementation is validated and promoted based on field testing with national collaborators.
- Institutional Programs of CATIE incorporate principles and practices of participatory implementation of IPM and coffee agroforestry in graduate education and training, research, and working links with national and regional institutions.

#### 4.1.2. Organisational design; structure and processes of the Program

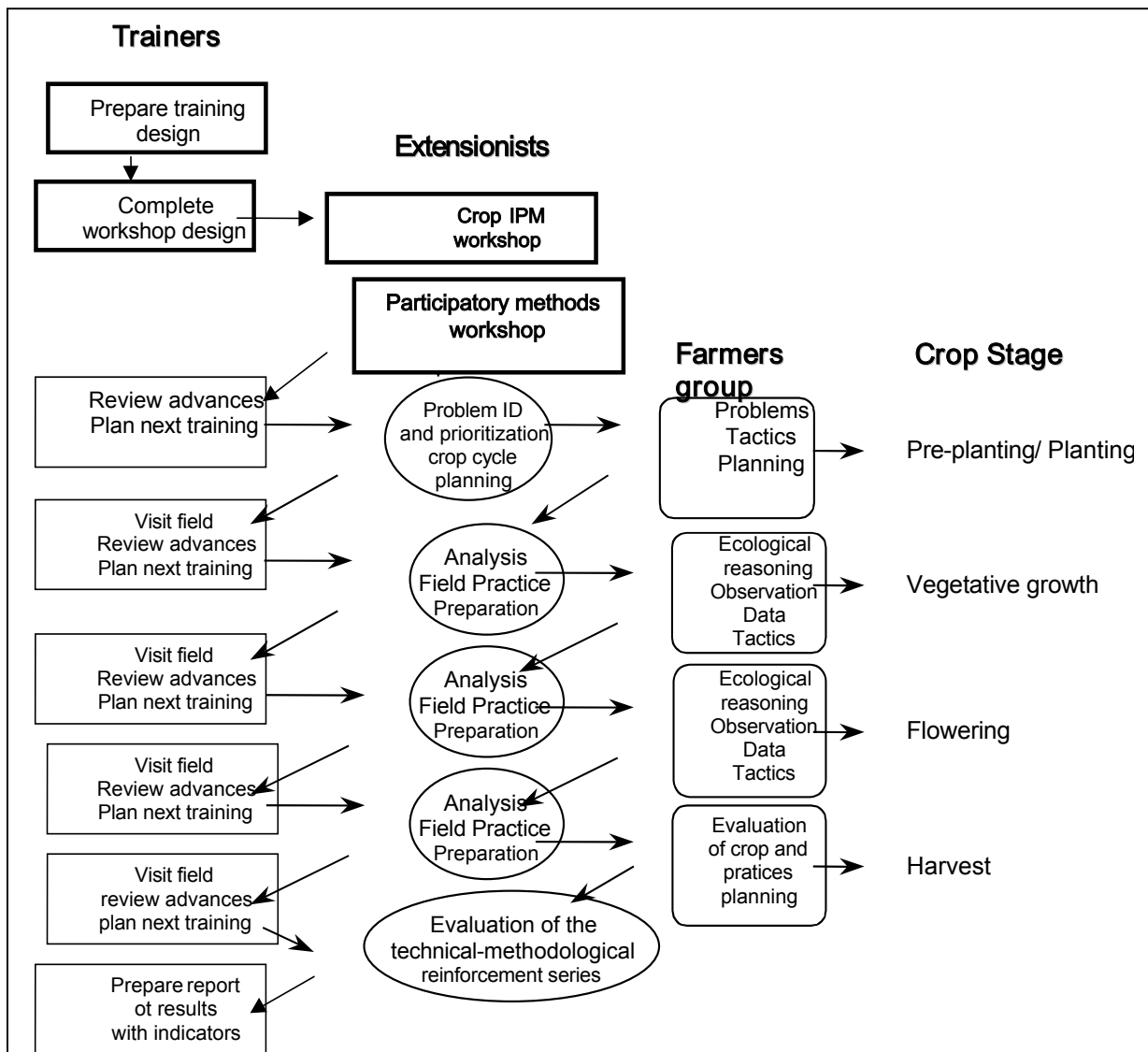
The Program organigram (Fig.1) shows the different stakeholders involved and how information flow is directed. The “zigzag” method (Fig. 2) helps secure information flows and exchange between trainers, extensionists and farmers during the entire crop cycle.

**Figure 1.** The organigram for the CATIE IPM/AF Program (Source: Stonehouse, 2002)



**National IPM committee:** The committee was created in 1995 and recognized by ministerial decree in 2001. It is presently coordinated by UNA. All the regional networks and CATIE are represented. It acts as an advisory body to the government on IPM issues. The committee acts as a coordinating, advisory and consultative body to the government on IPM issues. It is a neutral entity with a broad, multi-institutional vision that proposes strategic lines of research, participates in the design of policies and actions impacting on national agricultural technological development. On a national scale, it carries out work in IPM and agroforestry through the specialist and regional groups

**Figure 2.** “Zig-zag” method in which extensionists facilitate groups of farmer-experimenters.



**Program Advisory Committee** (not included in the organigram): This committee was established to provide oversight to the Program and is composed of members from government organizations, NGOs, and universities including INTA, UNA, UNAN-León, MAGFOR, UNICAFE, and SIMAS. The committee meets twice each year to review the plans and projects of the CATIE IPM/AF Program. Annual plans and Program reports are presented and discussed at the first and second meetings respectively. The role of the Committee has been to give inputs into the activities proposed by the Program and to approve the terms of reference for the external evaluations that the Program has had during each of its phases.

**Regional Groups** (called Regional Committees in the organigram): There are 5 groups in different geographical regions of Nicaragua. These groups consist of representatives from many organisations with stated interest in IPM. Four of the five regional networks have a representative from INTA as the coordinator. One staff member from the Program is represented in each network. The networks interact with governmental agricultural agencies and NGOs. They have a formal role in discussing and planning activities in the region within the Program, and make suggestions for the allocation of small projects to different local groups.

**Specialist Groups** (called National Theme Committees in the organigram): These are groups (4) of researchers from different organisations who have specialist knowledge of particular crops; (coffee, vegetables, bananas/plantains and basic grains) or themes (gender in agriculture and agricultural education). They interact with research and strategic bodies such as universities, CATIE-IPM/AF and other providers of research services and policy support.

**Specialists:** These are researchers and trainers from universities and other organizations who work with extensionists.

**Extensionists:** The extensionists come from a diversity of organizations, which are in turn members of the Regional Groups. To enhance networking they are trained in group events involving several different organisations. Most small projects are designed by extensionists and often with help from the Regional Groups and the CATIE-IPM/AF national staff. The small projects are then executed by the extensionists.

**Farm households:** Farmers and their families and farmers' groups participate in the Program. These include a wide variety of individuals and groups from small communities identified by extensionists, as well as highly organized certified cooperatives. The farmers also vary from traditional growers of maize and beans to very diversified and farmers who are experimenting with an array of new crops and other livelihood options.

Besides disbursing financial resources for small projects **CATIE-IPM/AF's** role in this multi-institutional environment, has been that of facilitator, motivator and glue between stakeholders, especially on the level of the Regional and Specialist Groups.

The Program has developed strategies and working procedures based on a philosophy of moving away from a "top-down" model of development. The main strategy has been twofold:

- The use of networking and liaison between support organisations, for information sharing and planning
- An emphasis on participatory research and evaluation, to allow farm families' views to be not only absorbed into research but actually to dictate the research agenda.

The implementation of these strategies is based on participatory training to instill capacity for ecological reasoning. The training is designed around crop phenology and the development of

knowledge based on hands-on experience.

The principal Program mechanism for achieving institutional sustainability is training of national extensionists, specialists and institutional decision-makers in project formulation, implementation, management, monitoring and evaluation. The collaborating institutions and the Program collectively identify the activities to be carried out during a field cycle. Based on these agreements small projects are formulated by extension workers, specialists and decision-makers of different institutions. These serve as a mechanism for developing the capacity of the national counterparts for massive implementation of IPM and coffee agroforestry during the Program and after the Program has finished. The Program policy was to include all organisations who expressed interest in participating. Nevertheless, it is unclear, at the end of the third phase, how and who will continue these processes and who will ensure that farmers will continue to receive updated information on IPM practices and who that will support the process of participatory technology development and adaptation at farmer level.

#### **4.1.3. Relationship to the donor**

NORAD(1/2), together with a counterpart contribution from CATIE and a considerable contribution from national institutions (1/3), has been the main supporter of the Program.

**Annual meetings between NORAD and CATIE:** The main formal forum for dialogue between CATIE and NORAD is the Annual meeting. The minutes from the Annual Meetings over the last 5 years gives a clear picture of that there have been no major disputes or problematic issues. The following are the main issues that have been particularly mentioned by NORAD.

- There have been several budget amendments over the years in relation to expenditures. This is addressed in section 4.3. One item of some concern has been that less was allocated to farmers training groups than originally designed. NORAD has, however, agreed to all budget reallocations.
- The planned research component with Norway has been less than fulfilled and this has been a topic of discussion in the last two annual meetings, culminating in the development of a specific plan for the allocation of these funds.
- Some comments have been made on the need for better documentation of the use of core funds by CATIE-HQ.
- CATIE-IPM/AF has several times been asked to prepare plans for phasing out of the Program and for formally anchoring it in national institutions.
- An ambition of the Program has been the establishment of the National Committee, to influence national policies on pesticide use, and NORAD questions the extent to which this has been accomplished.
- NORAD also raised concerns about the gender profile of farmers trained.

**Discussion with the Norwegian Embassy, Guatemala:** The CATIE-IPM/AF Program is presently supervised from the Norwegian Embassy in Guatemala. In an interview with the counsellor for development, Lars Henie, he stressed that NORAD is generally pleased with

CATIE's professional execution of the Program and the results acquired. They may also be motivated to continue support to CATIE; through core funding to CATIE-HQ, and also by providing funding for other activities. This is however, dependent upon the allocations given for next year; which will only be clear by the end of 2004.

NORAD is involved in supporting other activities managed from CATIE-HQ, including the Degraded Pasture Management Program. NORAD has also considered a CATIE-HQ proposal for a program on organic cocoa production by indigenous people, but this year's funding cutbacks has put possible support on ice.

According to Henie, supports to CATIE represents a potential backbone in Norway's regional, environmental and agricultural support activities for the years to come, but the extent of support is heavily contingent on the size of future allocations.

**Discussion with the Norwegian Embassy, Nicaragua:** In a brief talk with the counsellor for development, Reidun Roald, she mentioned that support to INTA's institution-building efforts have just come to an end. There is also support to two NGOs working with agricultural development; FADCANIC and ADAC, that both are involved with agricultural diversification and IPM. There are also Norwegian NGOs working with UNAG (SNV). NORAD participates in annual meetings (called "Mesa Agricultura") with other donors and the government where national coordination efforts are discussed for initiatives related to agriculture. One idea could be to raise the issue of a possible national follow-up of the Nicaraguan part of the IPM/AF Program at the next Mesa Agricultura.

**CATIE:** Both CATIE-HQ and CATIE-IPM/AF make it clear that their working relationship with NORAD is very good, and that NORAD is seen as "an exemplary donor" in the way Programs are planned and approved and in the way changes are explored through dialogue. NORAD gives substantial autonomy to the implementer and is less concerned with details in the program compared to many other donors.

An overall assessment is that the relationship between NORAD and CATIE is very good, based on mutual trust and respect and that there are few serious disagreements about Program goals, management or execution of activities. This is also reflected in NORADs' stated interest in the continuation of core funding support to CATIE-HQ, and also to possible future regional programs if funds should become available.

#### **4.1.4. External factors**

As described in the historical overview the Program has been operating under constantly changing conditions during most of its life; including natural disasters, substantial macroeconomic changes and alterations in political and policy frameworks. The Program's logical framework stated an expectation that most external factors would not be stable, and these assumptions have been borne out.



#### **4.1.5. Key constraints and strengths of the Program design**

*This section addresses constraints and strengths of the Program related to the different Program design elements, the structure and strategies chosen and external factors.*

##### *4.1.5.1. Constraints related to goals and objectives*

The objectives of the Program are relevant to CATIE's mission, which is to improve human well-being through the application of scientific investigation and post-graduate education to the conservation and sustainable use of natural resources in tropical America. As a research and development organisation CATIE has not been involved in mass implementation until now, and one could discuss if mass implementation is a role that CATIE ought to have; both politically and relative to its collaborative partners throughout the region.

#### **Focus on the target group/choice of counterparts**

The impact of the Program's participatory approach and especially the horizontal and "Zig-Zag" communication and information flow was recognized as successful by many of the stakeholders at institutional and farm household level. However, the selection of counterparts by the Program seems to be rather ad-hoc and leaves room for some questions. Not all relevant counterparts were included in small projects.

Organisations like ATC and UNAG/ PCaC (Campesino a Campesino) form an extensive network among small farmers and seem underrepresented in the Program. Both are well-established organisations and in other cases we have seen that well-organized, local farmer groups like cooperatives seems to have a particular advantage in adopting and sustaining new technology and adapting innovations for their own use.

Program data also confirms that the smallest producers who mainly produce food grains are not well represented in the work of the Program (0.4% of the total in Nicaragua)<sup>1</sup>. Small-scale producers of maize and beans lack organization and any strategy for incorporating them would have to start with organizational strengthening rather than capacity-building on ecological and empresarial reasoning. The inclusion of health workers as counterparts was also limited and should be contemplated for the future.

For many organisations working in rural areas financial resources are very limited, in some cases the operational resources accessed through the CATIE-IPM/AF small projects could have been the only resources they had. The availability of resources may have been an important incentive to participate, although our field visits gave impressions of true commitment from the various organisations.

#### **Involvement of decision-makers**

The way the Program has involved numerous counterparts in giving and receiving training must be seen as successful both in itself and also because it has facilitated networking for rural

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<sup>1</sup>Advances towards the development objective (1999 – 2003)

development at large. The decision-makers of counterpart organisations clearly appreciate the role the project has played in creating a multi-institutional environment and in providing effective methodological tools. However, decision-makers of many counterpart organizations in Nicaragua are concerned about reciprocity in their relationship with CATIE-MIP/AF. Perceptions of power relationships between CATIE-MIP/AF and counterparts have sometimes been negatively influenced by the funding modality, which places the management of funds in Program hands with disbursements to counterpart institutions in the form of small projects. In the view of decision-makers, the Program uses its resources to “buy cheap labour”. Nicaraguan decision-makers often expressed the view that their staff were working for CATIE-IPM/AF rather than for their own organisation, an arrangement which they felt to be unsustainable. Indeed, the participation of specialists and extensionists in training activities organized by the Program was often motivated by their individual interests, particularly, since in their view, time invested and intellectual contributions are not adequately recognized and credited by the Program.

Interestingly, this topic was a major issue in an interview with staff from CATIE’s national office in Nicaragua. A recent study of CATIE’s image in Nicaragua, conducted by CATIE’s office in Nicaragua (which is located in the MAGFOR office complex) has pinpointed this issue as a particularly sensitive one. Although specific measures have been undertaken to change the perception that CATIE-IPM/AF has sometimes failed to acknowledge the intellectual and other contributions of national counterparts, this perception is proving very difficult to change. The measures undertaken include review and reformulation of letters of agreement to make sure that credit issues are formally addressed.

Another frequent observation by decision-makers (in Nicaragua) was the limiting nature of what they perceive as “the one-way flow of information” (from the Program towards their organization) and lack of opportunities for contributing to Program design and strategies.

Several suggestions for ways to ameliorate the negative perception of these funding and planning arrangements emerged during interviews with decision-makers. These were very similar to those made by decision-makers during the mid-term review. One mechanism would have been for CATIE-MIP/AF to increase its responsiveness to the agendas of counterpart organisations. An example of the reciprocity desired by university counterparts, for example, would have been the provision of support by the Program to undergraduate teaching programs and joint agenda setting to include issues such as curriculum development. Another solution proposed was to involve donors and the multi-institutional platform that the Program has facilitated in seeking ways to progressively extend access to financial resources and managerial responsibility to counterpart organisations. Decision-makers felt that once an institution had gained practical experience in formulating, monitoring and evaluating small projects, it should have been considered as a candidate for formulating projects directly. During the third phase in particular, decision-makers felt that the Program should have devolved much more managerial responsibility for the Program itself to Nicaraguan nationals.

### **Gap in the holistic approach**

The Program has focused on quality improvement, diversification and increased yield but has paid only a limited consideration to commercialisation and marketing aspects. Focus on

knowledge and understanding about market mechanisms and identification of market possibilities for IPM products, through certification and other and other ways of distinguishing niche products from regular produce, has been mentioned as a gap in the Program. Greater attention to these aspects was a major recommendation of the mid-term review. The products from farming systems evolved around IPM have special qualities which could be exploited through niche markets which bring a much higher price. Farmers are fully aware of the gap between farm gate prices and consumer prices. In order to engage in more direct marketing, farmers must be organised to achieve certain scales of production and quality standards in order to organize transportation, establish market linkages and access information about markets.

### **Commodity focused approach**

The training of farmers has been focused on one commodity at a time. The advantage of this approach is that it provides opportunities for deeper exploration of subjects connected with particular crops. On the other hand, one of the objectives of the Program is to generate more secure and diverse farm production, especially in coffee-based systems. In several areas we have seen that other species like citrus have become more important than coffee due to the price fall. The commodity approach thus has its limitations and needs revision

### **IPM as a means not as a goal**

A keystone to the Program was that generation of technology is secondary to the establishment of more fundamental ways of thinking. The concept of sustainability was developed as something that would stay behind when the Program disengaged, not in terms of a product, but in terms of permanent process or structure that allows systems to be dynamic, flexible and adaptive. This is a valuable insight.

The focus of the Program on methodologies, concepts and structures such as networks has assisted this development by emphasizing the role of IPM development as a process of technical, innovation and social change, rather than merely a suite of pest management options. IPM itself is thus not viewed as a goal, the Program has rather made use of the IPM and agroforestry as entry points and aims at reaching more fundamental goals through the participatory approach. The Program has focused on supporting change in farmers and other stakeholders from passive and functional forms of participation to more self-mobilizing, and innovative behaviour among individuals and organisations. During the farm visits and meetings with extensionists, specialists and their organisations, we have met very motivated, proud, and engaged people (see also 4.2).

#### *4.1.5.2. Constraints related to the organisational structure*

The main focus of the third phase of the Program has been on massive implementation of the IPM/AF approach based on experiences gained during the previous phases both nationally and regionally. The participatory approach, including actors at farm household level, farmers organisation level and on decision makers level in planning, designing, executing and evaluating the activities has been pointed out by many of the same stakeholders as the most valuable and positive element of the Program. The active participation of many actors from governmental institutions, private universities, NGOs, private enterprises and farmer organisations in the Program has provided a foundation for communication and collaboration between them which can continue after the Program ends.

However the level of activities, especially for the Regional Groups, is to a great extent, dependent on financial resources. In Nicaragua, the present rural support infrastructure is in disarray and is not well consolidated. Conflicts of interest and tension about the “ownership” might destabilize the situation even more. However, strong alliances (individual and institutional) within the network of Regional Group have been established and will most likely continue.

In some cases we saw that Regional Groups are being adapted to needs and split up to cover smaller geographical areas as a way to reduce transport costs to meetings. Finding ways to cover such operational costs will become an important challenge after the Program closes. It is doubtful whether the centralised design with CATIE-IPM/AF staff based in Managua and administering most of the financial resources from its central office was the most appropriate design for the third phase of the project. This design is less likely to leave a viable structure behind when external support for the Program ends. A more decentralized design with Program staff based at the regional level and with more local administration of the resources might have increased the learning effects.

#### **Use of lessons learned in the region**

The level of success of widespread implementation of IPM and agroforestry in the Central American region has differed between the countries in the region. Outside Nicaragua, the implementation of the Program started in 2001 while in Nicaragua the whole learning and experimenting process has been taking place over more than a decade. On one hand time has been short, especially considering the ambitious goals of the Program. On the other hand in the new pilot areas (in Trifinio and Costa Rica) the selection of the counterparts has been more structured than in Nicaragua and decision-makers have been involved from the very beginning. The Program has thus made use of the lessons learned in Nicaragua. However, the emphasis on scaling out to new areas, which was initiated during the third phase of the Program may have reduced the opportunities for parallel (participatory) learning of the Program staff and counterparts.

#### **Use of experiences in CATIE-HQ research and education**

One of the goals of the third phase of the Program is to facilitate the incorporation of principles and practices of participatory implementation of IPM and coffee agroforestry in CATIE’s graduate education and training, research, and working links with national and regional institutions.

The extent to which this has been achieved has been an important ongoing discussion topic within the Program, which has also been taken up by NORAD, the CATIE country office in Nicaragua and CATIE-HQ itself. Many of the individuals interviewed by the evaluation team expressed doubts about CATIE-HQ’s interest and capacity to learn from Programs executed outside CATIE’s campus. At the same time, it must be recognized that the impact of CATIE-IPM/AF’s experiences on CATIE-HQ depends on interacting attitudes and behaviour both within the Program and also within CATIE itself as the “mother” institution.

CATIE lacks sufficient core funding or an endowment to support its mission as a regional

institution for higher education and research. This forces CATIE to support its teaching and research programs through the overheads charged on short term outreach projects and programs funded by donors. Consequently there are limited mechanisms for phasing in of staff from such projects and programs when they end although this would clearly be desirable from the point of view of facilitating institutional learning.

Not surprisingly, CATIE is very good at picking up elements from its successful outreach projects that can help resource mobilization in the future. Many of those interviewed feel that CATIE has learned to use the rhetoric of participation in proposal development, but that it remains to be seen whether the associated principles and practices have really been internalised.

While staff members at CATIE-HQ tend to agree that CATIE could have learned more from the IPM/AF Program, they feel that some elements are now in place to internalise learning and utilize resources created by the Program. It should be stressed that most of these elements seem to have been put in place more through the efforts of the CATIE IPM/AF Program and the alliances it has created at CATIE-HQ, rather than through the initiative of CATIE-HQ itself. Examples of Program initiatives include the following:

- CATIE IPM/AF has based a Program staff member at CATIE-HQ. He has responsibility for the Program's pilot project in Costa Rica as well as for the management of a long-term agroecological experiment comparing a range of coffee cultivation systems. Unfortunately CATIE's policies prevent nearly all of other CATIE IPM/AF staff from participating in CATIE's teaching program since they do not hold PhD degrees.
- Through the establishment of Program pilot site in Costa Rica, CATIE-HQ staff has been drawn into the collaborative and participatory activities of the Program.
- The Program has developed material that can be used by CATIE HQ staff in teaching. Program staff with PhDs have also taken advantage of the new modular calendar in order to be able to participate directly in teaching activities. CATIE-HQ has replaced the old semester system with a much more flexible modular calendar which enables the development of short courses that can be taught by outposted staff.
- The Program has organized field study visits by CATIE MSc students to Nicaragua.
- The Program has partly supported sociologist Kees Prins, who developed several courses using materials from the Program. Dr. Prins has explored the meaning of interdisciplinarity in the context of Programs like IPM/AF with students and has played a key role in bringing about internal reflection by CATIE on major issues related to participation and institutional learning. For example, during 2003 Dr. Prins organized a workshop called "Is CATIE a Learning Organisation?"

Despite these positive developments, our impression is that institutional learning at CATIE could be vastly improved. Suggestions include the following:

- more research on outreach experiences by CATIE HQ staff,
- more conduct of PhD and MSc thesis research in the field as part of outreach programs,
- more and regular field visit by CATIE HQ staff to outreach programs with formally assigned backstopping roles for HQ staff in the field

- more emphasis on international publications.

There are many ways to promote learning within CATIE, which at the same time can simultaneously contribute to regional and global dissemination of well-documented experiences from this and other outreach programs. The Program's value as a learning laboratory on widespread dissemination of IPM and agroforestry is obviously limited if such issues are not seriously and coherently dealt with by both CATIE HQ and by the Program staff.

#### *4.1.5.3. Strengths related to the main Program strategies*

The use of networking and the national information sharing and the participatory planning approach for learning and teaching has been an enormous strength of the Program. It has changed peoples way of thinking, not only about pest management but about farming and may be even life in general. (more about this under 4.2 Multi-institutional collaboration).

#### *4.1.5.4. Constraints related to external factors*

In 2002 the coffee crisis was at its worst reducing the price more than 50% compared to 2000. This led to significant changes in coffee production and influenced the emphasis of the training Program. In regions (e.g. parts of Costa Rica), where much of the coffee was produced in monocultures, producers realized how vulnerable they were in terms of food security and the diversification of the coffee agroforestry system took off.

In some paradoxical way the heavy decline in coffee price and reduction of subsidies of pesticides has actually promoted some of the ideas of the Program, as the farmers were in need of alternatives with less reliance on these markets. The contraction of public expenditures in the extension services is more complex. On the one hand, it has made the institutional anchoring more difficult as very few extensionists are employed at local levels at present. It has paved the way for a variety of organisations and actors trying to fill the gaps in different ways and with different levels of competence, coherence and success. It could also be that the collapse of the public sector made it easier to implement a more experimental model with non-traditional methods and approaches, but history seldom reveals its alternatives.

#### **4.1.6. Clarity and consistency between inputs, activities, outputs and objectives**

The Program design is based on the logical framework approach. The Program has been successful in maintaining logical consistency between inputs, activities, outputs and progress towards achievement of objectives. However, the logical frame work approach has well recognized limitations when the goals are related to more qualitative dimensions such as diffusion of knowledge, ideas, innovations, methodologies and under highly complex and rapidly changing conditions; all relevant for this Program.

Below we mention some areas where inputs and the main expected outputs were not logically consistent. Most of the inconsistencies mentioned are also discussed elsewhere in this report.

*i) Farm households use improved decision-making based on ecological reasoning and systematic observation for better crop, tree and pest management.*

There is some inconsistency in numbers in different documents regarding participating farmers and organizations, which might be explained by the previously described organisational instabilities. When extensionists are fired the farmers they have been working with are often no longer attended. In addition, units of counting sometimes vary. For example, the Program goals mention members of households as a unit while in the indicators and in most of the documented, results of single farmers are counted. Since this Program claims to have a strong focus on female participation, data should be consistently disaggregated by gender.

An immediate objective of the Program is increased production on farms using ecological reasoning. However, many stakeholders, especially farmers and extensionists mentioned that lack of knowledge about the market was dominant. Especially in Trifinio lack of market intelligence resulted in over saturated markets and low prices. Many stakeholders requested more focus on marketing aspects and this was a key recommendation of the mid-term review.

*ii) Stakeholders in two pilot zones in three other Central American countries are aware of understand or use principles and practices of participatory IPM and agroforestry.*

The amount of work for the number of Program staff in the Trifinio region has been underestimated. The workload has been especially large due to long distances, differences in interests among the three countries, and the frequent change of staff in the counterpart organisations.

*iii) Participatory IPM field implementation is validated and promoted based on field testing with national collaborators*

The continuation of the high level of participation, which clearly has taken place, is uncertain since the Program has not focused enough on the consolidation of the networks and organisational structure being built. With weaker networks the synergy of working together and possibilities for learning will be reduced, as will the spreading of innovations.

*iv) Institutional Programs of CATIE incorporate principles and practices of participatory implementation of IPM and coffee agroforestry in graduate education and training, research, and working links with national and regional institutions.*

As stated above, much can be done to improve this; especially on a regional and global level.

## **4.2. RELEVANCE AND EFFECTIVENESS OF THE PROGRAM APPROACH**

*This section examines the relevance and effectiveness of the Program in terms of achieving Increased use of IPM-Agroforestry approaches at the level of farm families, supporting organizations and networks.*

### **4.2.1. Effectiveness of the Program at the level of Farm Families**

There is no doubt that this Program has had a significant and positive impact at the farm level in Nicaragua, and to a lesser extent in Costa Rica and the Trifinio region of Guatemala, Honduras

and El Salvador. As the Program worked for many more years in Nicaragua than in the other countries (15 overall, and 5 in this Phase, vs. approximately 2 years in the other countries), we begin with an overview of proportions and numbers of farm families practicing IPM there. We note that there is an apparent discrepancy in the figures reported by CATIE (15%) and by INTA (5%) for adoption of IPM practices in Nicaragua (Table 1), which at least highlights a potential perception issue.

**Table 1.** Adoption of IPM Practices by Farm Families in Nicaragua

		Source
% Farmers Using IPM Practices	5%	INTA, MAGFOR (no studies cited)
% of Small Farmers Using IPM Practices	15-21%	CATIE (from Central Bank and Dumazert studies)
% of Families Participating in this Program using IPM practices (n = 8,000)	68%	CATIE

CATIE staff was quick to point out that the 15-21% does not reflect only the impact of this Program, but is the cumulative impact of this and other IPM projects that have been carried out. However the 68% of the approximately 8,000 families who have worked with the Program and employ one or more IPM practices is a very impressive achievement that outstrips the results any other single project or program.

The Program has correctly chosen to define IPM as something much broader than just reducing pesticide use or using pesticides more efficiently, to include ecological reasoning, based an innovative “phenological stage” of the crop approach, as the basis of agronomic decision-making, the use of natural and preferably homemade alternatives for crop pest and disease management, selective manual management of weeds, cover cropping and green manures, and generally reduced dependency on external, off-farm inputs. This is underscored by the modification of the Program name from “IPM” to “IPM-AF,” with the inclusion of an explicit emphasis on agroforestry options in coffee as a strategy of crop diversification using ecological reasoning as a way to combat the effects of the coffee price crisis on farm households.

The Program focused mainly on poor rural families who grow coffee (n=4,600), vegetables (n=2,400) and basic grains like maize and beans (n=1,000), with substantial proportions of them reporting reductions in pesticide use and expenditures on pesticides, along with yield increases in coffee and vegetable yields, as summarized in Table 2.



**Table 2.** Participating Farm Households in Nicaragua<sup>2</sup>

	<b>Coffee</b>	<b>Vegetables</b>	<b>Basic Grains</b>
<b>Number of Farm households</b>	4,600	2,400	1,000
<b>Pesticide Reduction</b>	62%	37%	71%
<b>Pesticide Savings (US\$)</b>	380,000	98,000	34,000
<b>Yield</b>	+8%	+6%	-15%*

\*Impact of drought.

It is clear that the greatest impact has been in coffee, which makes sense for several reasons.

First, there is a greater level of organisation among small growers of coffee than in vegetables. In Nicaragua, the national union of coffee growers, UNICAFE, is the best organized and most effective (or at least, the least ineffective) of the farmer organisations. UNICAFE has been able to lobby somewhat effectively at the national level on a number of economic issues, and has its own (weak) coffee research and extension system. Many small coffee farmers are also members of new or old local associations, and many are members of already existing or in-the-process of being formed, cooperatives. Organisations at this level are leading the way in a “fever” of transition to organic coffee. Commercial vegetable growers on the other hand, for example those we visited in the Sebaco Valley (a key vegetable production zone), are virtually bereft of organisation, at the local and national levels. We were not able to assess the degree of organisation of basic grain growers, who generally represent the poorest of the poor among those who have access to land.

Second, despite the coffee crisis which has seen prices plunge over the past few years, before a slight recovery this year, there are a number of emerging niche markets for coffee which have generated enthusiasm among small farmers who hope to be able to access them in coming years. These include the niches for “quality,” “café de altura,” gourmet coffee, organic coffee, bird-friendly coffee, sustainable coffee, and fair trade coffee. While there is some incipient demand for organic vegetables from Managua supermarkets, commercial vegetable farmers have had very mixed experiences with this new and so-far small market opportunity, and it is not exerting a “pull” on them that is anything like the situation in coffee. Rather, commercial vegetable farmers are being literally swept away by market forces and ecological disasters, which combined with their lack of organisation, are leaving them reeling and without much capacity to respond in terms of getting excited and motivated about technological options.

Table 3 shows just how much coffee growers have adopted IPM practices. The use of alternative methods of fertilizing crops and controlling pests and diseases far outstrips the use of chemicals.

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<sup>2</sup> This table and the other tables in this report represent a tiny sampling of the massive quantity of data generated by the Program. In general the Program should be commended for having done an excellent job of documenting impacts via extensive data collection. Readers who wish to review more data should refer to the reports listed in the Annex.

**Table 3.** Practices Used by a Sample (n=119) of Participating Coffee Farmers in 3 Regions of Nicaragua

	Las Segovias	Matagalpa	Central Pacific
Average area of coffee (mz*)	3.0	1.9	2.5
Organic fertilizers	66%	30%	69%
Chemical fertilizers	14%	8%	8%
Natural pesticide ( <i>Beauveria</i> )	7%	22%	38%
Chemical pesticide	0%	3%	4%
Homemade fungicide	55%	72%	42%
Chemical fungicide	7%	5%	8%
Sell as organic	12%	3%	32%
Sell as fair trade	11%	15%	7%

\* 1 manzana (MZ) = 0.7 hectares (ha)

Table 4 shows how the Program has moved beyond the narrow definition of IPM with adoption of soil and water conservation techniques, and implementation of shade management and shade diversification in coffee, all under the “ecological reasoning” philosophy.

The vegetable farmers with whom the project worked fall into two categories, small to medium commercial growers in commercial production zones like Sebaco, and an emerging class of very small scale vegetable-growing families in Matagalpa, Boaco, and elsewhere, who have been organized by local NGOs and others. The more commercial growers have been beset with problems, which have made them difficult to work with.

For example, the entire principal national potato growing region around Esteli has been literally wiped out by the combination of an ecological disaster – complete soil contamination with the pathogen that causes late blight (the result of insufficient crop rotation) – with the opening of the market to cheap imports from Guatemala and Honduras. Potato growing has recently relocated to the Jinotega region, where it is still threatened by free trade and by the possible entry of a new disease, “punta morada,” in the imports from neighboring countries. Tomato growers face similar challenges of free trade and cheap imports and the ecological disaster of the whitefly (the result of extreme overuse of pesticides for decades). While the role that pests and diseases are playing in these two crops is real, the lack of farmer organisation and the buffeting by the market conspire to make it very difficult for farmers to focus on the pest management part of the problem.

**Table 4.** Implementation of pest, tree and crop management options by participating coffee growing households in Nicaragua during 2001-2002.

	Management options	Jinotega (n = 500)	South Central (n = 333)	Las Segovias (n=694)	Matagalpa (n=552)	South Pacific (n=670)
<b>Healthy crop</b>	Pruning of coffee bushes	52	26	46	34	26
	Use of organic fertilizer	38	32	45	41	19
	Use of fertilizers	12	8	20	7	8
	Coffee pulp applied as fertilizer	40	33	47	37	2
	Application of home-made foliar fertilizers	32	31	46	37	25
	Re-planting	32	32	45	29	9
	Use of green manures	24	13	26	19	8
<b>Environment favoring crops and natural enemies and disfavoring pests</b>	Shade regulation	72	47	52	58	40
	Promotion of natural soil covers	50	40	47	49	34
	Soil and water conservation	24	24	37	16	17
	Planting shade trees	44	35	45	36	29
	Gleaning of fruits for Coffee berry borer	59	48	56	55	36
<b>Pest populations suppressed directly to reduce damage in the crops</b>	Removing CBB infested fruits	75	48	63	61	40
	Sanitary pruning for anthracnose	63	39	48	52	33
	Selective weeding	50	40	47	49	34
	Use of Beauveria for CBB	0	38	7	17	0
	Localized endosulfan spraying for CBB	6	1	6	6	2
	Homemade botanical insecticides	36	14	30	39	17
	Copper based fungicides	22	20	36	13	6
	Herbicides	10	4	6	9	2

This in no way suggests that the Program has failed to generate positive impacts among the more

commercial vegetable farmers – however this success is of a relatively smaller magnitude that being achieved with coffee growers and with less commercial vegetable growers. The least success with vegetables was in places like Sebaco - which is dominated by commercial growers- even the small farmers who participated in the Program in Sebaco are more commercial in their outlook, and are not organised. Yet even in Sebaco, the Program has made it possible to grow tomatoes again in parts of the Valley where extreme whitefly problems had led farmers to give up. The use of nylon mesh covers over the seedbeds where transplants are produced has been widely – almost universally adopted – and has made it possible to grow tomatoes again. This technology came out of the farmer-research groups created by the Program, and has been widely promoted since then by other projects and institutions in the area. Certainly that is a major success, yet Sebaco tomato farmers are still teetering on the verge of collapse, and have had a hard time focussing in a sustained way on IPM and on participation in the farmer research groups. The cutbacks and now the final closing down of the INTA extension service office in Sebaco hasn't helped. Without farmer organisations, they are unable to respond effectively to market problems or to government policies like the elimination of technical assistance.

Nevertheless, the somewhat more organised and smaller, newer vegetable farmers in other regions have proven to be more fertile ground for the Program, probably because of a combination of factors: they are more organised, they are in areas less touched by ecological disaster, and they are working with NGOs who have helped them access new markets like the CLUSA cooperative supermarket in Managua. Table 5 highlights the success the Program has had with these farmers.

It is clear that from a technical/ecological point of view, vegetables are a tougher nut to crack than coffee. They have short growing seasons, are very susceptible to pests, and there is a long tradition of excessive pesticide use. Thus, while the project has clearly made substantial in-roads in terms of encouraging the use alternatives like homemade fertilizers (77-88% are now using them), insecticides (80-89%) and fungicides (53-88%), the use of chemical products also remains high (42-89%).

**Table 5.** Practices Used by a Sample (n=1871) of Participating Vegetable Farmers in 3 Regions of Nicaragua.

	<b>Las Segovias</b>	<b>Matagalpa</b>	<b>South Pacific</b>
<b>Have plots of less than 2 mz</b>	86%	70%	61%
<b>Organic fertilizers</b>	92%	60%	71%
<b>Chemical fertilizers</b>	88%	89%	77%
<b>Homemade insecticides</b>	89%	80%	85%
<b>Chemical pesticide</b>	82%	81%	58%
<b>Homemade fungicide</b>	88%	53%	68%
<b>Chemical fungicide</b>	88%	73%	42%

The results for basic grains reveal a similar tendency, as shown for beans in Table 6.

**Table 6.** Implementation of pest and crop management options by participating bean growing households during 2001-2002 in Nicaragua

Goal	Practices	% of farm households implementing options (N = 839)
<b>Healthy crop</b>	Increase planting density	31%
	Varieties tolerant to diseases	63%
	Seed selection before planting	88%
	Application of chemical fertilizers	72%
	Application of liquid organic fertilizers	31%
	Selection of healthy lots for seed production	46%
<b>Environment favoring crops and natural enemies and disfavoring pests</b>	Eliminate weeds that house pests	63%
	Early tilling of soil	28%
	Crop rotation	53%
	Field selection	62%
<b>Pest populations suppressed directly to reduce damage in the crops</b>	Elimination of crop residues	53%
	Use of neem	6%
	Use of baits for slugs	25%
	Use of botanical pesticides	22%
	Use of home-made fungicides	27%
	Prevent seed production in weeds	27%
	Eliminate diseased plants	44%

Beyond just implementing IPM practices, Program results indicate that 82% of the participating households were able to increase their crop yields and 96% of them feel they have improved the quality of their produce. The same results also reveal that farmers who implement more IPM and agroforestry options on their farms achieve higher yields, as shown in Table 7. A later section of this report presents an economic analysis of this data.

**Table 7.** Crop Yields versus Number of IPM and AF options Implemented by Participating Families in Nicaragua.

Level of adoption of IPM-AF options	Coffee yield (qq/mz)	Tomato yield (crates/mz)	Beans yield (qq/mz)	Maize yield(qq/mz)
0	18.2	559	7.9	15.4
1	23.6	562	10.0	17.5
2	28.3	600	9.4	19.1

Program data also suggest that farm households using more IPM and agroforestry options received better prices for coffee and vegetables (though not for basic grains) indicating a higher quality product, as shown in Table 8.

**Table 8.** Crop Prices Received by Participating Families in Nicaragua versus number of IPM and Agroforestry Options Implemented.

Number of IPM-AF options used in the farms	Commodity prices received by farm households				
	Coffee (US \$/qq)	Sweet pepper (C\$/100)	Cabbage (C\$/unit)	Maize (C\$/qq)	Beans (C\$/qq)
0	284	155	1.3	89	260
1	260	132	1.1	83	260
2	244	200	2.1	83	239
3	333	200	3.0	97	268
4	400	No cases	No Cases	80	No cases

It is likely that the significant improvement of prices for coffee and vegetables reflects those families involved in production and sale of organic and/or quality coffee for export and organic vegetables for local markets.

Thus we can say that in general, families participating in the Program adopted IPM and agroforestry options, which enabled them to achieve higher yields and better quality, with the strongest overall impact in coffee. A key additional achievement is that families adopting more IPM and agroforestry options were significantly more secure, as measured by the probability of suffering catastrophic crop loss. Table 9 shows that families who participated in the Program had a 61% lower probability of suffering total crop loss than those who did not participate. This is a remarkable achievement indeed. Furthermore, not one family surveyed that implemented 3 or more IPM and agroforestry options suffered a catastrophic crop loss.

**Table 9.** Probability of Total Crop Loss versus Program participation and Number of IPM and Agroforestry Options Implemented Among Families Surveyed in Nicaragua.

Number of IPM-AF options used in the farm	Probability of total crop loss by pests for different levels of IPM-AF options	Probability of using different levels of IPM-AF options		Probability of total crop loss	
		For farm households not in training	For farm households in training	For farm households not in training	For farm households in training
0	0.040	0.44	0.1	0.0176	0.004
1	0.016	0.2	0.12	0.0032	0.00192
2	0.02	0.14	0.17	0.0028	0.0034
3	0.0	0.13	0.26	0	0
4	0.0	0.07	0.22	0	0
5	0.0	0.02	0.13	0	0
<b>Probabilities of total crop loss</b>				<b>0.0236</b>	<b>0.00932</b>

The work in the Trifinio region has been much more difficult. First, in contrast to Costa Rica, the farmers are poorly organised by and large, and as in Nicaragua, in all three countries extension services have been cut way back by structural adjustment and World Bank/IDB-driven privatisation, and there has been a massive out-migration of farmers driven by economic crisis (for example, in one group of 15 participating coffee farmers in Guatemala, 13 left for the United States). There is also a macho, frontier mentality that largely excludes women from participating, and coordinating institutions and bureaucracies in three countries has been a daunting task. Nevertheless the Program has generated a palpable and enormous degree of enthusiasm at all levels (from farmers to decision-makers), and this suggests that though results are still incipient, this work should under no circumstances be abandoned. The evaluators were very impressed with the high quality of work and dedication shown by the staff members outposted to Trifinio and Costa Rica, and felt that perhaps the Nicaragua-based team had not fully recognized their achievements and perhaps not given them as much support as they could have used in the difficult task of breaking into new environments.

Over the past 2-3 years the Program began to work regionally in Central America, with significant activities in Costa Rica and in the Trifinio “three border” region of Guatemala, Honduras and El Salvador. In Costa Rica, the overall Program methodology was extended – with some relatively minor adaptations – to several coffee growing regions, where it worked with mostly well organized farmers, such as those who are of the APOT organic farming association. The emphasis was on the diversification of coffee plantations to respond to low coffee prices, and Table 10 reveals substantial adoption by participating families. The Program was both successful in reducing the use of chemicals, and in achieving significant diversification of coffee plantation via tree planting and intercropping with annual crops like vegetables.

**Table 10.** Implementation of IPM and AF Options by a Sample of Participating families in Costa Rica at the Beginning and after 2 Years of the Program.

Practices	2001	2003
Chemical herbicide	58%	44%
Chemical pesticides	28%	4%
Chemical fertilizer	73%	59%
Organic fertilizer	0%	19%
Planting trees (diversification)	19%	60%
Intercropping with coffee	0%	35%
Shade management	66%	73%

When this report was prepared the Program had not yet finished analyzing results data for their work on vegetables in Trifinio, and had not begun the analysis of the coffee data. It is safe to say, however, that the principal achievements to date have been with diversification (tree planting) in coffee, and with substantially reduced use of some of the most toxic pesticides in vegetables (though not of overall chemical use), as shown in Table 11.



**Table 11.** Principal Program Impact with Vegetable Farmers in Trifinio: Reduced Use of the Most Toxic Pesticides

Pesticide	% who stopped using it
Tamaron	34%
Lannate	10%
Folidol	6%
Others (Gramoxone, Thiodan, Decis, Volaton, Karate, etc.)	17%
Didn't eliminate use of any	33%

#### 4.2.2. Effectiveness of the Program at the level of Groups and Networks

After numerous farm visits and interviews with extensionists, specialists, and others, we came to an overwhelming consensus that the substantial success reported in the previous section is first and foremost due to the innovative (and virtually unique) participatory, ecological and multi-institutional methodologies pioneered by the Program.

No matter how impressive the technology adoption and impact figures are, the greatest contribution of this Program has been methodological, and the methodologies are so clearly superior to conventional transfer of technology approaches as to hold out enormous promise both beyond the concepts of IPM and agroforestry (into many other aspects of crop and livestock production and rural development in general) and beyond the borders of the region (i.e. beyond Central America).

The investment by NORAD (and SIDA) has been large, but it has been worthwhile, because a “lighthouse” or pilot experience has been created that clearly shows ‘there is a better way’ (or “there are better ways”), and it is now critical to consolidate and continue developing these approaches in Central America, and to disseminate and adapt them to other regions of the world.

There are perhaps four fundamental pillars to the methodological approach, listed here in decreasing order of importance:

**Participation and the Promotion of Innovation by Farm Families.** Early in its history the Program rejected the conventional technology transfer approach because of its widespread failure to either generate much adoption of new practices or to promote self-mobilization by farm families to respond to new challenges. This outmoded approach was replaced with an emphasis on radically re-training extensionists to become promoters and facilitators of groups of farm family experimenters (by farm family we mean that a strong emphasis was placed on the participation of female as well as male family members, and on communication within the family unit), encouraging them to experiment both with new techniques brought from outside their community and to innovate their own approaches. Figure 2 schematically portrays the “zig-zag” method that was evolved through a process of adaptation.

The philosophy is that farm families must become active participants in the generation and adaptation of technologies. These groups proved enormously successful in motivating farmer participation, and also in motivating extensionists. This is because usually the farmers are accustomed to the typical “square” extensionists produced by agriculture schools, who arrive at the farm with a one-size-fits-all technological recipe that is often inappropriate to the diverse and varying realities of individual farm families. This creates a distrust over time by farmers in the recommendations made by the extensionist, and also leads to a kind of depression in which the extensionist no longer feels motivated to go out in the field and meet with farmers. In contrast, in Nicaragua, Trifinio and Costa Rica, we found both farm families and extensionists revitalized by the active and participatory approach taught them by the Program. One farmer expressed deep thanks to the Program for “un-squaring” his extensionist!

Another philosophical component is that as the **farm families move from a passive to an actively experimenting role**, they are increasingly better prepared to face future challenges and uncertainty. For the one certainty in rural Central America is that there will not always be an extensionist or a project at hand when new challenges appear, which can be in the form of a new pest or disease, new market preferences, climate change, price swings, etc. This philosophy holds that it is more important to “echar a andar” (get rolling) a dynamic process in which farm families take control over experimentation to overcome challenges, than it is to transfer a single technology or package of technologies in a static way that assumes the world is unchanging. Table 12 offers evidence supporting the strength of this approach. Although there is clearly still a way to go, about twice as many participant families use IPM and agroforestry options than do non-participant families.

**Table 12.** Comparison of Implementation of IPM and Agroforestry Options in Samples of Participant and Non-Participant Families in Nicaragua.

	<b>Non-participant group (n = 945)</b>	<b>Participant group (n = 360)</b>
<b>Organic pesticides used by</b>	1.2%	21.7%
<b>Cultural practices used by</b>	20%	41%

<b>Number of non-chemical options used for pest management</b>		
0	83.0%	64.4%
1	13.5%	18.6%
2	3.2%	11.7%
3	0.3%	3.1%
4	0%	1.4%
5 or more	0%	0.9%

**Multi-Institutional Collaboration.** In the Central American region, as in the rest of the world, individuals and institutions tend to work in isolation from one another, or even in competition. This inevitability leads to a low level of synergy, little collaboration, duplication of efforts, little division of labour, and inevitable gaps not addressed by anyone. In short, business-as-usual is both wasteful and ineffective. While wastefulness can possibly be tolerated in wealthy countries with ample institutional resources, it can be fatal in poor countries with few resources and weak institutions.

This Program innovated a new approach to bring dispersed actors together and encourage collaboration and mutual support. The key features at the institutional level are: 1) Regional Groups, which bring together public (i.e. Ministry of Agriculture and extension offices, universities and other educational institutions, etc.), non-profit (NGOs, cooperatives, farmer organisations, etc.) and private sector (the new private technical assistance companies spawned by the World bank/IDB-driven privatisation of extension) actors to meet, discuss and jointly plan how to address the challenges faced by farmers and extensionists in their region; 2) Specialist Groups, which bring together scientists and other specialists from similar organisations at a national level to address specific sets of issues, like vegetable production, or gender issues in extension; and 3) Extensionists with the Farmer-Experimenter groups they facilitate. These groups are integrated at the national level via the National IPM Committee. Remarkably, the Program has been able to generate several good cases where these actors have meshed together effectively.

In the best cases, extensionists facilitate farmer groups who experiment to solve problems, and unresolved questions are transmitted via the extensionists through regional groups and specialist groups (whose members also occasionally visit farmer groups), where this input defines the questions researchers ask, and the results are fed back to farmer groups. The focus at every stage is to promote “learning institutions,” who accumulate experience and change accordingly. Unfortunately many of the Regional groups and Specialist Groups remain not fully consolidated, and have tended to weaken as the Program has withdrawn gradually over the final phase. We also detect a latent institutional power struggle within the National IPM Committee that could have a destabilizing influence in the future. A strong recommendation from virtually all actors interviewed was for the need for a phase of consolidation of these groups. In Nicaragua there currently are more or less functional specialist groups focusing on coffee, vegetables, basic grains, bananas and plantains, and gender and agriculture, and five regional groups (Leon-Chinandega, Las Segovias, Matagalpa-Jinotega, South Pacific, South Central).

**Ecological Reasoning.** The basis of the philosophical and training approach transmitted to farm families, extensionists and specialists has been ecological reasoning. The ecological reasoning approach goes beyond the conventional single problem (i.e. attack by a pest), single input (i.e. find the correct pesticide, whether chemical or organic) approach, which is inevitably costly as it fails to prevent problems before they occur (i.e. deter pest incidence), inefficient, as it fails to take advantage of ecological synergisms (i.e. agrobiodiversity in the form of companion planting with species that repel pests or attract natural enemies), and sees as a problem (i.e. the pest) that which is in reality a symptom of a deeper systemic malaise (i.e. an ecosystem devoid of natural enemies of pests as a result of excessive pesticide use). The ecological reasoning approach emphasizes participatory ecological analysis and assessment of each family’s farm, and a process of planning and re-design to maximize the role of synergisms and ecological processes in reducing pest, disease and weed incidence, enhancing crop vigour, and maintaining soil fertility, thus reducing costly dependence on inputs. Table 13 shows the significant extent to which farm families have learned from this approach.

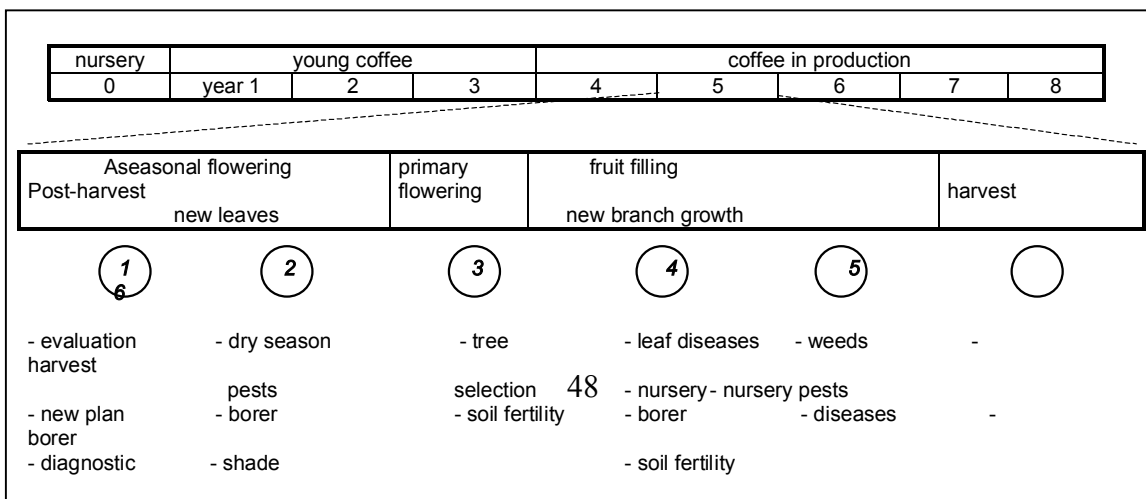
**Crop Management Approach Emphasizing Crop Phenological Stages and Local Resources**

The Program has broken away from the conventional and largely ineffective conventional pedagogical approach to crop protection which 1) isolates pest and disease issues from overall crop management, as if they were unrelated, and 2) presents all pests and diseases together in an overwhelming manner, disregarding the fact that each pest and disease actually tends to be associated with one or another phenological stage (or growth stage) of crop, which also happen to coincide with different phases of practical crop management. The phenological stage method used by the Program, as depicted in Figure 3, simplifies information management for both farmers and extensionists by associating each pest and disease with the appropriate phenological and management stage.

**Table 13.** Percentage of participating farmers in Nicaragua who correctly answer key questions on ecological relations between pests, crops and the environment

<b>Coffee</b>					
<b>Pest-shade relation</b>	<b>Men (n = 2736)</b>	<b>Women (n = 634)</b>	<b>Pest-climate relations</b>	<b>Men (n = 2622)</b>	<b>Women (n = 603)</b>
Coffee berry borer	66%	63%	Rust	61%	54%
Rust	63%	59%	Brown leaf spot	55%	54%
Brown leaf spot	68%	64%	Grasses	64%	64%
Grasses	77%	71%	Leaf miner	52%	43%
Leaf miner	53%	49%			
<b>Vegetable crops</b>					
<b>Climate favoring pest increases</b>	<b>Men (n = 980)</b>	<b>Women (n = 617)</b>	<b>Crop stage in which pest causes most damage</b>	<b>Men (n = 990)</b>	<b>Women (n = 626)</b>
Whitefly	81%	75%	Whitefly	76%	73%
Early blight in tomato	54%	54%	Early blight in tomato	54%	50%
Diamondback moth	76%	69%	Diamondback moth	76%	78%
Sweet pepper weevil	62%	67%	Sweet pepper weevil	61%	71%
Wilt	46%	47%	Wilt	38%	37%
<b>Beans</b>					
<b>Climate favoring pest increases</b>	<b>Men (n = 395)</b>	<b>Women (n = 107)</b>	<b>Crop stage in which pest causes greatest damage</b>	<b>Men (n = 403)</b>	<b>Women (n = 111)</b>
Slugs	71%	64%	Slugs	71%	70%
Web blight	49%	33%	Web blight	58%	47%
Golden mosaic virus	63%	59%	Golden mosaic virus	69%	67%
Root rot	72%	61%	Root rot	77%	54%
Cucumber beetles	77%	57%	Cucumber beetles	64%	53%

**Figure 3.** Coffee example of farmer group learning and experimentation by crop stage centres on the



pests, crop management, and decisions at each phenological stage of crop growth.

The Program has also emphasized the mobilization and use of local resources for input substitution to reduce costs. Under the current conditions of low crop prices (largely a result of trade liberalization and the elimination of price supports under structural adjustment), farmers find it hard to purchase inputs. In this context, the Program has worked with rural farm families to recover traditional technology and search for substitutes based on local resources, such as green manures, botanical brews, and soil conservation.

Overall, it is this approach based on these four pillars that has accounted for the remarkable pattern of adoption and adaptation of IPM and agroforestry alternatives described in the earlier section. In interview after interview with farmers and extensionists, we were told ‘there is no going back once you have experienced the difference this approach brings.’ In the cases of Trifinio and Costa Rica, initial scepticism with this approach has been replaced by wholehearted endorsement among participating actors. However, it is clear that like in Nicaragua, but to a greater extent, a longer phase of development, dissemination and consolidation is called for in these countries/regions.

#### **4.2.3 Broader issues and concerns on institution-building**

Educating decision makers was emphasized late in the Nicaragua portion of the Program (the past 1-2 years) and became a weakness that was addressed too little and too late. We heard repeatedly from extensionists and specialists/researchers that their large time commitments to the Program were misunderstood by supervisors who had not been educated sufficiently about the Program and about IPM.

The importance of participatory approaches and of a gender focus (usually associated with a household or family focus rather than as specific strategies oriented towards women) was acknowledged by middle level managers and extensionists/specialists, but not directly mentioned by directors of organisations such as MAGFOR, INTA, universities, although an exception was some NGO directors.

In contrast, many mid-level managers were educated by the Program, and the importance of participatory approaches was particularly notable in INTA where middle level managers, researchers and extensionists alike saw that a shift from in attitude and skills from a “transfer” mentality to one of a “facilitator of processes” enabled their organisation to have much more success in reaching farmers. The weakness was more felt at the upper management level in INTA and elsewhere. The situation was better in Trifinio and Costa Rica, where decision makers were involved directly from the outset. As an “outsider,” the Nicaragua-based Program had no choice but to go through directors in these new territories, and acceptance at the director-level is notably better than in Nicaragua.

In most cases gender only came up with decision makers when questions were raised about it by the evaluation team. This suggests that it has not been successfully mainstreamed as an integral part of the Program strategy, which tends to subsume on gender as part of its focus on families. The weakness of the gender focus is not surprising since the Program lacks clear strategies for involving women. Although women and the wider family are specifically invited to participate in

training activities and data collection is disaggregated by gender the Program has not sufficiently considered ways to integrate gender and family focus at other stages of the project cycle from planning to dissemination.

At the institutional level in Central America, we noted how policy changes emanating largely from the World Bank and the IDB like the privatisation of extension have hindered the ability of this and other projects to achieved desired impacts. We found that private technical assistance companies – with a few notable exceptions - were plagued by corruption, low salaries, short-term contracts, and other problems that render them ineffective. Everywhere we went we found poor farmers had lost the access to credit they once had, research Programs had been virtually shut down, and extension offices were being closed down right and left. Even in institutions not being closed down, high staff turn rates over limits the ability for the assimilation of concepts such as these, and for effective follow up. In this context we note that the universities, such as the UNA in Nicaragua, offer more stability.

### **Other groups**

On one hand the creation of networks was a key factor in the successes of the project, but on the other hand these networks are weak and consolidation of these is a key issue for the future. The future of the Regional and Specialist groups is highly uncertain. These have operated as “public goods” that require sustained support, and a means must be found to provide that support in the future. The inclusion of some farmer organisations and NGOs (like ATC/CIPRES, and Campesino a Campesino in Nicaragua) that address the needs of the poorest of the poor has been overlooked, and should be contemplated in future stages.

#### **4.2.4 Other achievements**

The Program has many other achievements that were not explicitly included in the Terms of Reference for this evaluation. A partial list of these would include:

- Spin-off projects: Many other smaller and more local projects have spun off from the Program, such as artisanal Beauveria factories, some new market opportunities for farmers, and advances in organic and other forms of certification.
- Synergizing other projects: Anywhere rural in Nicaragua, for example, there are literally dozens of other projects, mostly with little success or impact. The Program created conditions for the resources of other projects to be accessed by farmers and extensionists and to be used more effectively. These include projects for credit, appropriate technology, information resources, etc.
- Enhanced social capital: Once people get organized for one thing, they often use this new degree of organisation to then address other issues – social capital is created, that contributes to completely unrelated initiatives. The Program has promoted the creation, spreading and thickening of connectivity and other types of social capital, with positive spin-offs. For example, many farmer research groups in Nicaragua have become precursors to farmer associations and cooperatives. People who have played leadership roles in farmer groups have been empowered to take broader leadership and political roles in their communities.

- Even in the case of extensionists who worked with the Program who were subsequently laid off or transferred by INTA or other institutions, they are frequently still applying the Program approaches in their new jobs.
- Stimulating other projects to bring together different lines of work (e.g. INPRHU involving students from the Escuela Alternativa in training events and visits to farmers practicing IPM/AF).
- Linking up farmers to opportunities through informal provision of market information
- Some innovative farmers whose success stories were published in the widely circulated Enlace magazine were able to access opportunities to provide technical assistance to larger scale farmers.

### 4.3 ECONOMIC EVALUATION OF THE PROGRAM

*In this section we look at economic aspects of the Program and its result. We first analyse the Program cost structure or how the money has been spent over the year by cost items, by different actors and for different activities and we make some rough cost-efficiency comments. We then look at some brief results from the existing analysis of costs and benefits as reported accrued to farmers carrying out the different activities. Thirdly we briefly analyse and discuss a particular social cost benefit analysis of the Program carried out by an independent consultant. Lastly we discuss some aspects of economic sustainability of these items.*

#### 4.3.1 Program cost structure

The **cost structure** of the Program is influenced by the type of planned outputs and the activities this assumes. But it is also important to address the organisational design of the Program and the implementation processes when analysing the cost structure, as it typically will influence cost levels for different items.

##### 4.3.1.1. Overall budget and expenditures

The total budget for Phase III (1998-2003) according to the project document and the contract was planned to be 78 million kroner (some 10 million USD) (Table 14).

**Table 14. Program Budget 1998 - 2004 (000 US \$)**

Year	Sums
NORAD	8,060
NORAD 25% support to CATIE core budget	2,015
National (*) Counterparts	5,301
CATIE (**)	1,900

\* Counterpart contribution calculated from monetary value of time and transport by participants in Program-sponsored activities (policymakers and directors, specialists, field agents, farm households). These figures are reported in the Annual meetings between NORAD and the Program.

\*\* CATIE's contribution is monetary value of time of participants in Program activities, value of research and student grants contributing directly to activities of the Program, and the value of existing publications/ training materials used for Program implementation. Includes contributions from CATIE's core budget and other sponsored projects. These figures are also reported in the Annual meetings.

We could not use precise figures for comparing budgets with final expenditures because the final external audit for the Program (1998-2004) will not be carried out until later this year. The latest available workplan, for March-May 2004; contains is an overview (Table 15) of the “current financial situation of the Program”; and gives plans for utilizing the remaining funds.

**Table 15 Overview of budget and expenditures through May 2004**

	Original Program document Funds allocated		Funds used 1998- 2004	Funds available 2004
	NOK	US\$ 1998		
Program budget	60,180,000	8,059,461	6,908,902	283,497
CATIEs core budget support	15,040,000	2,014,020	1,761,820	35,682
Scientific collaboration	740,000	99,094	41,561	47,276
External monitoring	2,535,000	339,464	238,687	64,284
<i>Exchange rate</i>	<i>7.47</i>	<i>8.34</i>	<i>(from workplan, March-may 2004)</i>	

*The Program contract is in NOK, and the allocated funds have been adjusted for the significant fluctuating currency rates in the period.*

At this budget decomposition level, and given that the overview is accepted by the upcoming audit, there seems to be reasonable accordance between budgets and expenditures.

Spending on collaborative research is less than 50% of budget for some reason. According to the minutes of the annual meeting between CATIE and NORAD plans have been made for the use of remaining funds.

#### *4.3.1.2. Costs for different project components*

If we descend one step in the budget and look at spending by different components inside the Program, we find the following:

**Table 16 Total budget and expenditures by components (000' US\$)**

Components	Budget Amount	% of total budget	Expenditures up to May 2004
Nicaragua (including coffee)	3,867	38,4	-422.4
Coffee sectors in three countries	2,243	22,3	394.2
Pilot zones vegetables/food crops	1,199	11,9	446.0
CATIE/teaching and research	711	7,1	-278.9
CATIE administered support to external reviews	40	0,4	
<b>Sub-total</b>	<b>8,060</b>	<b>80,0</b>	
25% support to CATIE core budget	2,015	20,0	
<b>Total</b>	<b>10,075</b>	<b>100,0</b>	



Table 16 shows that the main component of the Program in this phase is the Nicaragua country program with its widespread implementation focus, while the three-country program draws some 22% of the budgeted funds.

In the Nicaraguan coffee component, main deviations from budget are related to less spending (15-20%) on farmers groups and more on training technicians (3-4 times budget), more to CATIE national staff (some 40-50% more than budget) and more to office operations (3-4 times more) and total overspending of the Program component by 12-14% or some 424 000 USD. This constitutes some 5% of the total budget for the Program. This can hardly be seen as a major problem or deviation, although it implies that fewer farmers have been trained than could have been.

For the regional coffee and vegetable food grains components there are unspent balances of around 10-15%, with no particular pattern, except that there has been less involvement of regional staff (salaries and travels) than planned for. The overspending in CATIE's regional teaching and training component is mostly for CATIE's international staff salaries and travel (some 100%). According to the minutes of the annual meeting between CATIE and NORAD, these deviations have been accepted, and the budgets revised accordingly.

#### *4.3.1.3. Costs by different cost items*

The percentage calculations will differ depending on whether the core support to CATIE-HQ of some 2 million USD is included or not. As a significant share of this "core funding" is used to finance components of the Program, it seems reasonable to include it in the overall Program (Table 17). One could also question the term "core funding" in this case, as the funds clearly have particular conditionalities attached, relating in particular to training of students and providing scientific backstopping in the Program.

**Table 17. Budget and expenditures by types of activities (000'US\$)**

Types of activities		Total Budget	Funds received	Total budget share %	CATIE Contribution	Remaining Balance May 2004
1	Farmer groups	1,460.0	1,302,9	14,3	65	161.4
2	Technician training	275.0	245,4	2,7	100	-210.3
3	Specialist training, working groups and local research	323.0	288,2	3,2	35	41.4
4	Regional scientific meetings and exchanges	120.0	107,1	1,2		52.9
5	Annual planning and review with collaborators	132.0	117,8	1,3		0.9
6	Training; project formulation and management	89.0	79,4	0,9	10	59.3
7	Annual planning and review within CATIE	30.0	26,8	0,3	60	-1.8
8	Regional research CATIE	410.0	365,9	4,0	60	67.1
9	Scholarships student training	285.0	254,3	2,8	1,540	31.3
10	Salaries PhD	2,023.0	1,805,3	19,8		181
11	Salaries MSc.	967.0	862,9	9,5		-378.6
12	Consultants					
	- Program strategy and participatory methods	100.0	124,9	1,0		-38.3
	- External review	40.0		0,4		
13	Regional Staff travel	508.0	453,3	5,0		246.5
14	Local Staff travel	447.0	398,9	4,4		-42.6
15	Vehicles	250.0	223,1	2,4		41.6
16	Computers and office equipment	72.0	64,3	0,7		-0.7
17	Support staff	480.0	428,3	4,7		-28.8
18	Office operations	49.0	43,7	0,5		-182.4
19	25% CATIE core budget	2,014.00	1797,6	19,7		
20	Scientific collaboration	99.0	88,3			
21	External monitoring	339.4	302,9			
	<b>SUM</b>	<b>1,0512,6</b>	<b>9381,3</b>	<b>98,7</b>	<b>1,900</b>	

The main budget items are the international staff and national staff salaries, which including travel (items 10, 11 13,14) amounts to some 4 million USD or some 50% of total funds when we exclude CATIE core support.

The total training component constitutes some 2 million USD or some 25% of the total budget with most of these funds going to farmer training groups. Keeping in mind that this is a research and development Program with substantial degree of knowledge dissemination targeted at several levels, one may accept that less than 20% of the budget actually goes straight to small scale farmers in terms of training, advice and capacity building.

If the initial Program design for Phase 3 had based the Program in national institutions, the resources available for direct benefits to local farmers would have been much greater than what has been achieved de facto.

Concerning deviations between budgets and expenditures, there are no very striking issues. Farmer training groups have received less than allocated and technician groups more; salaries for local staff and support staff are clearly quite far above budgets, but the general impression is that the deviations would not have significant impacts upon the main Program goals and outputs. These deviations have also been accepted in annual meetings between the Program and NORAD.

*4.3.1.4. Costs accrued by different groups of actors*

Below (Table 18), we have reorganised the budget given in Table 17 according to the agent in charge of covering the direct expenditures in question.

**Table 18. Budget and expenditures by recipients (000'US\$)**

Recipient	Budget Amount	% of total budget
<b>CATIE-HQ; Turrialba Core fund (employees in CATIE-HQ working on project and teaching)</b>	<b>2,015</b>	<b>20%</b>
<i>CATIE IPM/AF Program and national/regional offices</i>		
Specialist training, working groups, local research	323	3.2
Regional scientific meetings and exchanges	120	1.2
Annual planning and review with collaborators	132	1.3
Training; project formulation and management	89	0.9
Annual planning and review within CATIE	30	0.3
Regional research CATIE	410	4.1
Salaries PhD	2,023	20.1
Salaries MSc	967	11.0
Consultants	140	1.4
Regional Staff travel	508	5.0
Local Staff travel	447	4.4
Vehicles	250	2.5
Computers and office equipment	72	0.7
Support staff	480	4.8
Office operations	49	0.5
Sub-sum	<b>6,050</b>	<b>60%</b>
Scholarships student training	285	2.8
Funds to Technician training	275	2.7
Funds to farmers training	1,460	14.5
<b>Total</b>	<b>10,075</b>	<b>100%</b>

First of all; this is not an overview of direct beneficiaries of the funds. Much of the costs to the CATIE IPM/AF Program offices must be said to be throughputs, expenditures passing through

the regional office to different groups.

Most of the total funds in the Program are routed through the CATIE-IPM/AF office. This also means that substantial authority; power, financial governance and policy formulation strength is centred there relative to the other actors. Many national actors have commented upon this dominance of the Program office. These comments are grounded in the perceived lack of opportunities for decision-makers from national organizations to provide input to the design and budgeting of the Program. Although information about expenditures was in the public domain in the form of reports, this always became available after funds had been spent, hence the flow of information was perceived by decision-makers from national organizations as one-way – from the Program to them. In analysing cost structure and its further implications; this concentration of funds is a visible feature. For further discussion refer to section 4.2 and to the recommendations.

#### *4.3.1.5. Summing up on cost structure and recommendations*

The cost structure analysis reveals heavy Program involvement. One could discuss the relative shares of the budget in light of the way this Program has been positioned as a widespread implementer of IPM and agroforestry rather than as a pilot project. In particular, given the emphasis on poverty alleviation in CATIE-HQ's mission statement, more could have been spent directly on training farmers groups, maybe also involving landless workers as a special target group; increasing cost shares for such purposes.

Also, national institutions are heavily involved through their own contribution of some estimated 5.3 million USD. Very little of direct Program funds have gone to these institutions. This may be good, in the sense of not creating donor dependence; but the role and contribution of national institutions could have been given more prominence in Program documents.

#### **4.3.2. The Program cost-efficiency**

Looking back, can the achieved outputs of the Program justify an expenditure of 10 million USD? The outputs and efficiency can be defined relative to at least six areas;

- 1) Human resource development; specialists, extensionists and farmers
- 2) CATIE's development and learning
- 3) Publications
- 4) Education support for students
- 5) The cost-efficiency of Program design; structure and process perspectives
- 6) Increased food security and household incomes for farmers (addressed later)

Core funding to CATIE-HQ will be kept outside the discussion at this point as the output from the general core funding in terms of output is not easy to assess.

We briefly look at costs of different activities in relation to the different achieved outputs; and discuss some figures on the cost-efficiency of different items. While *effectiveness* measures the level of goals achievement; goal fulfilment; the **cost efficiency** will measure costs/achieved output. The effectiveness has been described and discussed in section 4.2.

4.3.2.1. *Human resource development (Capacity-building)*

Three types of capacity building activities have been carried out: for specialists, for extensionists, and for farm families.<sup>3</sup>

Table 19 shows that the largest share of funds for capacity-building was spent on coffee growers: 58% of the trained producers were coffee growers, 29% vegetable growers, 13% grain growers, while no plantain growers were included, with a similar pattern for extensionists and specialists.

The 19,964 producer families who participated in Program-supported capacity building constitute some 40% of all coffee growers in the six regions of Nicaragua.

The 5,818 vegetable growers constitute 68% of all growers. For basic grain (maize/beans) growers only 2,533 farmers (1% of all growers) participated in training.

The cost effectiveness of capacity building for producers (US\$35.33/person) is considerably higher than that of extensionists (US\$253.6/person) or specialists (US\$234.43 / person).

The farmers training is thus much cheaper per capita which is not so surprising; and the balance between the three activities could of course be challenged. However, from a long run sustainability perspective; there is need for good extensionsists and specialists. Although this Program was positioned as one of widespread implementation of IPM and agroforestry, we argue in section 4.2 that it is actually better described as “lighthouse or beacon” which points to better ways of building capacity at multiple levels. Given that the Program is thus better characterized as a pilot activity, we thus find that the distribution does not seem unreasonable.

**Table 19. Capacity building for producers, extensionists, and specialists by crops in the CATIE IPM/AF Program** (Source: Mid-term review)

Crops	Producers			Extensionists		Specialists	
	# Trained	% Of those trained	% Of all crop producers in question	# Trained	%	# Trained	%
Coffee	11,621	58	40	354	41	44	33
Vegetables	5,818	29	68	248	29	35	26
Grains	2,533	13	1	152	18	41	31
Plantain	0	0	0	107	12	13	10
<b>Total number</b>	<b>19,964</b>	<b>100</b>		<b>861</b>	<b>100</b>	<b>133</b>	<b>100</b>

<sup>3</sup> Much of what is presented is taken from the mid-term review; as much of the activities already had been accomplished (but not all).

<b>Investment:</b>			
<b>Total amount \$</b>	728,622	219,559	30,849
<b>amount/person \$</b>	35.33	253.60	234.43
<b>% of total budget</b>	12	4	0.5

#### 4.3.2.2. *The cost efficiency of CATIE's learning from the project*

To give a qualified or a quantitative answer to this question is beyond the scope of this evaluation. However, looking back at the substantial amount that has been left with CATIE-HQ, as core funding, as backstopping, for educators and for national specialists and trainers, one could ask if the costs in the range of 4-6 million US\$ for the last phase were worthwhile. One could have phased out the Program's major role earlier, phased in national institutions and thus improved cost-efficiency in terms of more farmers trained and thus achieved more improved livelihoods.

On the other hand, CATIE plays an important role as a regional centre of research and higher education. From the Program's point of view and from NORAD's; two questions are very important: 1) how well CATIE-HQ is learning from the Program and 2) to what extent has the learning which has taken place in the Program been of utility for CATIE-HQ? Our impression is that there is much room for improvement in the design of learning structures. This has been addressed in a report by Kees Prins and in workshops held at CATIE-HQ. In terms of cost-efficiency of the output of CATIE's learning, our response is thus that it is there, but that it could have been better if CATIE-HQ and the Program had set up mechanisms for institutional learning far earlier. These mechanisms need to consider how to integrate lessons learned through the Program in CATIE's wider research, education, and in internal learning processes and how to reflect this in publications.

#### 4.3.2.3. *Publications*

In the Annex (section 6.1) there is an impressive list of publications from the Program.

The Program has produced various publications specifically to be used by researchers/specialists, decision-makers, extensionists, and producers (Table 20), and the total cost represent 1.6% of the total spent budget. These publications will produce wider impact in the future for both educational and extension purposes.

**Table 20. Costs of publications produced by the Program for different groups.**

	Researchers Specialists Extension workers Teachers	Decision- makers	Farm households	Total
<b>Number of publications</b>	17	25	21	63
<b>Total costs (US\$)</b>	129,740	55,490	138,500	323,730
<b>Costs/publication (US\$)</b>	9980	2055	6925	5138
<b>Share of total budget %</b>	1.80%	0.77%	1.9%	4.47%

*Source: Activities reports 1998-2004*

The price per publication does not give a good measure of the cost-efficiency of the publication goal.

Publication goals are scattered throughout the Program document and are summarised below:

**Table 20. Types of publications produced by the Program**

Type of publication	Planned	Accomplished
Annual reports	4	3
Study reports	5-10	?
Monitoring and external reports	3	4
Abstracts of research findings	<b>30</b>	?
Academic papers	15	?
Practical documents for use by regional organisations	2	?
Practical doc. for planning, man. and evaluation of IPM AF projects and activities- specialists	2	4
Practical documents for planning, man. and evaluation of IPM AF projects and activities-trainers	<b>5</b>	5
Practical documents for planning, man. and evaluation of IPM AF projects and activities- specialists	2	4
Practical documents for planning, man. and evaluation of IPM AF projects and activities-trainers	<b>5</b>	5
Practical publications to facilitate improved crops pests and tree management by farm households	10	?

The Program logframe also refers to the following goal: Participatory methods, technical strategies and practices, and ecological knowledge for IPM and agroforestry in coffee and IPM in food grains and vegetables published in 20 practical and 10 scientific publications and presented in 9 international meetings

Most of the planned publications were produced. The total costs for these are in the range of 0.2-0.4 mill. USD, which does not seem unreasonable.

However; two concerns could be raised.

- The content and quality of published materials and the overall information strategy should be carefully examined. We did not find a planned coherence, especially when it comes to research efforts that aided implementation and that also would document effects and experiences. We thus believe there is a need for more comprehensive and thorough documentation of the Program; and that the Program would have benefited from more continuous “action research or follow-research” activities. A better design for documenting the results would have drawn on comparison of the situation before and after; and with and without the Program, using a broader livelihood approach. And there is also a unique opportunity, which should not be missed to follow the adoption/

adaptation processes among the different target groups.

- The number of international publications is far below what has been planned and paid for. This is a matter of concern; in itself; but also because we believe that the many interesting experiences gained definitely deserves deeper analysis and a wider audience.

A better and more explicit research and documentation strategy would in our opinion have improved the cost-efficiency of the Program in itself and in particular the publication goals; especially in terms of potentials for international publications. We return to this in the recommendations; where we also stress the strategic use of these projects in this context.

#### 4.3.2.4. *Education, training and goals and cost-efficiency*

The impact on education is a significant contribution of the Program to the development of Central America. The Program has provided financial and technical support to 9 MSc students in CATIE-Turrialba and another 8 in Nicaragua, together 15 MSc theses were produced (Table 21). The 15 BSc students who received technical support, on the other hand, did not receive financial support.

The total expenditure for the student training program and CATIE's administration costs is almost 1.5 Mill. USD or some 15% of the total budget. We have not had time to go into the profile of the theses relative to the more specific areas of interest to the Program, but we find it surprising also from a cost-efficiency perspective, that none of the M.Sc. students have been used actively in the Program. We return to this in the recommendations.

**Table 21. MSc and PhD students supported by the Program (costs in 000 UD\$)**

	1999-2000		2000-2001		2000-2002		2000-2003		2003-2004	
	No.	CATIE cost	No..	CATIE cost	No.	CATIE cost	No	CATIE cost	No	CATIE cost
<b>Msc thesis:</b>									13	
<b>Agroforestry</b>	5		5		5	256	7			208
<b>Agroecology</b>	6	208	7	198	8		4	224		
<b>Socioecon.</b>	2				1		3			
<b>others</b>					2					
<b>Ph.D. dissertations</b>	0		2	60	0		1	30	1	30
<b>Adm.costs</b>		58.3		81		51		51.2		44.7
<b>Sum</b>		266.4		332.8		307.7		305.2		282.7

It could also be explored whether the funds used for thesis at CATIE-HQ, could have instead have been invested in MSc. degrees at national universities. According to the mid-term review, the cost of supporting an MSc student is ca. 20 000 USD at CATIE; and 2200 USD at national universities. We are not saying that the quality would be the same, however if CATIE-HQ fails to engage these student fellowships as an instrument for coherent institution building and networking efforts in the region this would certainly tend to justifying having the students at national universities rather than at CATIE.



CATIE is already Integrating mass communication strategies: 52 radio programs have been developed, but this could have been done earlier. It is an inexpensive and far-reaching way of disseminating knowledge.

Linking information efforts with those of other sectors could also improve cost-efficiency for the implementation goal. This has started, but could have been introduced earlier, for example, some literacy projects are using MIP/AF publications for farmers as didactic material.

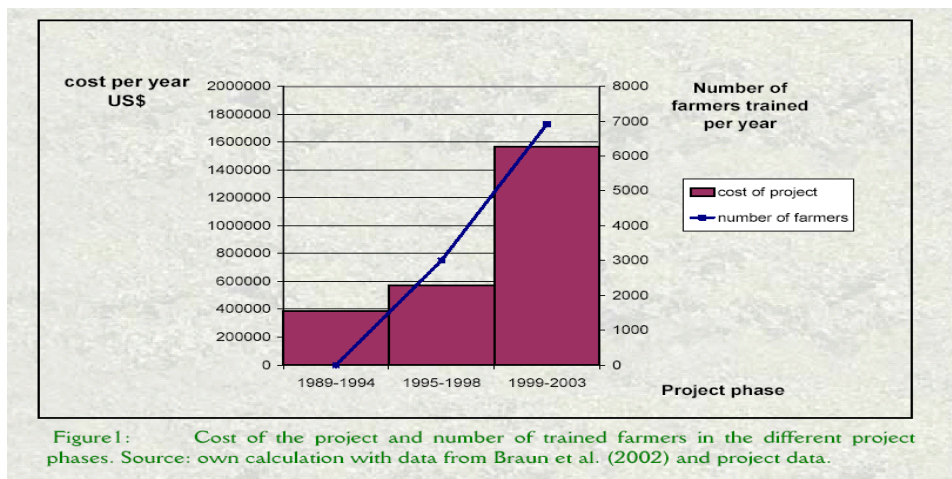
#### 4.3.2.5. *The cost-efficiency of Program design; structure and process perspectives*

*This section gives a broader overall assessment of whether the structure of the Program and the implementation processes have been optimal in relation to reaching the outputs in a cost efficient way.*

i) **Implementation costs vary** between levels of the organisation of the Program. The higher up, the more expensive the services are. If less had been done by CATIE-HQ, CATIE-IPM/AF and the specialist groups and more done by training groups at farmer's group level, more farmers could have been reached with the same funds. The trade off here concerns the degree to which this would have meant a loss of quality of implementation and end result. But if the ultimate cost-efficiency is measured as the number of farmers trained and actually implementing more IPM/AF, then such a move could have improved cost-efficiency. If however, it is just as important to build capacity among trainers groups or the specialist groups, the assessment of cost-efficiency would differ.

ii) **In a process perspective**; the project started back in 1989 as a pilot activity; but later positioned itself for the task of mass-implementation in the case of Nicaragua. Such a transformation of profile implies a change in perspective that concerns cost efficiency (see Figure 4). In a pilot strategy, quality is crucial at all levels; from ideas to be promoted, to quality of performance of trainers at different levels and in levels and quality of the adoption and adaptation and innovation processes among farmers. Close monitoring and evaluation will be key issues. In a mass implementation strategy more pragmatic approaches to the same concerns may be necessary- and cost-efficient. It is our impression that such transformation or growth challenges may not have been explicitly planned for in the Program, and which again could have cost-efficiency implications.

**Figure 4. Costs of Program by numbers of farmers trained**



iii) **Are the IPM/AF measures** selected for inclusion in training the most cost-efficient- and appropriate for all farmers? How well has the Program thought through optimal farm adaptations in relation to the technical measures trained for?

A simple example is that from an economic perspective the optimal amount of shade for coffee depends more on relative prices of coffee versus citrus fruits or plantains than on what would be termed agronomically optimal (max. yield/quality) for coffee. Another example concerns some of the more complex measures as the production of anaerobic bacteria cultures. Perhaps these should be produced by selected individuals instead of trying to transmit the same knowledge to all. The “Wider Lessons” piece commissioned by the Program and authored by Myriam Paredes and Catrin Meir clearly shows that there are large differences among farmers in terms of their broad strategies. As households face different land, labour and capital constraints, their choice of what measures they prefer to use will vary. Some households visited in field, buy organic fertilisers and engage in sericulture; either because they have access to migrant remittances, or have a general lack of available labour.

iv) **Crop orientation versus diversification and a household livelihood approach.** The Program started with a crop approach, and this is still visible in project design and implementation. Households adoption strategies and decision-making, however, are not made from gross margin assessments of each crop in isolation; but must be seen as complex action relating both to production and consumption needs as well as to external natural, socio-cultural and economic factors impacting upon the decision-making context (Coffee-prices, input prices, climate change, social institutions etc.). It could thus be that a broader household livelihood approach with more emphasis also on developing farmers entrepreneurial and economic skills would have given different Program practice, maybe more relevant and thus increasing participation rates and adoption rates, raising cost-efficiency

v) **Choice of specialists for training.** Good advice is always expensive. We find it difficult to assess if the best experts were chosen,

vi) **Choice of training groups**

It would have been very interesting to know if there are significant differences in adoption/adaptation rates for farmers depending on what organizations were involved in capacity-building activities with them. A rather casual impression from field visits could indicate that the cooperatives seems to function well; both as trainers, but also in terms of developing the products further; processing and generating licensing and marketing, thus improving the expropriation of value added of ecological products by farmers themselves. This leads us to ask whether the cost-efficiency in terms of quality of training, levels of participation, and adoption/adaptation rates by farmers could have been improved by a careful selection of participating organisations for the different crops and activities? If the idea was to test different organisations and be open, the Program could at least have conducted some kind of monitoring or assessment of their performance and the end results; numbers of participants and levels of implementations and income and food security increases. And from there, see what lessons were learnt in terms of which organisations that seem to be functioning best, also in terms of cost- efficiency. Better

targeting of training at all levels was also a main recommendation of the mid-term review and is also supported by the typology of trainers (tecnicos) developed in the Wider Lessons study by Myriam Paredes.

**Table 22. Types of training organisations involved in different small projects**

	NGO	Government	Cooperatives/ Farmers org.	Private extension service	Education	SUM
<b>Coffee</b>	118	112	<b>180</b>	156	0	576
<b>Vegetables</b>	84	51	8	<b>159</b>	14	316
<b>Maize</b>	0	<b>10</b>	0	11	1	22
<b>Beans</b>	22	<b>41</b>	16	31	2	112
<b>SUM</b>	224 (22%)	214 (21%)	204 (20%)	348 (35%)	17 (2%)	1026

Interestingly, the main implementer of small-scale projects seems to be the private extension enterprises (Table 22) although their volatility and instability is a well known feature of the institutional landscape in Central America. NGOs and cooperatives have around 20% each. Government bodies (INTA and others) have had around 21% of the small projects.

**vi) Increased co-ordination and economics of scale**

One focus of the Program has been on high quality and intensive interaction with farmers and rural support services in order to build capacity, create and strengthen networks. The main methodology is the “Zig-Zag”. There are two main strategies for increasing cost effectiveness in this respect, either to make the zig-zag process cheaper or to derive more benefits from it.

*Making it cheaper:* In some areas many institutional actors are working in the same places whereas in other places there is low presence of rural support services. The Program could have been more cost effective if there were more rationalization with regard to geographical coverage by institutions. For example, INTA has just transferred extensionists from Jicaro to Ocotol. These extensionists will be working with the same farmers as UNICAFE.

*Deriving more benefit from it:* Including more about social processes in capacity building for specialists and technical workers. Many farmers mentioned that organisations working with them helped them to make key contacts – examples included market linkages and services [designing a label for organic coffee in Costa Rica. The incidence of this kind of behaviour could be increased by creating an explicit topic in training on the role and importance of this kind of “informal” support.

**4.3.2.6. Summing up on cost efficiency**

In general, the Program has performed well, and there are substantial results to justify the use of the allocated funds. However, one could still ask if the project could have been more cost-efficient.

- Could more have been achieved by an early transfer of funds, responsibility and

implementation to lower levels of Program organization resulting in less use of expensive staff and organizations?

- Could more have been learned and utilized in CATIE-HQ by developing mechanisms for this at an earlier stage?
- Should there have been a clearer plan for research and dissemination, especially for international publication efforts?
- Should more have been done to differentiate between the pilot and the mass-implementation phases in terms of choice of organisations to work with, measures to work on, the diversification strategy and the economic dimensions of the interventions at farm level?
- Could more students have received degrees by allocating more funds to national level institutions instead of to CATIE-HQ?

#### **4.3.3 Economics of the IPM/AF options at the farm level**

*This section includes an assessment, based on available information, of the economic implications of the various innovations that has been promoted by the Program. This includes issues like what do farmers adopt in practice. Are the farm level suggested technologies economically viable? And to what extent do they more broadly contribute to improved economic livelihoods for people? Much of this is derived from the Annual report 2002-03. The section also includes an assessment of the publications themselves relative to making such assessments of the Program.*

##### *4.3.3.1. What do farmers adopt in practice in the Nicaraguan case?*

In Nicaragua the following changes are well documented at the farm level:

- The percentage of farmers using synthetic pesticides has dropped significantly; in coffee from 90% to 10-20%; for vegetables and food grains; from 95%, to 60-65%
- Farmers not been exposed to the training use on average 2-3 times more pesticides in vegetables than those who have been trained, and they use more toxic ones.
- 43% of farmers have less damage on crops than before and use 4 times more pest control options
- Farmers have increased numbers of soil and water conservation measures substantially; 2-3 times and the number trees planted for shade increased by 20-40%.
- The use of fermented manure has increased from 20-50%, fermented cow-dung from 10-80% and lime-sulphur mixture from 10-30%
- Number of crops/unit of land has increased by 30%
- 82% of farmers report crop yield increases. Coffee increased some 10%, tomato 10-13%, sweet pepper 25% .
- 96% of farmers refer to quality increases on their crops.
- The quality improvement is reflected in increased commodity prices for crops
- Yield increase are reported with increasing numbers of interventions
- Looking at relationship between the total number of interventions and incomes; the incomes increase 2-3 times for the different crops.
- The costs, in particular for labour also increases with increasing numbers of interventions;

- from 30-40% and up to more than 100% increase in production costs.
- Coffee prices have fallen so much that the gross incomes, even if yields go up, still has fallen over the project period. Incomes have still declined more for non-participants, even if there is scant documentation of this.

Similar results have been observed in the pilot projects in Trifinio and Costa Rica.

Program reports and our field visits have left us with a good impression of widespread adoption and evidence that farmers base their adoptions/adaptations on good ecological understanding and reasoning. Still, a crucial question concerns the economic viability of the interventions.

#### 4.3.3.2. *Are the farm level suggested technologies economically viable?*

It is not easy to assess whether the farm level options are economically viable as the prices for coffee and relative prices of inputs as well has changed in the same period, leading to substantial variations both in costs and incomes, that are independent of the yield changes.

In coffee, the yields levels have increased by as much as 10-25% not only for the coffee itself; but as the number of crops in the coffee fields have increased; total incomes from each area of coffee crop has increased even more leading to higher gross output values for the households. This influences both cash and subsistence incomes.

There is also the potentially higher price for an improved quality. For organic certified coffee and fair trade the price may be up to 50% higher and agro-ecological products for local markets fetch up to 20% more. However, these increases in gross income of households need to be examined in the light changes in costs at household level.

Although costs for synthetic fertilizers have gone down, the labour input has increased substantially (30-100%). The magnitude of this increase will partly depend on the prices used. Many but not all of the households may have low alternative value of labour. Many households reported to use much more hired labour than before - especially in Nicaragua.

We have not found good data that compares carefully the total incomes and costs for farmers with and without the adoption. Our feeling is that the farmers benefit economically from the adoption in terms of increased yields that comes at the price of increased family labour input. From an economic perspective, one could also argue that farmers would not do this, if they did not feel that it made economic sense. The proof of the pudding lies in the eating.

#### 4.3.3.3. *Do the innovations contribute to improved economic livelihoods for people?*

Taking the above argument further, the widespread adoption can be explained, both in economic terms but also because the diversification strategy has provided for broader food security. Diversification permits more freedom in the extent to which small-scale farmers participate in the market, in response to what they themselves on several occasions referred to as the insecure world of neoliberal markets. The increased labour needs have probably also improved the job market for landless labourers - in Nicaragua these may account for some 50% of the rural population.

#### *4.3.3.4. Assessment of economic studies in the Program*

Much of the available farm and crop level economic results are found in the Annual reports. There is also a study by Dumazert (2002) where some economic results are presented. The team has also been seen a PowerPoint presentation of some data derived from interviews with relevant actors participating in training and participatory evaluation sessions with groups of farmers. Some 2300 farmers have participated in this work.

Halfway through the Program a statistical study, a beneficiary assessment study, an organizational study and a communication study were carried out using both quantitative and qualitative methods. Several additional wider lessons studies were carried out on sociological, organisational and economic aspect and the Program carried out specific studies to understand and analyse the learning capacity of the partner organisations and their contribution to the environmental governance and innovation. During the last year base-line studies were carried out to map out systems of innovations in the areas where the Program has been active. Nevertheless, we are not sure whether there has been an explicit and conscious research strategy for the Program. We feel that what we have seen is rather scattered and not as well planned as should have been the case in a program run by a research and development institution such as CATIE. This could have been drawn extensively PhD. and M.Sc. theses and the co-operation system with Norway.

We would have liked to see more comprehensive socio-cultural and economic analysis by means of livelihood approaches and household economic modelling type thinking around the adoption processes. The singular crop approach that was the starting point in the Program, has given some rough gross margin assessments. They do, however, not take into account that the farmer is part of a family household with both consumption and production needs and that he/she is not necessarily running a business enterprise. It would in particular be interesting to see how the adoption/ adaptation patterns changed in response to the diversification strategy and AF measures.

A further problem with the existing data from an evaluation point of view is that one would like to compare:

- before and after for the same farmers; This would avoid a sample bias problem and would tell us about how and why the different types of households have made their choices
- groups with and without the training; especially to control for external crucial factors, such as coffee prices, input price changes and availability etc. so that the changes observed could be accrued to the implementation and no general problems facing agriculture.

Lastly, this is a pilot activity involving implementation of novel ideas in the field. In such undertakings, it is crucial that adoption and learning is documented and analysed, so that mass-implementation by relevant actors can be well informed.

#### **4.3.4 Results of the cost-benefit study and underlying assumptions**

*This section develops a short assessment of IPM in the context of social cost benefit analysis and the role of an extension system in this context. Secondly it gives an overview of the Nicaraguan study made by Waibel et al (2002), and lastly gives some suggestions to a more comprehensive approach to such an analysis.*

##### *4.3.4.1. Some basic comments on CB perspectives*

A social cost benefit analysis has the ambition to assess a program's total costs and benefits for a country. This implies that the several types of issues usually not considered in an ordinary economic analysis would also be considered.

These would include external effects not part of the decision-making rationale of involved actors (for example less pests also for adjacent farmers). It would also include economic effects of market imperfections or failures, and also aspects of missing information. In fact, economists could actually justify a public extension program by the very fact that particular actors have less than full or optimal amounts of information.

It would also include the production of several public goods. Public goods are goods that are not readily paid for in a market; but that still are profitable from an aggregate welfare point of view. A completely privatised extension system will not cater for a variety of such public goods. Waibel makes a point in his report that the role of a public extension system must cater for such public goods in at least four crucial areas:

- 1) Information on non-market goods such as public health and cultivation practices to protect ground water quality and other environmental resources*
- 2) Poor small-scale farmers and rural landless tenants, and women may not have sufficient access from private sources*
- 3) Information from private may be biased towards technologies that benefit the private supply industry; creating inefficient use of farm resources*
- 4) The public extension can provide public adult education elements in extension to improve literacy rates for poor illiterate farmers*

IPM programs are in this respect very relevant for a social CB analysis because they produce a number of public goods, reduce particular negative external effects and generate positive external effects.

##### *4.3.4.2. Some overall assumptions in the report*

The analysis looks specifically at the effects of the training component of the Program, and not the institutional learning and capacity building results. It studies the net benefit increase for the farmers involved in the Program. References to analyses of other aspects are mentioned, for example in an institutional study of organizations involved in the Program, and in the sociological study on farmers improved relationships with organisations. He strongly stresses the need to see these three works as complimentary.

A main point of departure for the analysis is that the Program's IPM measures must be viable on

farm level; and costs of implementation project must be justified by equivalent benefits for the society as a whole.

The lifetime of the project and its effects is assumed to be five years after the Program has ended. Waibel uses a social discount rate of 12%.

The analysis only considers IPM, leaving out adoption of measures related to water and soil conservation and diversification.

#### 4.3.4.3. Possible and included costs

1. The possible **farm costs** are assumed to be the time spent on training, the additional labour requirements of the new system, inputs etc. for preparing manure and pesticides and possibly land set aside for soil erosion measures.

The **actual included farm costs** are less; basically the time spent on training, and the increased labour requirements of the new system, inputs etc. for preparing manure and pesticides and possibly land set aside for soil erosion measures increased labour use are not included.

2. The possible **Program costs** are assumed to be organisation, financing and training of field staff, including salaries and transport. The development of the techniques etc. requires research and development costs. Administration, monitoring, control and dissemination costs are also important.

The **actual included Program costs** include those mentioned above; and the costs reflected in the two first phases, counterpart costs, CATIE costs, and farmers training courses. (See also the Table 23 below).

**Table 3.: Assumptions of projects costs and number of farmers in training**

Cost of project US\$	1989 - 1997	1998	1999	2000	2001	2002	2003	2004 - 2008
Field cost (implementation)		39,400	241,051	423,796	670,457	147,235	188,177	
Salaries, transport, office, advisory	386,944	296,700	350,000	303,134	382,891	291,938	224,383	
Labor cost in counterpart organizations and farmers			220,069	1,069,297	1,169,025	340,105	250,000	500,000
total program	386,944	336,100	811,120	1,796,200	2,222,373	779,278	662,560	500,000
Numbers of farmers								
Coffee			2,480	4,565	4,800	2138	2000	2000
food grains			414	911	1,171	499	500	500
vegetable			1,121	2,338	2,601	1130	1000	1000

**Table 23. Cost assumptions at farm and Program level**



4.3.4.4. *Possible and included benefits*

1. The possible **farm benefits** include “reduced costs” for pesticide and equipment, direct health benefits, increased yields, positive diversification effects in quantity and quality and less variance of income, and also less crop losses. In addition to direct effects also agro-biodiversity effects, effects for neighbouring farmers plots, less resistance problems, broader health issues. It could also include increased social and institutional capacity of farmers, making them more able to concert action towards marketing, certification etc.

The **included** benefits at farm level are basically increased yields for coffee and reduced costs for pesticide use calculated through a crop specific gross margin approach. No price increase is assumed for the coffee or for any other crop. For the other crops, vegetables and maize and beans, the only benefit assumed is reduced pesticide use. There is also an estimate of health costs (166 persons intoxicated/year and treatment costs, transport and loss of labour is included). The analysis only considers IPM for three crops, and not water and soil conservation adoption or the diversification measures.

Compared to all possible benefits, many benefits are omitted from the presented economic analysis.

2. The **possible national benefits** would be a general increase in national incomes (accounted for at farm level), lower pollution levels of water and food, improved biodiversity, improved social capacities at national, regional and local levels, improved livelihood of target groups, and lower levels of public health expenditures (partly accounted for at farm level).

None of these are included **as national benefits** in the analysis. Many of them are, however, discussed qualitatively in Chapter 5.

4.3.4.5. *Findings*

The findings indicate a positive net present value and an internal rate of return of 19.1%. The main benefit is the increased coffee yield.

The study underlines the data problems, and undertakes risk analyses to explore how important assumptions impact on the main conclusions; yield level, pesticide amount, coffee price and that the impacts of training effects are lowered; but the basic conclusion holds; that the project has a positive net present value.

The results are also analysed by means of a Monte Carlo type simulation model for four variables; yield, health, price and pesticide amount. The main finding is that for most outcomes the NPV is still positive; the probability for a negative NPV is 9% for the base scenario. The results are thus robust.

The profitability depends on the yield effect of coffee. It also depends on that the effects of training will endure over time. The longer it lasts, the higher net present value.

4.3.4.6. *Comments on the present analysis*

The report is well written and clear, and with balanced discussions about the crucial problems with lack of good, consistent data; and in particular sample bias. It also draws attention to the problem of working with data that is limited to studies before and after rather than with and without implementation. It is quite sober in conclusions and recommendations, and urges a much closer monitoring and registration system to allow for “the proper conduct of an economic analysis”.

Nonetheless, a more comprehensive or ambitious CB analysis could still be undertaken in the future. The author could use some of these insights, but our main task as per TOR is to give an overview of the findings and of the underlying assumptions (our comments should also be read bearing in mind the 5-6 hours available for reviewing and writing about this report).

The way the analysis has been framed; the quantitative part is an economic analysis of costs and incomes. There is no welfare economics attached to the valuations of costs and benefits; and the results therefore most likely will be a lower bound estimate of NPV.

The report claims to only look from a crop approach at coffee, beans and maize, and does not look at soil and water conservation, crop diversification and agroforestry measures. We believe that these have impacted the coffee yields used in the analysis and that the labour input in training includes these other items, so it becomes problematic when the benefits of these are not included. Still, it may have been difficult given the quality and availability of data.

The crop gross margin approach used in the analysis cannot capture household level economic rationale adequately as relative input constraints of different groups of households would form different optimal sets of adoption to the various measures. This is not meant as a practical critique of what has been done, as the access to information was not adequate to permit the capture of such issues.

In Table 24 we have assembled a list of issues and variables that could, if included, have influenced the results of the analysis. Most of them would add positively to the NPV and as such would enhance the strength of the presented conclusions.

We cannot comment upon these items in detail. But they constitute possible areas of research and investigation and could be included in a more comprehensive social cost benefit analysis of the project.

Some points made by Stonehouse 2003, can also be included concerning the broader benefits of the IPM interventions in terms of long term effects of farmers agro-ecological and managerial thinking on society. Also, the broader effects of the Program in terms of paradigm development and the institutional development of various actors at different levels within the Program is important to assess.

**Table 24. Factors impacting on cost and benefit estimates**

<b>Factor to consider</b>	<b>Anticipated impact on NPV*</b>
<b>Representativity</b> Sample bias of farmers; too large, productive farms relative to the average farms – assumes some 9.8mz/farm; (way too big?) -only looked at coffee and for some regions	- -/+ ?
<b>Time frame</b> for effects; most likely last longer than the 5 years assumed)	+
<b>Shadow prices;</b> - Using farm gate prices for coffee instead of world market prices may underestimate value - Using only traditional crop prices and not some percentage of organic/fair trade coffee may underestimate value	+ +
<b>High social discount rate</b> (gives lower total NPV when project has more long term benefits compared to costs)	+
<b>Omitted costs</b> - Increase farm operation labour costs (costs are most likely higher for all crops than what is assumed) - Include costs of implements for new techniques	- -
<b>Omitted benefits</b> - Cleaner and more water in general - Food safety for consumers - Food security for households -No yield increase assumed for beans and maize - Capacity and competence building of organisation at different levels - Diversification of crops (more crops and yields, improved diets) - Agroforestry techniques (more tree products, increased yields etc.) - Many subsistence income effects of diversification and AF) - Less water pollution from coffee effluents and manure - More work for poor target groups - Public adult education and literacy rates for poor farmers - Too low adoption rates?	+ + + + + + + + + +

\*(+ increases NPV and - decreases NPV)

#### 4.4. SUSTAINABILITY OF THE PROGRAM ACHIEVEMENTS

*This section investigates sustainability issues of the Program. We see sustainability in this context of if the positive effects of the Program continue after external support has been terminated. We have used policy, institutional, financial / economic, technological, socio-cultural/ gender, and environmental as sustainability elements. Sustainability of the Program achievements is also assessed at the level of farm families, at the level of support organisations (including farmer organisations) and at the level of organisational networks where deemed relevant.*

##### 4.4.1 Policy support and sustainability

The Program with its focus on agriculture, rural development, production increase, institutional development and with target groups on poor small-scale farmers are well in line with NORADs general goals on poverty alleviation and improved livelihoods.

The Program is also in line with national and regional policies on agricultural development in general. In practice, however, the lack of a widespread public – or even private extension system, lack of credits and support to small-scale farmers and the general neoliberal contraction of the state policies, limit institutional anchoring of the Program, and constrain the potential for widespread success inherent in the Program's basic ideas. The future for small-scale farmers in the countries, especially with the expected free-trade agreements; is also uncertain, constituting a threat to some of the elements of the Program. However, the diversification approach and the emphasis on agroforestry with citrus fruits and other crops; may constitute some viable protection for small-scale farmers not able to compete in globalise - and subsidized markets.

Some evidence of the Nicaraguan government's willingness to introduce complimentary policies is embodied in interventions supported by the World Bank and FUNICA, and through INTA and the Pasa Danida program. These programs however, have a rather different approach than the IPM/AF Program; and in the sustainability context are not compatible with the basic approaches found in this Program. From a donor perspective, one should seek clarifications about possible harmonization of these initiatives; as we believe that the IPM/AF Program has **much** to offer to more traditional extension approaches.

The team has not had time to look closer at the PRSP strategies of Nicaragua or the other countries; but it must be stated that the IPM philosophy should fit well with the PRSP intentions.

As commented upon earlier, a problem of the Program is that it has bypassed the management level of central government agencies and worked directly through regional groups. On the other hand government agencies have been actively in these; for example in Nicaragua INTA has played the leadership role in 4 out of 5 regional groups. This circumvention, especially in the mass implementation phase, has led to a problematic relationship for future initiatives, and much depends on to what extent INTA and FUNICA may be willing to work with the ideas- and even with the national staff of the Program.

At lower levels of governance, and in the civil society, we have felt and seen that the Program enjoys substantial support, also when it comes to INTA and MAGFOR at regional levels. There seems to have been little contact in general with local levels of governance- at municipality levels and we are not sure how relevant that could have been. The support from local groups is strong; NGOs, private business groups, cooperatives and also local government agencies. We have asked about the role for farmers groups and unions and it seems as if this could have been stronger. We met with UNAG in several regions, and they were represented in some of the regional groups, but they would not, for some reason, execute the small-scale projects on their own. The Program ideas fit well with local cooperatives in particular.

Concerning human rights and democratisation; it must be stated that the Program's profile of educating farmers, the ecological reasoning and the emerging perspectives on commercialisation efforts, empowerment of farmers and the different local groups is very much in line with broad human rights perspectives.

#### 4.4.2 Institutional sustainability

*Institutional sustainability can be analysed at different levels; for CATIE-HQ, for the Program itself; for the regional groups and their different member organisations and for farmers groups.*

**For CATIE**, the institutional sustainability will depend on how much learning there has been; and especially on how much CATIE has benefited from the experience of the Program; both in terms of the pilot activities; but also in terms of operating a program of mass implementation. What is the sustainability of these experiences?

In our view; CATIE has been better at the first than at the second. The development of novel and well-founded pilot ideas has been exemplary, while the mass implementation, as discussed in several places in this report, could have been better, especially relative to the institutional anchoring. The sustainability of the Program itself upon donor withdrawal is highly uncertain. CATIE-HQ's capacity for learning from the Program and thus the institutional sustainability of the different interventions, ideas, principles, methodologies of participatory implementation and monitoring seems to be stronger; even though it is clear that more and better mechanisms to secure more learning could have been sought including more field research carried out by CATIE-HQ staff and, MSc and PhD students. The Program and its staff, however, are facing an uncertain future.

**Institutional sustainability for the Program:** It constitutes a major problem that no clear national anchoring has been found for the Program upon its completion, and that it has been difficult to clarify rights and responsibilities of the different actors; in particular the relationship between CATIE-HQ, the national CATIE office and INTA, FUNICA and MAGFOR. If NORAD can coordinate and resolve this issue, the prospects for sustaining the fruitful ideas of the Program would be improved.

**Sustainability of regional networks:** The critical question here is “what is the capacity among the organisational networks developed through the project for supporting future IPM/AF programs?”

The Program has left a legacy of regional networks that have the organisational, technical and methodological capacity to contribute to the implementation of future IPM/AF programs and to develop a broader focus beyond this. However, the ending of the Program has led to reduced activities among these, suggesting that the process of their consolidation is far from complete.

The institutions involved express interest in continuing with the process of implementation of IPM/AF but they are limited by lack of financial resources. In addition, the departure of the Program has left a leadership vacuum that needs to be filled in order to promote further development and consolidation of these. This role could be undertaken for example by the National IPM Committee, which is made up of representatives of a diversity of national organisations and which played an important role in the development of the networks during the life of the project.

Many organisations (universities, farmer associations, NGOs, government organisations) have

institutionalised the methods and approaches of CATIE-IPM/AF that were disseminated through the institutional networks and these are actually being implemented. Networks have thus been created but not consolidated. They were dependent on resources from the project and have become less active and effective, as the project has pulled back. Because of their importance, a follow-up to consolidate them is critical.

There are strong debates in Nicaragua on the organisational structure, economic resources (source, management, priorities), membership, legal status etc. All but one group are led by local INTA's. PASA-Danida II is supposed to strengthen these networks but there is concern about INTA's role and capacity in bringing this about. The PD II proposal was formulated by the National IPM Committee with the intention that it would strengthen these groups, but there has been concern about INTA's management, specifically about congruence of goals with implementation. There is a mutual lack of coordination of between the National IPM Committee and INTA and also a concern about transparency. At the same time there is a desire on the part of both UNA and INTA to lead the National IPM Committee.

There is also an underlying tension deriving from a difference between the National IPM Committee and INTA regarding the role of pesticides in sustainable agriculture. The Committee's generally held viewpoint (which is shared by UNA) is that alternatives should be sought to pesticide use. The university enjoys prestige and respect from other members of the Committee.

In contrast INTA's view is geared towards a safe use approach. INTA is subject to the political changes, which accompany regime changes. This can lead to internal contradictions in priorities for example the simultaneous implementation of *Libra por Libra* with the strong collaboration that INTA has had with the IPM/AF project.

So, in principle, INTA would be a strong ally and an actor in the field to secure the ideas and experiences of the Program; but much will depend on its ability and willingness to move in the direction that the Program has pointed out.

**Sustainability at the level of support organisations;** What is the capacity among the support organisations (including farmer organisations) to spread project approaches to other farmers groups after the project is terminated (Nicaragua and pilot zones)?

The project has focused on production aspects of key farming systems. In the future it will be necessary to integrate other links in the production to consumption chain. This will require the commitment of organisations that can provide support and follow-up to the lessons learned and capacities developed. In developing this wider focus on the whole production chain it will be important to select entry points carefully; for example the greater level of organisation of coffee producers favours the development of a production-to-consumption focus more than is the case in vegetable crops like tomato or potato.

Overall support organisations will continue to spread these approaches, but institutional instability, staff turnover and unfavourable policy environments such as the privatisation of extension, the lack of credit, pesticide and trade policies limit them. (E.g. confluence of

ecological disaster of spread of soil diseases coincided with free trade dumping of cheap potatoes from Guatemala.

There is also an important difference between crops and the organisational strength of support groups. The coffee organisations are much stronger than for vegetables. Promoting associations of vegetable growers is crucial and it seems pointless to continue to promote IPM without building and developing organisations. Coffee also offers many market niches and the project worked more in coffee. UNICAFE had already generated a large knowledge base about coffee so the starting point is higher.

**Farmer's levels:** Some key questions related to sustainability at the level of farm families include the following:

- Do farmers keep using the technologies?
- Do they continue to work in groups?
- Do they continue to experiment and to use ecological reasoning?

The innovations generated with the involved farmers seem robust and sustainable especially in coffee. Plantains could go the way of coffee, but the sustainability of the work in vegetable and basic grains is lower.

The spread of approaches by farmers groups at the local level to new *groups* of farmers may be less certain. Farmer-to-farmer dissemination is widely recognized as the most robust mechanism for the spread of innovation. Exchange visits, forums etc are recognized as ways to accelerate the spread of innovations, but this is resource dependent.

There is no doubt that many of the singular innovation presented at farm level will spread, but it is more dubious if the whole idea of ecological reasoning can be developed through farm to farm approaches or if that would require more “professional guidance”.

**Institutional sustainability:** The Program has successfully strengthened certain capacities in rural families to maintain and spread IPM/AF approaches, however the extent to which this will happen after the Program ends will depend on the level of local organisation and the support of key institutions.

After the Program ends it is critical that a certain level of follow-up is maintained with farm families who have been involved in order to maintain and reinforce the ecological reasoning, to support the ongoing processes of experimentation and analysis and further diffusion of these. Without follow-up there is the risk that that the learning that has occurred will remain at the level of individuals or families or at best within small groups of farmers.

#### 4.4.3 Economic sustainability of the Program

Economic sustainability refers to: the financial sustainability of the Program upon donor withdrawal, the cost efficiency of the Program and its various components; the extent to which

the Program has a positive cost-benefit profile and the extent to which the Program and its components has particular vulnerable conditions or assumptions

*4.4.3.1. Financial sustainability of the Program upon donor withdrawal*

The **Program** will have no funds if NORAD withdraws and sustainability in this sense assumes the entry of a new donor or that government would be willing to take over the Program as it is today. The latter is hardly likely. The former is quite uncertain.

The Program, with its key target groups, cannot be expected to be sustainable in the sense that CATIE and the national groups and specialist groups will follow up this without external support of some kind. At present, by completion of the project, this does not seem to be the case. This is deplorable.

The **different facilitation groups** will neither be able to continue their activities without funds. Funds may primarily be available through donors, and through various government schemes. But this must be said to be rather unpredictable and erratic, and will not generate a stable- and thus-sustainable environment for long-term collaboration between the groups and the farmers. An alternative is that training and follow-up of different groups can continue through payment from farmers. This is not likely with the present target group of small-scale resource poor farmers. One exception could be some of the co-operatives that may be able through membership contributions to build structures where training and facilitation can continue.

Many of the **farm level** measures; on crop diversification, on agroforestry, on soil and water conservation and IPM have proved to be economically profitable under the prevalent conditions, and farmers use them. Adoption and adaptation rates are quite high for many of the activities, and indication of their sustainability. They are furthermore labour intensive rather than capital intensive, which also is positive from a sustainability point of view.

An aspect in this direction is also the project emphasis on developing farmers' ecological reasoning. This makes the adoptions and farmers' adaptation of these more flexible in time and space; a feature that will strengthen the adoptions' robustness in hard times. Obviously, much of the value of the Program hinges on that farmers maintain both practices and abilities to adapt dynamically to changes such as in prices, market options etc.

Following this, it would have been an advantage if the emphasis in training of farmer also had focused more on economic ("empresarial") reasoning; which obviously would benefit economic sustainability of the interventions, but also of rural livelihoods in general.

*4.4.3.2. Cost-efficiency and economic sustainability*

During the mass-implementation stage of the Program, one would expect to see progressively more responsibility transferred to lower levels of the Program to cut costs and improve the possibility for economic sustainability.

The goal of CATIE's learning process, has been discussed several places, and has also implications for economic sustainability. If CATIE can capitalize economically on the



experiences and innovations developed through the Program through improved learning; this would enhance the economic long term sustainability of the Program for CATIE (in terms of better reputation, better future results, more support).

The lack of a coherent publication plan, low cost-effectiveness related in particular to international publications, reduces the economic sustainability of the Program. Securing that all suggested farm interventions are economically cost-effective, will also improve the overall Program's economic sustainability.

The selection of which groups to include in the training of farmers should have been monitored and evaluated so to identify the most efficient groups. This could also have improved adoption rates, and secured the economic sustainability of the Program.

#### *4.4.3.3 The cost-benefit profile and economic sustainability*

The Program is very clearly economically sustainable when assessing all social costs and benefits. The various interventions are also clearly profitable for the farmers and as such they are also economically sustainable. This is also shown by Waibel et al (2002), but we believe that his figures represent a very low estimate of the NPV, and that the project is much more economically profitable- and sustainable- than he estimates.

On a variety of issues we feel that he underestimates the economic benefits, both factors that could rather easily be quantified, and also several important factors, that would require more investigations. Unfortunately, and to defend Waibel, the data material is erratic and difficult to use, and even more so two years ago than today.

Factors that could have given an even higher level of economic profitability would include; the inclusion of water and soil measures and diversification; with the increased yields and number of crops it would encompass. He has also assumed a rather short-term effect of the interventions and a rather high discount rate. The use of only traditional crop prices and not some percentage of organic/fair trade coffee underestimates both realized and potential values. There are furthermore many public goods, such as cleaner and more water in general, improved food safety for consumers and improved food security and work for poor households. Improved capacity and competence of rural development organisations at different levels is also a public good. All these factors point in a direction of economic sustainability of Program activities for the future.

#### *4.4.3.4. Economic sustainability and key assumptions*

The most important single challenge for economic sustainability in the Program is that the superstructure disappears without a donor. Ideas and some activities may continue at lower levels but crucially depend on external support.

The best issue seems to be that many of the activities at farm level are economically sustainable, and with the farmers improved abilities for ecological reasoning and the acceptance and understanding of the measures, it seems to be economically sustainable.

An advantage for the Program has actually been the drop in coffee prices and the relative rise in

pesticide prices. The Program's interventions imply lower capital input costs and higher degree of labour use; which is compatible with these macroeconomic bearings. If, however, prices on coffee increases again; and pesticide prices fall; one may see that the strategies become somewhat less economically interesting, at least for some groups of rural households. But the main message is that the farm level intervention seems to be robust also from an economic sustainability point of view.

#### **4.4.4 Technological sustainability**

The majority of the suggested interventions are found to be well adjusted to farm levels abilities and needs and are broadly adopted by participants as shown in section 4.2 and 4.3. A major reason for this is the way innovations have been developed together with farmers, and thus tested for significance and relevance.

The technologies do not require much external investment, inputs and costs. Although they demand high labour input, they are on the whole well suited for the small-scale farmers in question, and may actually provide an innovation that makes small-scale farmers have a comparative advantage here compared to more commercial farmers; in particular relative to the entry of high price; fair trade or organic price markets.

The innovations and the ecological reasoning are generally in line with "good agronomic principles" and farmer's way of life and way of understanding the world.

The Program's focus on ecological reasoning and the emerging perspectives on "empresarial" or enterprise reasoning, is also an important item to facilitate not only the technological sustainability of the presented innovation, but the approach has also facilitated an innovative capacity of the farmers that goes well with a dynamic sustainability for the farmers.

There are also interesting differences in how different groups of farmers - and for different crops- are able to utilize the innovations; On the ecological side there is no equivalent in coffee to the problem of whitefly in vegetables. Likewise potato cultivation was wiped out by the massive importation of potatoes from Guatemala as a result of regional market liberalization. The perennial nature of coffee permits much more opportunity for experimentation. Management of vegetables requires much more precision; production costs are much higher, production is much more risky, products are more perishable, and markets are much more volatile. The coffee group is more advanced than the other groups in this respect and do show to be both adopting more technologies and also be more innovative. The type of crops, the type of challenge- and external factors thus has bearings on the technological sustainability of particular interventions.

#### **4.4.5 Socio-cultural and gender sustainability**

The Program has approached small-scale, poor farmers. They have not had a strong gender focus, nor have they done much to explicitly include landless workers and tenants. Apart from that, the targeted farmers represent a poor segment of society and as such the poverty focus of the Program is good.

The interventions also generally imply higher incomes and more labour use, both which benefit

both tenants and landless workers.

The people are poor and it is dubious that they will be able or willing to spend much money on purchasing the services rendered. However, there is one important exception to this. Many co-operative farmers are willing to pay for producing certified organic coffee, and with a price difference from 43 to 105 USD/bag, this is not surprising. It is an important lesson also for other crops; relative to fair trade, organic crop registration and also to local markets; as for example in Costa Rica where they reported that local people would be willing to pay as much as 20% more for organically produced vegetables- in the local markets.

As in the rest of the world, there are tensions between traditional agriculturalists and the alternative, organic farming congregations. These tensions will be mirrored in differences among donors, specialists, the regional groups, and even at community levels between farmers. Again, the results over time at farm level will in the final instance, determine the technological sustainability of the various interventions.

We did not get much evidence of that this has created much problems at local level; but we have observed that these types of difference are more dominant between institutions at national levels. It is also obvious that the crash in coffee markets and cuts in subsidies for pesticides has heavily favoured the technology and made it both economically and technically more interesting and acceptable for proponents of different schools of thought in this respect.

#### **4.4.6 Environmental sustainability**

This is an environmental program and as such it both ought to be and definitely is sustainable and environmentally sound. The field visits really gave positive impressions of the interventions and also proof of the ecological reasoning and understanding among farmers that is striking, even for tired and experienced consultants.

The interventions also involve a positive utilization of local farm resources that otherwise may go to waste, such as the explicit use of manure, of litter and of coffee affluents in soil and water conservation and for production of compost and organic fertilizers of various types. This, combined with the agroforestry elements providing more trees and ground cover also generates positive external effects in terms of more water to the watersheds and improved local climates. In terms of economic values; water regeneration and quality improvements often prove to be the highest single value derived from biodiversity enhancement activities.

The results concerning reduced pesticide use, is also in line with Nicaraguan policies on safe and appropriate pesticide use- even beyond the official goals.

The health related risks are greatly reduced. However, one could discuss potential health related hazards related to the production of some of the biological fungicides and how well people appreciate potential risks here.

The general improvement of crop production in quality and quantity and the diversification with more types of vegetables, fruits etc, also forms a positive precondition for improvements in

nutritional status and general health and well-being.

It is clear that the approach used by the Program has particular assets that will not be catered for by more traditional extension “Training and Visit” approaches and a focus on safe pesticide use instead of the integrated approaches of the reviewed project. As such- it becomes important to see how also donors may influence the processes around IPM in the future.

#### **4.5. APPRAISAL OF THREE PROPOSALS RELATED TO THE BASELINE STUDIES**

*In this section we give a very brief overview of the plans for proposed future programs. We then give a brief assessment of some key components and offer some general conclusions/recommendations.*

##### **4.5.1 Presentation of the proposals**

There is, unfortunately, no single coherent program document to assess, and no documentation of the vegetable component, except for a power-point presentation with many pictures! We have two draft proposals; one for coffee growing highlands in Nicaragua and Honduras and one for drought prone areas

There is also a proposal from 2002 for a baseline study that has been carried out, where four project elements are planned. The two other project components mentioned are the vegetable/pesticide reduction project and a coffee growing project in the Caribbean. This latter has not presented to us. There are thus three different components of the proposal that we address.

In a final document we would assume that there will be a more comprehensive presentation of a joint approach, and not least also a program design, with both presentations of overall goals, objectives and outputs and with some bearing and novel principles. We also assume that there will be presentation of the program’s organisational design and distribution and allocation of powers, authorities and funds to different levels of the program design. This is not clear at present.

We were given a brief power-point presentation, to which we refer briefly before commenting on the three sub-components.

**Project name;** Multi-sector strategies to strengthen the capacity of farm households and grower organisations to innovate under ecological and economic uncertainty.

##### **Three problems of regional importance;**

- Production and marketing of quality products to revitalize the economy of the coffee growing highlands
- Increasing the resilience of communities affected by drought, climate change and

- globalizing markets
- Extreme use of pesticides in vegetable production affects environment and health of producers and consumers

#### **Conceptual progression**

- From participatory implementation to Innovation capacity
- From Multi-institutional groups to Multi-sectorial forums
- Integrating Ecological reasoning with Rural Business Development
- From widespread implementation to Strategic partners and Locations

The development of proposals is based on the baseline studies and investigations and according to our judgment involved exemplary participatory approaches and consultation with key institutions and actors in the different areas for the three components. Out of these consultations one has developed sets of priorities and selected outputs that is reflected in the final proposals.

The overall program seems to be planned with a design similar to what is there today; and requests a total of 4.6.Million USD for the three components over a five-year period.

#### **4.5.2 Presentation of the three components**

Component 1. Production and marketing of quality products to revitalize the economy of the coffee growing highlands

The key findings from the baseline study identify the following issues;

- Need to unite sectors to form value chain working groups that facilitate the recognition of quality along supply chain
- Strengthen organisational and business capacity of co-operatives and business service providers
- Potential to apply lessons for developing a quality coffee market in Segovia's to other regions and other crops

This component requests 2 million USD over 5 years. Concerns over central staff, the CATIE model etc. are taken up below under the program appraisal. For this particular component we recommend to employ also national staff with rural business/co-operative competence and experiences.

We also recommend that the IPM component should not be forgotten when trying to introduce the empresarial approach. Many of the new ideas fundamentally depend on competent training and execution of the IPM/AF elements.

We believe that the new sets of principles are novel, exiting and very relevant from NORAD/donor perspectives' point of view.

The farming system approach is interesting, but it should also be more closely linked to

household economic perspectives. And from experience; many interventions or advice that may be ecologically or agronomically wise, may not be economically sound; and CATIE HQ should make some assessment of where in particular such “conflicts may arise” prior to field interventions.

The rural business development thinking is sound and definitely important; one could may be ponder also about other types of farm level further processing possibilities; not only for coffee but also in a broader context; farm products.

The proposal lacks a clearer approach on institutional design, especially on national institutional public anchoring of the activities. Could a more explicit and binding focus on existing or dormant co-operatives be considered?

There is a lack of clarity over whether this is purely a pilot and demonstration activity or whether there is some element of mass implementation: if the latter is the case, then one should consider our previous comments on national institutional anchoring prior to any such move.

Also if it is a pilot scheme; then one must set as a precondition that rigorous scientific AND participatory monitoring and evaluation component are executed. We are then talking about studies before and after implementation; and also control groups without implementation. A publication plan should be made quite early for this. The same comments as made for the Program about CATIE HQ’s responsibilities as a regional manager of joint knowledge and experience generation cannot be emphasized too strongly. The new approaches could imply a need to strengthen CATIE-HQ relative capacities in the “empresarial areas”.

The particular role of share croppers, tenants and landless workers should also explicitly be dealt with in a final proposal.

Component 2. Increasing the resilience of communities affected by drought, climate change and globalizing markets

The key findings from the baseline study identify the following issues;

- -Multisectorial coordination to develop effective strategies to confront drought and climate change
- -Significant advances in implementation of conservation practices on farm, but crop losses in 5 out of 10 last years
- Poor business capacity to transform and sell products among producers’ organisations and service providers

This component requests 0.6 million USD over 5 years. It involves dryland agriculture in two countries; Nicaragua and Honduras. These are dry and poor areas. Frequently receiving food aid and malnutrition is common. As such the types of interventions are quite different from what have been implemented in the other projects and Phase III. There are different type of products in the different case study areas; vegetables, beans, maize, cashew, sesame, fruits, in addition to

livestock, pigs and some cattle. These areas are quite different from what the team has visited and comments are thus made from a purely desk point of view.

It is important to stress the need to develop particular IPM component in these dry areas. And also see these in combination with the empresarial approaches. Even here, the new ideas fundamentally depend on competent training and execution of the IPM/AF elements.

Again, farming system approaches should also be linked to household economic perspectives.

The rural business development thinking is sound and definitely important; one could also ponder about other types of farm level further processing possibilities; not only for the present single cash crop but also in a broader context; farm products.

We also here lack a clearer approach on institutional design, especially on national institutional public anchoring of the activities. Could a more explicit and binding focus on existing or dormant co-operatives be considered for these farmers also?

If it is a pilot scheme; then one must set as a precondition also for this component that a proper; **both** scientific and also participatory monitoring and evaluation component is executed.

The particular role of share croppers, tenants and landless workers should also explicitly be dealt with in a final proposal.

Component 3. Extreme use of pesticides in vegetable production affects environment and health of producers and consumers

The key findings from the baseline study identify the following issues;

- Local concerns over environmental contamination, lack of government recognition of problem
- Identification of supply chain from Guatemala and Honduras to El Salvador, but little recognition of healthy products
- Need to supply healthy vegetables to local as well as urban populations

This component requests 1.8 million US\$ over 5 years. It involves vegetable growers in three countries; El Salvador, Honduras and Guatemala. We cannot say much more as the documentation is not available. But we would assume that many of the general comments made are also relevant for this project.

#### **4.5.3 Overall assessments of components**

In general, any recommendations are difficult as the proposals are not yet ready and combined under a coherent program design. This should be done prior to further scrutiny. The following are a few general recommendations that may be considered during further elaboration of the proposals.

We are in general positive to very good ideas, novel strategies and approaches, and also to the

exemplary way the Program has developed these in close contact with collaborative partners.

- The farming system approach is interesting, but it should also be more closely linked to household economic perspectives. And from experience; many interventions or advice that may be ecologically or agronomically wise, may not be economically sound; and CATIE HQ should make some assessment of where in particular such “conflicts may arise” prior to field interventions.
- The rural business development thinking is sound and definitely important; one could also ponder about other types of farm level further processing possibilities; not only for coffee but also in a broader context; farm products.

The program is definitely relevant from a poverty focus, from an environmental point of view and from an agricultural production point of view. However we recommend looking into the particular role of sharecroppers, tenants and landless workers should also explicitly be dealt with in a final proposal.

Concerning program design, there is a need for a proper national institutional anchoring. This should be a precondition for support; what are the strategic national public actors? –Could it be possible to develop a document also based on the Phase III experiences on the relative strength and weakness of collaborative partners also based on their results from Phase III?

In relation to this, there is also a need to try and think less of CATIE more of national institution for this program; both concerning budget allocations, but also in planning and execution of the program. It must be possible.

We recommend employing also national staff with rural business/co-operative competence and experiences.

There is a lack of clarity over if this is to be a purely pilot and demonstration activity or is there some element of mass implementation: if the latter is the case, then one should consider our previous comments on national institutional anchoring prior to any such move.

One must take more fully into account the meaning of a pilot and demonstration activity; to allow for continuous innovations and changes, and to document properly the experiences through an explicit research strategy made in cooperation with CATIE HQ. CATIE HQ’s responsibilities as a regional manager of joint knowledge and experience generation cannot be emphasized too strongly. The new approaches could imply a need to strengthen CATIE HQ relative capacities in the “empresarial areas”.

One should also develop a more comprehensive thinking of developing local partners as organisations in their own right; and not only focus the development of the institutions instrumentally for the particular items that the projects promote; see rural organisations as both objects and subjects for development!



### Further Recommendations

- Develop the program more fully and make a consolidated proposal
- Clearer organisational design is necessary for the program
- Improve the LFA format
- Develop a better description of the study areas

## **5. RECOMMENDATIONS**

*Our main recommendations relate to issues of design, sustainability and paradigm change. Many of the design issues are also ultimately sustainability issues. No major issues regarding the effectiveness of the Program emerged, which is not surprising given the high degree to which the Program has fulfilled its objectives.*

### **5.1 DESIGN**

#### Overall Program focus and positioning

With respect to the over all orientation of the Program the focus on IPM/AF was both a help and a hindrance. IPM and Agroforestry were excellent entry points for working with farmers, but at the same time these were limited because livelihood issues such as commercialisation and marketing were of much greater priority for many farmers. Ironically the crop-related focus meant that the Program could only make a partial, albeit highly important response to the opportunity offered by the coffee crisis and Central America's (contentious) participation in free trade negotiations. The Program's emphasis on diversification and lowering production costs enabled many farmers to maintain food security and to ride out the crisis; however it is clear that future initiatives aimed at sustainable livelihoods for rural families must expand the focus on ecological reasoning to include economic and empresarial reasoning. This implies a need to develop much more capacity for working with farmers and national support networks on market and commercialisation issues and on creating the levels of individual, community and rural organisation that are a prerequisites for poor farmers to be able to commercialise successfully.

The Program created a "beacon" or "lighthouse" experience that shows a way forward. The relatively large coverage of farmers and national organisations achieved has been instrumental in convincing many people of the importance and feasibility of the approaches for application on a massive scale. At the same time, the Program could have created an even stronger beacon had it focused more on working with organised groups of farmers and developing strategies for promoting and strengthening farmer organisations. This should have been explicitly included in the Program design and should be an important consideration in the design of future programs.

The positioning of the Program as a widespread implementer of IPM and agroforestry approaches created some unrealistic expectations and led to some lost opportunities. By positioning itself as a "widespread implementer" the IPM/AF Program raised expectations of massive implementation of IPM/AF by many and led to concerns that it was impinging on "national territory" by others.

In retrospect the Program's intention appeared to be that of working at a scale significantly larger than that of most pilot programs, but one that still fell short of massive implementation. The focus should have been more clearly articulated as one of creating a pilot experience with a relatively wide scope of coverage. If this had been the case, the Program would have been designed differently and as a consequence more attention could have been paid earlier to problematic issues such as the Program's integration within CATIE-HQ and its relationship with decision-makers in Nicaragua. In the future CATIE-HQ should continue the creation of beacons such as the IPM/AF Program via its outreach programs but at the same time it should give careful consideration to how it positions these programs. It has a special niche as regional organisation and should be especially carefully to avoid situations that put it in a position of competing with or supplanting the role of national organisations. CATIE-HQ and its outreach programs should also be constantly mindful of the importance of recognizing the contributions of counterpart organisations.

### Actors

Given CATIE-HQs mission to contribute to improving the well being of rural people in the region, the Program's focus on poor smallholder farmers was highly appropriate, but some important target groups, such as landless, rural labourers and sharecroppers were missing in project design. Follow up initiatives should include work with such poorest-of-the-poor groups, but IPM/AF may not be an appropriate entry point here; the strategy should instead be to help them organise so that rural development programs can work with them more effectively.

On a related note, organisation, connectivity, associativeness, social capital is critical for the take off of programs such as CATIE IPM/AF. With this in mind, future initiatives should consider entry points more carefully. When the target groups are not well organised, capacity building would be better directed at creating capacity to organise first before other interventions are attempted.

The gender focus of the Program was limited and subsumed under the family focus. Gender needs to be incorporated more broadly in follow-up initiatives. It should not be limited to the collection of disaggregated data and inviting women to participate in capacity building and experiential learning. Gender issues should be considered and appropriate strategies developed at every stage of the project cycle

The cost efficiency of the Program would have been favoured by better analysis of the strengths, weaknesses, characteristics and needs of different partners, leading to more targeted selection. The Program approached capacity building of farmers and extensionists as if both groups were homogenous, however the experience of the Program clearly shows that this is not the case. Follow-up to this Program should identify and respond to the differentiated needs of farmers and other targeted groups. Capacity –building activities need to be designed so that they cater for the needs of different groups, which have different capacities and needs.

Likewise, the Program would have been strengthened by creating many more links to other sectors; especially to education and health. These links would have helped to multiply the impacts of the Program and to increase its cost efficiency and the sustainability of its

achievements. Some efforts were made towards the end of the third phase, but these were too little and too late. Follow-up initiatives should involve actors from the health and education sectors.

Given the Program's perspective on innovation as a social learning process much more effort should have been placed not just on stimulating innovation by imparting ecological reasoning skills to farmers, but also on actively promoting local innovation through an array of farmer to farmer strategies. At the same time focusing on promotion of local innovation would have required the development of much closer relationships with organisations that have extensive farmer networks such as ATC and PCaC and UNAG. These gaps should be addressed in future initiatives.

The cost –benefit profile of the Program is highly sensitive to the degree to which it is able to multiply its impacts through as many learning channels as possible. A principle one is CATIE-HQ itself. Midway through the third phase of the Program NORAD was very concerned about the degree to which the Program and CATIE-HQ have engaged in mutual learning. This led to the identification of a major design gap in the Program in terms of its connectivity with CATIE-HQ. In designing future outreach programs, CATIE-HQ should consider more carefully the balance between providing autonomy which is necessary for creativity, and the need to internalise lessons from them as well as to ensure ample opportunities for contributions from a broader range of students and staff.

## **5.2 SUSTAINABILITY**

Consolidation of the networks facilitated by the Program is necessary and critical. Continued support is required to provide future facilitation, motivation and social glue; but this process of consolidation needs to be led by national actors. The evaluation mission considers this so important that we have prepared an in depth analysis of scenarios for carrying this out (see section 5.3). The networks are an invaluable public good and if there is absence of national resources to support these, NORAD should consider continued funding and/or leveraging support from other donors. At the same time in designing future outreach programs CATIE-HQ should pay much more attention to issues such as consolidation and nationalization of the capacity to lead and manage these. Given its objective of fomenting institutional learning and building national capacity the design of the Program was overly centralised in favour of CATIE. The design of the Program should have been centred in anchoring the Program in a national organisation.

In the opinion of the evaluation mission the knowledge management strategy of the Program is could have been much better developed. It could have been based on a local-to-global framework with specific attention to different types of audiences across this range. The strength of the Program's information strategy lay in developing materials for the capacity building process involving farmers, extensionists and specialists, but the Program was much weaker at developing information suitable for mass communication to farmers or to the international research and development community. Mass communication of Program experiences and results and

projection of the results beyond Central America both need immediate attention in follow-up plans for this Program. This projection should include scientific audiences and the development community as a key targets

Much more needs to be done to develop national policies favourable to IPM, organic and ecological agriculture and to harmonize program initiatives in the agricultural sector in Nicaragua (and the other countries) so that they are aligned with the production of products that are "clean" both in terms of the environment and human health.

Considering that the National IPM Committee is a national organization that brings together under its umbrella many institutions that implement IPM-AF in the country and that they are also well known on a nationwide scale, they should become promoters of the lessons learned through the Program. Some specific aspects to be considered would be:

- Greater pro-activity on the part of the National IPM Committee in the elaboration of proposals of policies favouring "clean" production, which should be targeted to normative authorities such as MAGFOR, MARENA, MINSA.
- The lessons learned, above all with respect to the non-chemical alternatives for pest management that are already known in the country, should be documented for their consolidation and mass dissemination throughout the country.
- This work on the use of pesticides and their consequences in the short, mid- and long term should be done at the different levels of education (basic and secondary), primarily in the rural areas.
- The National IPM Committee has been involved in the analysis and discussion of the new "dirty dozen," primarily in the search for alternatives in order to promote the prohibition of these products involved in poisoning, environmental damage, etc., as is the case of methamidophos, paraquat, endosulfan, etc.
- The National IPM Committee should promote greater nationwide efforts, together with other organizations that work in this field in the country, in order to present viable proposals seeking cleaner and safer production.

#### Paradigm change

The Program tried to bring about a paradigm change at all levels (decision-makers, specialists, extensionists and farmers), which amounts to bringing about new ways of thinking by these actors. Its strategy for accomplishing this was aimed at reorientation of the prevailing linear transfer of technology model, which is based on the assumption that rural innovations emanate from a central source, generally considered to be formal research. The reorientation favours a more holistic approach that recognizes and works with the multiple actors who contribute to the process of rural innovation, and with the contextual factors (e.g. policy, climate change, globalisation, institutional instability), that can stimulate or inhibit this process.

By its very nature, paradigm change is resisted because most actors have a vested interest in the status quo. This implies that the differences between the old and new paradigm (in this case the difference between an innovation and technology generation and transfer approach) are not clear

to many actors. The Program could have catalysed participatory development of a conceptual framework for the new innovation paradigm. Such a framework could greatly strengthen the activity of newly emerging actors such as FUNICA in Nicaragua. It would also represent an important public goods resource for CATIE-HQ as an institution of higher learning, and for many other research and development organisations. This and other kinds of important tacit knowledge which is held by the people who comprise the Program and its collaborators will be lost if there is no follow-up to the project.

To address these issues we recommend that NORAD provide funding to identify and develop key information resources that qualify as public goods; Among these would be the development of a clear conceptual framework on innovation processes in smallholder agriculture in the Central American context.

### **5.3. SPECIAL ANALYSIS OF CONSOLIDATION AND NATIONALIZATION OF ACHIEVEMENTS**

When we look at this Program and its very considerable achievements as a whole, we can see a variety of pending tasks that still must be done, and a variety of actors and human resources that can be deployed to do so.

In the broadest sense, the pending tasks are:

- 1) Consolidation, continued development, and “nationalization” of the Nicaragua experience.
- 2) Further development and then consolidation of the Costa Rican and Trifinio experiences.
- 3) Enabling other countries to learn from and emulate/adapt the Nicaragua experience.
- 4) Extending the Nicaragua experience in the Central American region via the projects that come out of the baseline studies.

At the same time, the available human and institutional resources include, but are not limited to:

- 1) The national staff members of the Program team, including staff currently outposted to Trifinio and Costa Rica (we understand that Elias, who is Brazilian, is a national hire). This is a remarkable group of individuals who have received a high level of (very expensive) training, have grown enormously as individuals over the years, have complementary skills, and work very well together as a team. They form a critical mass, which should be conserved if at all possible.
- 2) The international staff members of the Program team, who are highly skilled and charismatic.
- 3) Key national institutions (UNA, INTA, UNAN-Leon, UNICAFE, etc., in Nicaragua, and their homologues in Trifinio and Costa Rica).
- 4) CATIE.

The key will be to deploy these resources in a fashion best suited to meeting the goals outlined

above.

While it is clear that decision-makers and others in Guatemala, Honduras and El Salvador view the Program experience in Nicaragua as a “lighthouse” to be emulated, it still remains at a fragile and unconsolidated stage somewhere prior to what would be a “sustainable stage.” It would be crime to carry things so far at such expense, only to let it fall. But true sustainability requires institutionalisation in Nicaraguan institutions by Nicaraguan staff, something that should have been contemplated for Phase 3 but was not, and thus remains urgently pending. Figure 5 portrays a hypothetical structure that could have been used in Phase 3 to transition into a more sustainable institutional-strengthening mode prior to Program withdrawal.

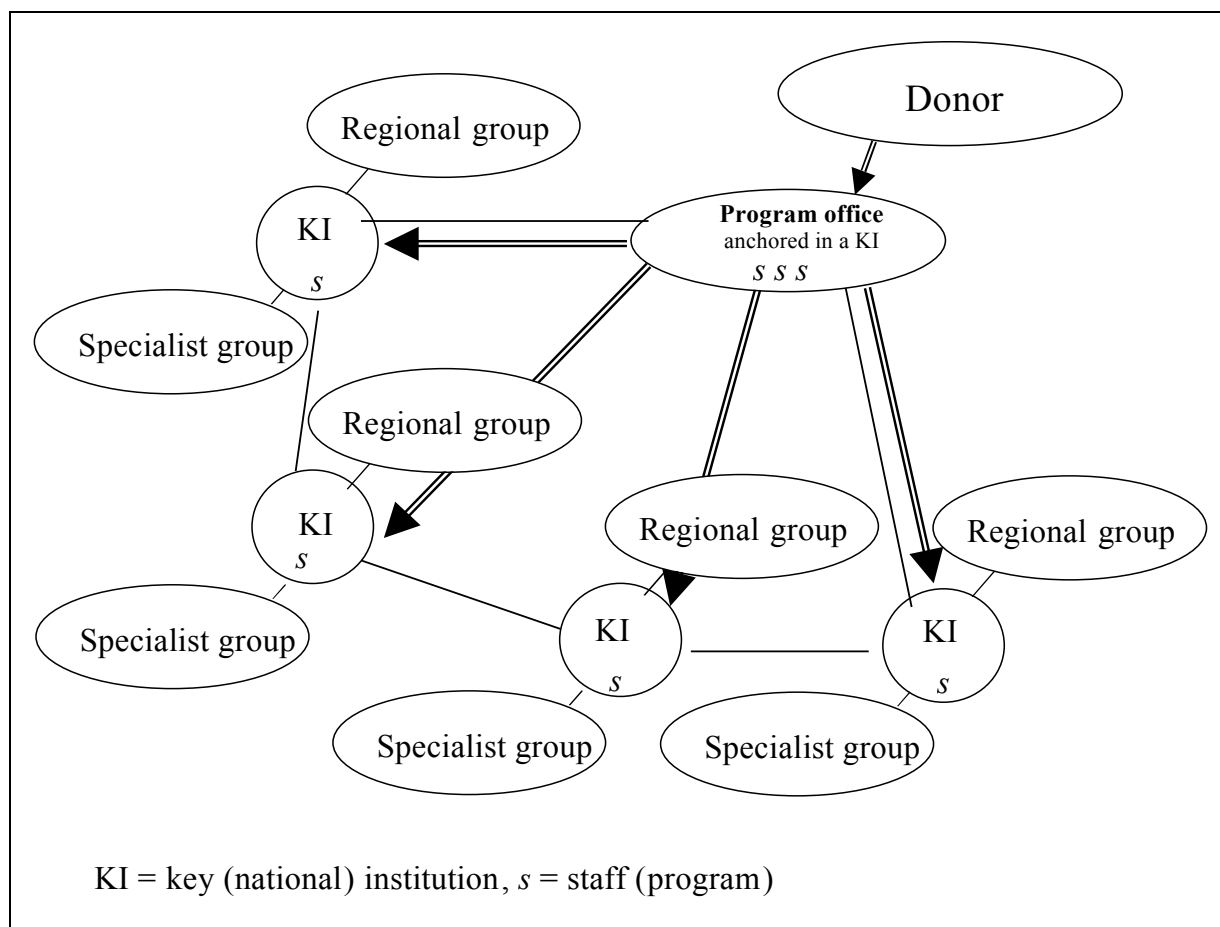
The idea would have been for key Nicaraguan institutions (i.e. UNA, UNAN-Leon, INTA-Matagalpa, etc.) to each take on responsibility for supporting and consolidating one regional group and one specialist group, in the work of these groups with extensionists and farmer-experimenter groups. The donor would have divided the financial resources among these institutions and the Program office, and Program staff would be deployed with some in the Program office and one each providing technical accompaniment inside each of the key institutions (also assuring that resources were used in accordance with Program goals). The Program staff would still have functioned as a team, but a dispersed one whose task would be to strengthen national institutions to take over. The role of international staff would be reduced in this scenario, as one would hope they could have been gradually phased out as national staff took on more responsibilities.

Nevertheless, for whatever reason such a phased transition to national institutions did not happen, and that leaves the task of consolidation and nationalization pending.

As part of the consolidation, the work to be done in Nicaragua includes, but is not limited to:

- addressing the market-related issues
- supporting and consolidating Multi-Institutional groups: CN-MIP, regional groups, specialist groups, farmers groups
- continuing to develop and spread participatory methodologies within a learning and innovation framework
- developing a more holistic approach to the rural farm family enterprise including aspects of crop production, marketing and organisation (expanding beyond IPM/AF).
- finding ways to include left-out target groups of rural poor like landless farm workers, women, poorer farmers, and organisations like UNAG, ATC, CIPRES and Campesino a Campesino.
- strategic linkages to other issues like pesticides in relation to farmer, farm worker and consumer health and the environment, and to educational institutions at all levels.
- accompaniment for the key institutions and groups, including ongoing training on methodology, technologies, and resource mobilization.
- developing an on-going communication and information strategy

**Figure 5.** Hypothetical structure that could have been used for Phase 3 to achieve more sustainable consolidation into national institutions.



As the evaluation team travelled in Nicaragua and met with different institutions and individuals, we were presented with many ideas and proposals as to how organize this work institutionally. We have compiled these into a series of possible scenarios, which we have annotated with pros and cons as follows [Note that they are not all mutually exclusive]:

Scenarios:

- A follow up project to strengthen the networks/groups via CN-MIP/FUNICA as executing entities. CN-MIP is a logical candidate because of its role in the coordination of the Regional and Specialist Groups, and because of its central place in IPM policy, but it and FUNICA are potentially susceptible to changing leadership and sudden shifts of direction.
- A follow up project to strengthen the networks/groups via CN-MIP/INTA. Same as above, but INTA seems to be susceptible to high rates of personnel turnover and even more rapid policy shifts.

- A follow up project to strengthen the networks/groups via CN-MIP; requiring CN-MIP to become legally constituted. There is a negative history of such networks gaining legal status and then going under.
- A follow up project to strengthen the networks/groups via key institutions at the regional level. This might be similar to the design outlined in Figure X.1 above, except it does not provide for technical accompaniment of the institutions.
- A spin off one or two NGOs; one to address follow-up in Nicaragua, composed of national staff, and the other to focus on disseminating these methodologies to other countries, composed of the international staff. This may be a good scenario, if funding and legal status can be arranged quickly. One possibility is that instead of an NGO, a contract be negotiated with a university, such as the UNA, to provide for the creation of a “semi-NGO” that uses the legal status of the university, but functions as a semi-autonomous institute (i.e. “Institute for Participation, Innovation and Multi-Institutionality in the Countryside”). A number of such models exist elsewhere, and work well, such as Focus on the Global south in Thailand ([www.focusweb.org](http://www.focusweb.org)), which is technically a project of Chulalongkorn University, but in practice works more like an NGO.
- A decentralized project with team members and some financial resources placed in key institutions who can take on the responsibility for consolidating the regional and specialist groups in their work with extensionist/farmers, with a role for some coordinating entity, which might be CATIE or might be a new NGO or some other entity such as a new NGO, as in Figure 5.
- The only follow up is the baseline projects, via CATIE or some other institution. This is simply insufficient given the needs expressed above. However, these projects are worthwhile and the best thing would be to carry them out in addition to meeting the other needs listed above.
- A continuation of the same project via CATIE. This is not acceptable, as the nationalization goal would not be met.

Overall, the basic principal for the Nicaragua consolidation portion of the work to be done should be the principal use of the national staff from the Program team, with strategic short term use of international consultants on an as-needed basis to resolve specific problems.

To conclude, this has been a truly remarkably successful and innovative Program, but the work is not done. Very important consolidation is needed to assure that this experience is not lost, and the model is so worthwhile and broadly applicable that it calls out for replication/adaptation in other countries. We hope that NORAD and/or other donors will be up to this task.



## 6. ACRONYMS

<b>Acronym</b>	<b>Name</b>
AF	Agroforestry
AGRODERSA	Asociación de Servicios Agropecuario y Desarrollo Rural
ANACAFE	Asociación Nacional de Cafetaleros
APOT	Asociacion de Productores Organicos de Turrialba
ASDI	Swedish International Development Cooperation Agency
ATC	Asociacion de Trabajadores de Campo
ATPM	Asistencia Tecnica Participativa Masiva
CAFTA	Central American Free Trade Agreement
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza
CBB	Coffee Berry Borer
CGIAR	Consultative Group on International Agricultural Research
CN-MIP	National IPM Committee, Nicaragua
CIPRES	Centro para la Promoción, la Investigación y el Desarrollo Rural y Social
CLUSA	Cooperative League of the USA
DANIDA	Danish International Development Agency
FAITAN	Fund for Assisting Technical Innovation
FAT	Fondo de Asistencia Tecnica (Fund for Technical Assistance)
FIDA	Fondo Internacional de Desarrollo Agricola
FUNICA	Fundación Nicaraguense de Tecnología Agropecuaria
HQ	Headquarters
IDB	Interamerican Development Bank
ICAFE	Instituto del Café
IHCAFE	Instituto Hondureño del Café
INPRHU	Instituto de Promoción Humana
INTA	Instituto Nicaragüense de Tecnología Agropecuaria
IPM	Integrated Pest Management
MAGFOR	Ministerio de Agropecuario y Forestal
MIP	Manejo Integrado de Plagas (Integrated Pest Management)
NGO	Non-governmental Organisation
NORAD	Fondo de Desarrollo Noruego
NPV	Net Present Value
PASA-DANIDA	Programa de Apoyo al Sector Agricola - DANICA
PROCAFE	Fundación Salvadoreña para la Investigación de Café
PRODECOOP	Programa de Desarrollo Cooperativo
PCaC	Programa Campesino a Campesino
PROMECAFE	Programa de Mejoramiento de la Caficultura Centroamericana, Mexico y el Caribe
PROMIPAC	Proyecto de Manejo Integrado de Plagas con Productores de América Central
PTA	Programa Nacional de Tecnología Agricola

*Ecologically-Based Participatory Implementation of Integrated Pest Management and Agroforestry  
in Nicaragua and Central America (CATIE-IPM/AF). Phase III*

<b>Acronym</b>	<b>Name</b>
REDCAHOR	Red regional de Hortalizas
SIDA	Swedish International Development Agency
SIMAS	Servicio de Información Mesoamericana de Agricultura Sostenible
SWAP	Sector Wide Assistance Program
UNA	Universidad Nacional Agraria
UNAG	Unión Nacional de Agricultores y Ganaderos
UNAN	Universidad Nacional Autónoma de Nicaragua (Leon)
UNICAFE	Unión Nicaragüense de Cafetaleros
USAID	Unidad de Ayuda y Desarrollo Internacional de Estados Unidos
USD	US Dollars
WB	World Bank