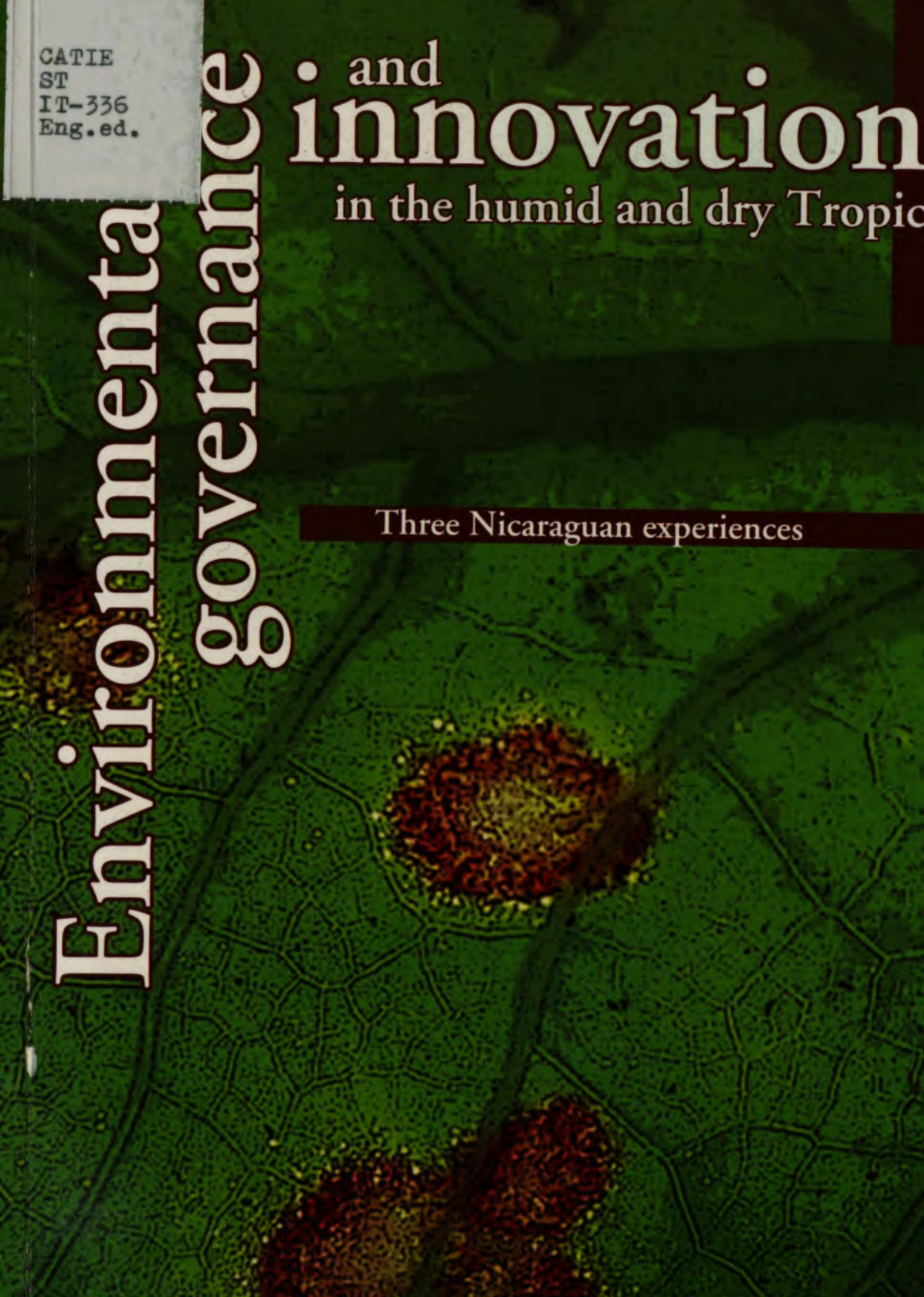
Environmental governance and innovation in the humid and dry Tropic

Three Nicaraguan experiences



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Environmental governance and **innovation** in the humid and dry Tropics

Three Nicaraguan experiences

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NICARAGUA

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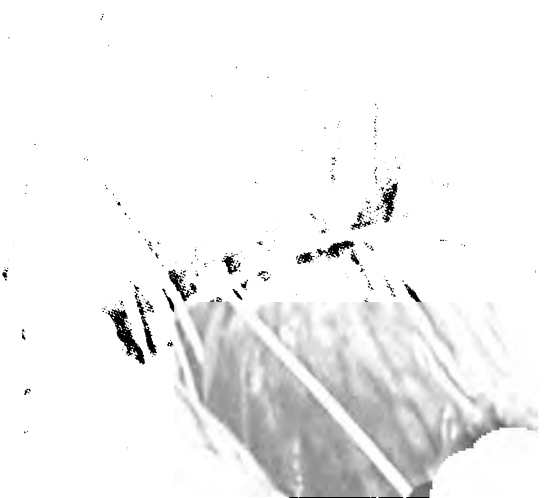
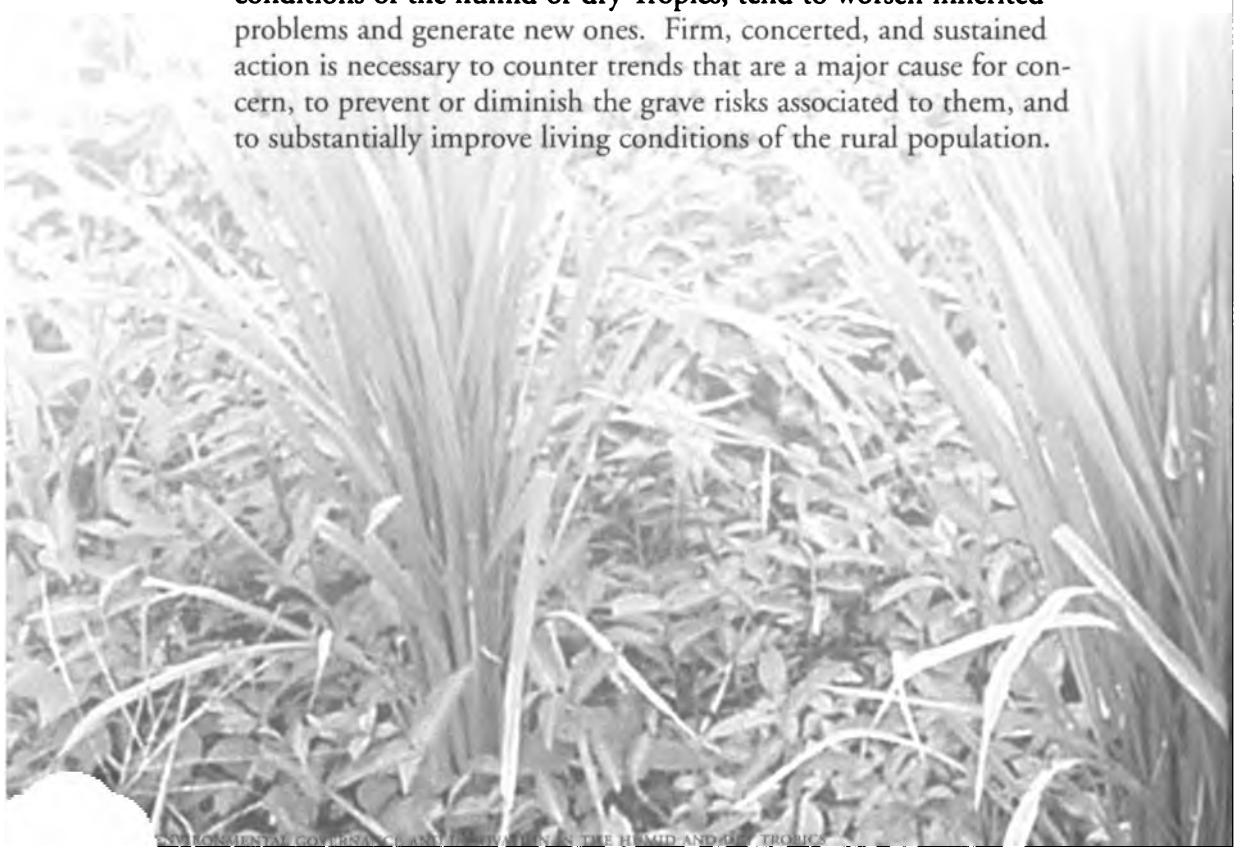


introduction

Appropriate management of natural ecosystems as well as agroecosystems is crucial for the future of each society and the wellbeing of its people. Improvement of environmental management and innovation processes go hand-in-hand, supporting and enriching each other. This mutual strengthening fosters development and enhancement of environmental governance, as a decision-making process regarding the environment at the local, regional, national, and cross-border levels.

Nicaragua has very valuable natural resources, an extraordinary biodiversity and a whole range of ecosystems, threatened by increasing degradation and inadequate practices. Indiscriminate deforestation, expansion of inappropriately managed livestock-raising, and forms of agricultural production that are poorly adapted, respectively, to the conditions of the humid or dry Tropics, tend to worsen inherited problems and generate new ones. Firm, concerted, and sustained action is necessary to counter trends that are a major cause for concern, to prevent or diminish the grave risks associated to them, and to substantially improve living conditions of the rural population.



There have been various efforts to promote good practices regarding participatory and socially-inclusive environmental management, seeking to coordinate initiatives taken by various actors at the local, regional, or national levels. Each of the three projects presented here was original in its approach, shows substantial achievements, and has accrued a wealth of experience over a number of years. One of these projects was carried out primarily in the area of Pancasán, in Matagalpa; another encompassed the Autonomous Southern Atlantic Region, and the third covered various areas in the Pacific and Central regions of Nicaragua. They have all received substantial and sustained support from NORAD, the Norwegian cooperation agency. NORAD also suggested and backed the exchange whose outcomes were the basis for this public information document.

We consider that the findings and lessons of the study presented in this book, are relevant not only for those who participated in the inter-change process, but also for all of those who struggle day after day to make this world more innovative and governable.

1

What was each experience *about and* who *were involved?*

The local experience in Pancasán, in the district of Matiguás within the department of Matagalpa, is that of the Humid Tropics Project, which subsequently expanded to include other, dryer areas toward the west of that same department. The project has been carried out since 1990 by the Asociación para la Diversificación y el Desarrollo Agrícola Comunal (ADDAC), an NGO established the year before to promote rural development programs in northern Nicaragua. Through a series of specific projects, ADDAC continuously worked in this settlement area, located in the midst of the eastward migration process. This situation posed major challenges regarding agroecological adaptation, durable production systems, and stabilizing the settlement frontier. There were also violent political/military confrontations in this area and, therefore, it has been necessary to overcome antagonistic relations within the peasantry due to prior involvement with one faction or another. The objectives sought by the project included training and agricultural diversification, support to farmers' organization and marketing of organic products. These objectives, in turn, were set within the framework of efforts to attain food security and productive development of smallholder families in the region.

The regional experience on the Caribbean coast was undertaken by the Fundación para la Autonomía y Desarrollo de la Costa Atlántica de Nicaragua (FADCANIC) in the Autonomous Southern Atlantic Region (RAAS). This private, non-profit foundation was set up in 1990 to foster autonomous and sustainable development in the two Autonomous Regions of the Nicaraguan Caribbean, based on principles of multi-ethnicity, gender equality and social justice. Its initial work focused on education and local leadership, with certain specific actions geared toward the productive sector. Since 1999, with NORAD's support, FADCANIC has furthered a sustainable forestry development proposal in five municipalities of the RAAS. Said proposal is set within the framework of its program on Protection and Use of Natural Resources, which seeks to attain balanced use of the natural milieu by the local and immigrant populations, in the face of growing deforestation and non-sustainable agricultural practices and extraction. Environmental degradation also affects the coastal lagoons, whose rich fishing resources are a significant source of food and income for the inhabitants of the coast.

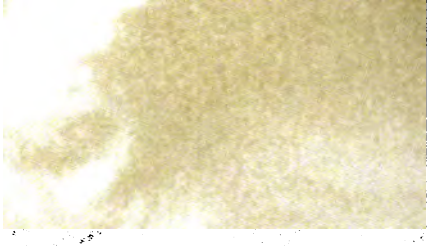
CATIE, the Centro Agronómico Tropical de Investigación y Enseñanza (Tropical Agricultural Research and Higher Education Center), has carried out a Regional Program for Participatory Implementation based on Integrated Pest Management (IPM) ecology and coffee agroforestry in Nicaragua and Central America (CATIE-IPM/AF). Being an international organization, CATIE works through institutional counterparts, especially in the agricultural and university sectors. It has also developed direct cooperation ties, in certain cases, with local or regional institutions and organizations. CATIE's Integrated Pest Management Program initially sought to include Nicaragua in a Central American IPM network in 1989, with support from Scandinavian cooperation agencies. At first it was a conventional research, training, and technology transfer project, but afterwards it developed a participatory, multi-institutional approach and sought to strengthen national capabilities to make IPM available to farmers and their families.

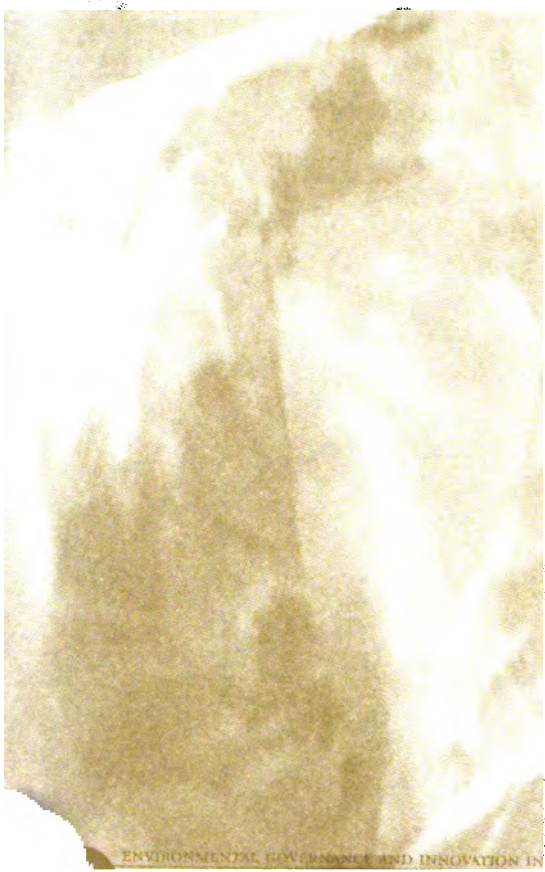
2

How did the exchange *of* experience *take place?*

An interest in learning from several years' work striving for sustainable, participatory rural development with gender equality led to the initiative to share experience among the three projects supported by NORAD at the local, regional and national levels. After initial consultations among the Norwegian cooperation agency and the organizations in charge of the projects, It was decided that representatives of the three projects should go on a two-week tour to attain first-hand knowledge of the work carried out in the different areas and to discuss it directly with those involved. An external consultant was engaged to facilitate the exchange and coordinate preparation of the final report.

The United Nations approach to governance regarding environmental issues was used to review each experience. The group deemed this framework useful to reflect on previous processes and future prospects, even though it had not been explicitly adopted at the outset in project formulation. The group also subsequently decided to include a discussion of technological, methodological, and organizational innovations, with the aim of reflecting the wealth of learning in their work with grassroots organizations and institutional counterparts. It also explored linkages between environmental governance and innovation, and it sought to systematically gather various other lessons learned. Finally, it reached a number of general conclusions and set forth certain recommendations. There was a public presentation of the results of the exchange at a meeting with high-level representatives of various public agricultural sector institutions in Nicaragua, together with cooperation agencies and other organizations.





The initial exchange of experience took place during an intensive, two-week tour of the North, Central and South Pacific regions and the Autonomous Southern Atlantic Region of Nicaragua, in September 2003. The group visited model farms and other production units, an artisanal establishment for production of biological insecticides, a small-scale market outlet for organic products, a training center, an ecological radio station, and an agricultural research center. We met with grassroots and non-governmental organizations, and we attended a meeting of the inter-institutional regional IPM group. We also attended training and other activities. There were informal conversations with male and female farmers and "promotores" or farmer community action workers, as well as with technical and scientific staff. During the tour and once it ended, the representatives of the three projects exchanged viewpoints, and the results were organized systematically by the consultant, then discussed again as a group, and finally submitted to thirty political and institutional decisionmakers on November 20, 2003. The group of decision-makers was very interested in the results; there was a lively discussion, and even a suggestion that the results should serve as guidelines for development of future initiatives on policies regarding technology.

3

What do we mean by environmental governance *and* management?

By environmental governance, we mean decision-making processes, in this case regarding environmental matters. Therefore, when we address the issue of environmental governance, we need to know how decisions are reached on management of the environment, whether natural or modified by human action. We must also ascertain who are the individuals and groups involved in said decisions. Environmental governance may be greater or lesser, depending on the characteristics of this process and the conditions under which it takes place. It is, therefore, a situation that we can improve through joint efforts, although it may also deteriorate. On the other hand, improving governance requires transparent exercise of authority, as well as following up on agreements and accountability regarding actions taken. Furthermore, it is linked to the role of public institutions, of civil society organizations, and generally speaking, of various social institutions, in a broad sense that encompasses values and rules, solidarity and communication networks.

Environmental management here refers to the set of decisions and actions, both public and private, regarding the use of natural resources and agroecosystem management. Environmental management mechanisms may be socially exclusive or inclusive, and either vertical or participatory. The way these decisions are reached and the involvement of individuals, groups and institutions interested in the issues may contribute to attaining sustainable, fair and effective management of the natural and modified milieu. As participants in local, regional, national, and even cross-border and international decision-making processes, the various parties must explain, acknowledge and negotiate their interests. They also need to address and resolve conflicts, build consensus and undertake joint responsibilities.

Good environmental management combines protection of the natural ecosystems with their sustainable use, when this is appropriate. It also seeks to improve the soil and ecosystems in degraded areas, and it promotes the development of agricultural production systems that are based on ecological principles and able to provide the food and other products required by the population, while also diminishing dependence on external imports and fostering durability of said systems.

Environmental governance and management of natural resources are, therefore, two sides of the same coin, or two different ways of looking at the same issue. They are social processes, because they involve human groups, and they refer specifically to the environment, both natural and cultivated.

The more relevant components of environmental governance generally and in project formulation, are:

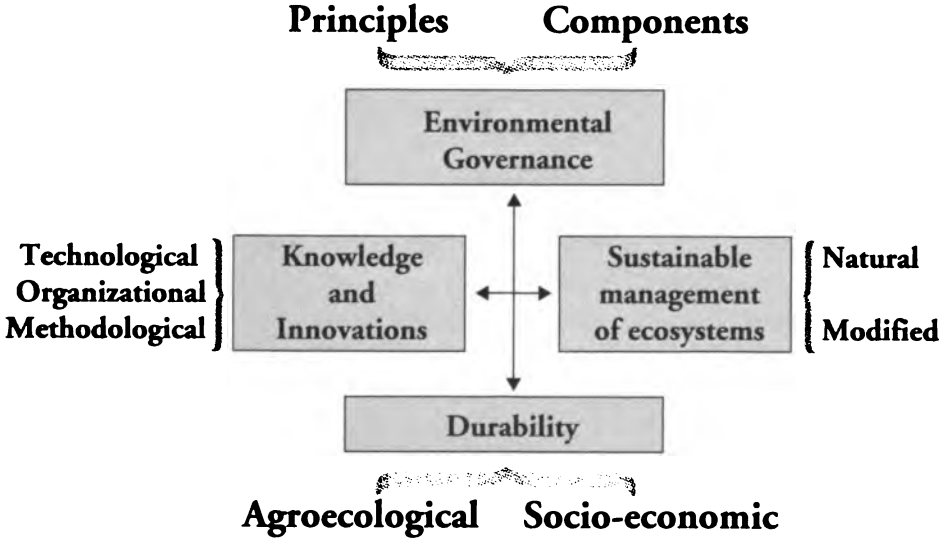
- the characteristics and development of institutions and legislation;
- participation rights;
- levels of authority;
- accountability;
- property rights;
- the role of the market and financial flows; and
- the function of science regarding risk management.

The fundamental principles of environmental governance in regards to the actions of development projects are:

- decision-making at an appropriate level;
- access to necessary information and to participation;
- incorporation of environmental considerations into all decisions; and
- inclusion of gender considerations into all decisions.

Strengthening of environmental governance and improvement of ecosystem and agroecosystem management practices also relate to three main types of innovation processes: technological, organizational and methodological. Technological transformations involve modifications in the management of said systems; organizational changes affect coordination of efforts among producers and with other social groups and institutions, while methodological developments pertain to the ways in which the organizations in charge of implementing development projects carry out their work.

The following diagram summarizes the main linkages among the concepts mentioned above:



4

What has our experience *been regarding environmental* governance?

While none of the projects involved in this study was explicitly conceived in terms of environmental governance, ADDAC, FADCANIC and CATIE-IPM/AF have carried out continuous efforts to foster participatory, environmentally sustainable rural development, with gender equality, respectively, at a local, regional, and national scale:

In Pancasán, ADDAC undertook activities geared primarily toward training of small-scale agricultural producers, with a growing emphasis on strengthening organized farmer groups. It fostered agricultural diversification on farms to counter degradation of local agroecosystems due to deforestation and livestock raising, while also promoting agroforestry, organic and other production systems to attain greater environmental sustainability. Subsequently, it addressed the need for a market outlet for organic products and it supported self-management of revolving credit funds by the grassroots organizations themselves.

In the Autonomous Southern Atlantic Region, FADCANIC aimed at establishing a Sustainable Agricultural Development Center to ensure lasting use of the region's natural resources through a participatory rural development model that combines local and scientific knowledge on the humid tropical forest. It also set the objective of enhancing the management capabilities of the communities, in order for them to develop sustainable options for natural resource management, through participatory research with a gender perspective. Its methodological strategy addressed organizational development and mechanisms for local participation of producers as major components. Its goals included strengthening capabilities to generate diagnostic information, community decision-making, and participatory planning. Subsequently, it included methodological training among the expected results, as well as development of strategic municipal

agroforestry plans, actively involving local groups. This would require strengthening local abilities to develop environmental agendas for protection and sustainable use of natural resources. One of its specific objectives was to enhance local economic capabilities to attain that goal, through administration of revolving funds for demonstration plots by credit committees.

CATIE-IPM/AF interacted with grassroots groups, NGOs, public institutions, research centers and universities in various parts of the Pacific region of Nicaragua, to promote IPM and agroforestry systems. At first it focused on formal research and training, then on strengthening the capabilities of specialists, technical outreach workers and small- or medium-scale farm households to implement IPM and agroforestry based on ecological principles. To this end, it developed an innovative method through parallel participatory training and experimentation involving farm households and technical staff, by phenological stages of each crop. This should strengthen the institutions and organizations involved in IPM systems and coffee agroforestry, as well as in several annual crops. It should also improve decision-making on family farms through ecological reasoning and systematic observation.

With respect to the components of environmental governance in project formulation, we may therefore, conclude that while they were not conceived specifically in terms of that approach, they did contain certain components from the start, and others were included in subsequent stages.

There are a number of common denominators among the three projects in this regard. An especially significant one is the importance attached to **organized participation of farm households** through their grassroots organizations. All three projects promoted decision-making at the most appropriate level of authority, through **self-management and consensus building.** They also fostered **transparency and accountability.** Furthermore, they all sought to make **scientific and technical knowledge available to farmers through training and experimentation,** with the aim of supporting agricultural diversification and agroecological improvements on their farms. This, in turn, should strengthen their ability to face climatic and market uncertainties.

Certain other aspects of environmental governance were more prominent in one or two of the projects. Involvement of **multiple institutional counterparts** was especially important for the CATIE-IPM/AF program. **Marketing of organic products** by ADDAC implicitly fostered better management of agroecosystems through market mechanisms. **Credit lines and revolving funds** managed by groups of farmers, both in Pancasán and in the RAAS, aimed at the same environmental objective, specifically through local financial flows.

None of the projects studied here explicitly addressed the issue of **property rights** as a concrete objective of their actions. However, as a matter of principle and through other initiatives, FADCANIC supports the property rights of ethnic communities and indigenous peoples. This principle is doubtless shared by those involved in the other two projects, although this is not one of their main lines of work.

Several components of environmental governance were therefore involved in project formulation or subsequent reformulation in each experience discussed, although this approach was not comprehensively adopted from the start.

Certain principles of environmental governance played an important role during implementation of the projects . All three included environmental factors in their decisio-nmaking processes, although their form of expression differed from one project to another, as well as from one stage to another. While the way they conceived this aspect of their work was at first more limited, they attained greater clarity and significance during subsequent development of each project. Thus, for example, the work in Pancasán overcame the lack of an initial strategic proposal regarding the environment, at first limited to environmental health, by effectively promoting **agroforestry diversification** and adoption of a set of practices that substantially improved soils and agricultural ecosystems. This was reflected in farmers' decisions, which in turn led to considerable expansion of the tree cover and a greater variety of tree species, especially timber and fruit trees. Environmental issues have also been involved in various ways in the agroforestry program in the RAAS and in decision-making processes there; including participatory **development of environmental agendas** in the communities. In that same region, FADCANIC supported participatory land use planning with all relevant stakeholders. For this, they carried out consultations, fostering the preparation of municipal, communal and farm-level plans. CATIE-IPM/AF, as a "second-tier" program, worked together with its institutional and non-governmental counterparts to make **ecology a key component of integrated crop management and agroforestry.**

In its direct work with technical outreach workers and groups of farmers, this program systematically brought ecological principles into the decision-making process.

All three projects explicitly included gender equity as an objective in their work with farmers, both male and female. They also actively promoted greater participation of women in project activities, in positions involving responsibility, and in decision-making. FADCANIC attained substantial results by means of a policy that required appointment of a least one female and one male farmer community action worker ("promotor") in each local group, thus ensuring equitable participation in this important function. ADDAC, in turn, promoted active and greater participation of women farmers in all its activities, including the leadership groups of farmer organizations and training events. Female participation increased significantly in community groups, while attainments in this regard were lesser in product-specific associations. CATIE's program included the gender perspective in its family-centered approach to work with peasant farmers. Since its actions are carried out through other organizations and institutions, the level of achievement of certain goals in this regard has been uneven.

Other environmental governance principles were also present in various ways and differing degrees in project execution. Experience of the projects in creating opportunities for decisions to be adopted at the most appropriate level differed substantially according to scale: progress was greater in matters directly pertaining to farmer groups, on which they were able to exercise direct control, especially on their own farms or in their collective actions as local organizations. Attempts to participate in public decisions at the municipal and department level have been weak, and usually fruitless. Participation of producers in national initiatives has been minimal or non-existent.

We also noted clear-cut differences among various types of organizations or institutions with respect to access of their counterparts and beneficiaries to information and participation. Generally speaking, grassroots organizations have little effective access to information that is appropriate to their needs and their possibilities of interpreting and using it, for example regarding environmental trends. Certain institutions, and especially research centers, have had greater access to environmental information, although it would be necessary to ascertain that it is updated, relevant, and used systematically. Regarding participation in decisions, that of producers was greater in local communities and diminished as scale increased; that of technical staff and researchers was greater with respect to their specific area of specialized work, lesser in connection with institutional policy formulation at a regional level, and minimal or non-existent at the national level.

In brief, several principles of environmental governance and management were tacitly or explicitly involved in the work of all three projects, while their emphases and forms of execution varied, as did the depth and rhythm at which they were developed.

Finally, sustainability of environmental governance beyond the period of project execution is potentially viable, but it will vary depending on which aspect we are considering. Based on observations made and conversations held during the exchange, it seems reasonable to expect that in future projects a substantial proportion of the participating farmers and of their grassroots organizations will be willing to invest time and effort in developing sustainable forms of environmental management, primarily on their own farms and in local initiatives. Involvement of the whole family will be crucial for this, but it is still necessary to continue and complete this process. Regarding the institutional counterparts, continuity requires effective adoption of principles and approaches geared toward long-term management of natural resources and agroecosystems, something that as yet has only been partially attained.

Public participation in local, regional and national decisions on environmental matters is still limited, and also quite variable. There is much yet to be done, from the local to the national level, to strengthen capacities for public participation in environmental decision-making processes.

Acknowledgment of the viewpoints of various parties in environmental management poses the challenge of identifying, taking into account, negotiating and integrating diverging interests, as well as of exploring complementarities. Observations made during the study suggest the need to strengthen strategic analyses of the alliances required to foster the types of change sought and for consensus-building, despite inevitable differences.

Follow-up of indicators of environmental governance is a weak aspect, even in cases in which there is access to data that might be useful. It is necessary to consider how to use the information and its interpretation to have a greater impact on public policies, to contribute to discussion of key issues, to share and exchange information with strategic allies, to develop trend projections with the aim of suggesting and assessing alternative scenarios, and to support decision-making processes.

5

How are environmental governance *and* innovation *processes inter-related?*

When we talk about innovation, we refer to changes in existing systems to improve their results. Here we are mainly interested in three types of innovations: technological, organizational and methodological. Management of innovation processes is related to improvements in environmental governance, and they reinforce each other. Innovation also requires access to indispensable knowledge and information to improve production systems, organizational processes and work methods. Effectiveness of these three closely linked types of innovation is affected by various actors' actual possibilities of participating in relevant decisions at the appropriate level.

- By technological innovation we mean here, primarily, effecting changes in agricultural systems to quantitatively or qualitatively improve production and quality with conservation of natural resources. This includes proper farming systems, livestock-raising, and use of natural resources, as well as harvesting, post-harvest handling, and processing of products. Technological innovation is both a material and a social process that involves applying knowledge acquired by various means and making farm management decisions.

The development of innovative production systems to attain greater ecological durability and socio-economic viability requires formal or informal experimentation. It is also associated with various sorts of learning and with organized or spontaneous exchange of knowledge among farm households. There are also direct or indirect exchanges with technical staff or scientific researchers. Technological innovation among small-scale farmers often involves contacts between local knowledge –both inherited and acquired through experimentation or

by other means- and scientific/technical knowledge. Communication itself is a process of knowledge construction, in this case by means of a dialogue between what experimenting farmers or other members of their communities know and what technical outreach workers or specialists can contribute.

Organizational innovation, in this study, refers to forms of coordination in cooperative efforts and to how knowledge circulates among the members of farm households. It also encompasses their interactions with public institutions, non-governmental organizations, or private entities, as well as among themselves. It includes both formal and informal relations and networks. The former may be organizations or associations, while the latter, in this context, are especially everyday social relations among neighbors or friends, as well as among relatives. Formal and informal networks are interconnected, and certain individuals may occupy prominent positions in several, or even in many networks. Outsiders to the community, when they work in it or interact with its members, link up one way or another with the local networks. Understanding these interactions is quite important to comprehend the dynamics of relations within each community or area, as well as between local and outside groups.

The more relevant methodological innovations, here, are mainly those pertaining to the manner in which the organizations that implement the projects carry out their work. This involves both their direct relations with farmers and with technical outreach workers, specialists and those responsible for public policy formulation at the local, regional and national levels. In each case, there has been a learning process in which greater maturity has been attained and there have been changes in the modes of training, experimentation, technical advisory services, organizational support or other aspects of their work.

6

What have we learned *about technological, organizational, and methodological* innovations?

All three projects generated or disseminated innovative options regarding rural production systems and sustainable use of natural resources. They also innovated regarding organized farmer participation and cooperation among institutions, as well as in their methods of work.

Processes of technological innovation discussed during the exchange involved various aspects of the technical and social organization of productive activities on the farms and in smallholder communities in the geographical areas covered by each project: generating and exchanging technological knowledge; integrated and organic crop management; development of agroforestry systems; experiments with disease-resistant or locally-adapted cultivars, and certain post-harvest practices with respect to food grains. Specific experiences include experimentation, knowledge exchanges and productive innovation by means of complementary, coordinated or joint assays. Others addressed integrated management of nutrition, organic coffee production in the humid and dry Tropics, and selective weed management on coffee plantations. Entomopathogenic fungi were used to control the coffee berry borer, and comprehensive pest counts for integrated coffee pest management. Secondary forests were enriched with timber species, and various short-, medium-, and long-term crop associations were explored. Disease-tolerant cultivars were also produced in a pollen laboratory. Cultivar validation included grains, especially beans, together with musaceae and fruit trees. Ashes and other materials were tested for their use in grain conservation, and grain storage centers were established for farmer groups to keep beans or other grains.

Various social processes underlie the specific technological innovations. These innovations are carried out by organized farmers, who share the results of their experiments and learning. There are also direct and indirect interactions with technical outreach workers and researchers, and this communication enables mutual learning through a dialogue among participants in different systems of knowledge. Local technological knowledge and scientific knowledge may be complementary and enrich each other, strengthening their relevance and validity while overcoming specific limitations of each. Creativity to explore appropriate and innovative solutions to concrete production or post-harvest management problems is another common trait of the cases discussed. Furthermore, conceptual and methodological as well as technical learning, insofar as it leaves behind the vertical transfer of packaged recommendations to explore various options, comparing them to each other, assessing each one and adapting them, combining them or inventing others, prepares farmers to face future, unprecedented and unpredictable situations.

Organizational innovation was a key in the cases discussed, and generally speaking, various forms of active participation of grassroots groups have been important. These include formal and informal networks, community and product-specific groups, model farms as key sites for experimentation and on-farm exchange of knowledge, and various types of local self-management. Involvement of other local or regional parties was variable, depending on the nature of the projects or

programs and the conditions under which they operated. Certain examples discussed during the exchange, and which can only be mentioned briefly, are: the national IPM network; and systematic grassroots organization through establishment of community groups and of specialized producers' associations, paying special attention to training, to farmer community action work, and to strengthening natural communication among participants. Model farms, chosen by the grassroots groups, were also important. In them, each experimenting farmer decides what assays to conduct, and the whole farm may be a complex experimental unit or a model of agroecological management. Autonomous administration of revolving credit funds with a gender approach regarding leadership and resource allocation made it possible to support proposals for agroecological improvements on the farms. Decentralization and local self-management in project execution, together with local alliances and organizational interactions with leaders and community groups, fostered direct and advisory participation of community representatives in project execution and evaluation.

When we focused on the organizational innovations as such, setting aside their specific contents, we realized that active participation and involvement of producers in decision-making was essential in all cases, whatever their forms of organization. Different types of model farms were very important both in the Pacific and the Atlantic, as sites for experimentation and demonstration, observation and discussion of results. Various forms of self-management made it possible for local

groups to exercise greater control over resources and over setting of priorities, while allowing follow-up due to their proximity and their familiarity with each concrete situation. Dialogue with other local or regional parties was important, although their degree of involvement in project initiatives was uneven. Building of regional networks and of a national IPM committee enabled integration of several agricultural sector institutions, but not those in other relevant sectors such as public health or education.

The methodological innovations observed, discussed or reflected in project documentation covered a broad range of work strategies and procedures. These included participatory agricultural learning through closely linked experimentation and training. Farmer community action networks, mentioned above, were also important, together with exchange of knowledge and technical assistance among experimenting farmers and other agricultural producers. Parallel training to technical outreach workers and farmers, by phenological cycle of the respective crop, was also significant. Local planning and execution of projects contributed to development of sustainable agroecosystems and to conservation and sustainable use of natural resources on each farm and in the area. Specific experiences included participatory experimentation and learning by farmers, individually or jointly, geared toward agroecosystem analysis as the basis for strengthening of household decision-making on crop management. Farmer community action networks must not substitute but rather complement informal exchanges

through conversations and unplanned visits between friends or acquaintances, neighbors or relatives. Horizontal technical cooperation involved training strategies based on horizontal reproduction of knowledge. Another significant methodological innovation was the "Zig-Zag" approach to parallel and interconnected training to technical outreach workers and experimenting farmers, by crop stage. Other experience mentioned included the role of multi-disciplinary technical teams in each geographical area; curricular design for training of specialists to strengthen their ability to better understand variability of the food chain and cropping systems in different agro-ecological areas; development of or adjustments to simple diagnostic methods and alternative practices for pest management; and preparation and execution of small-scale projects to strengthen methodological skills for design of the content of IPM training, as well as participatory monitoring and assessment of results and impacts. Local micro-planning was also deemed important; this involved reflection by the smallholder families on what they plan or wish to do on their farms regarding the various products, credit, organization, and marketing. Participatory construction of local agendas was an organized expression of community land use planning. Systematically organizing land use on model farms was another positive development, together with consensus-building for decisions within each project.

As processes, the methodological innovations mentioned above repeatedly show the key role of experimenting farmers linked to networks, with technical-scientific support for the assays and for the development of model farms. They highlight the importance of horizontal communication and exchange of knowledge between farmer community action workers and other producers in both organized and spontaneous manners. They also suggest that parallel training of farmers, technical outreach workers and specialists, grounded in experimentation throughout the crop cycles, is quite convenient. Furthermore, they point to the usefulness of consensus-building on environmental decisions, from the local to broader territorial scales, although it is also necessary to recognize that there are difficulties inherent to changing from one scale to another.

In the cases discussed, technological, organizational and methodological changes were intertwined to the point of being almost inseparable. A number of innovations had more than one of these aspects, and some combined all three. This suggests that it would be appropriate to explore in greater depth the linkages among technological, organizational, and methodological innovations in the experience of these or other projects, and more broadly in rural development.

We may tentatively conclude that combination and interaction of the three types of innovations generated a synergism in which each one contributed to progress of the others. Of course there may also be interferences; for example, an organizational weakness or a counterproductive methodological approach can impede technological progress, or poor results of deficient advice or mistaken decisions regarding production can weaken the grassroots organization or discredit the organization in charge or project execution.

By focusing on the innovation processes themselves, rather than their specific contents, we find certain common traits of the three cases. One such trait was the crucial importance of active and creative participation by various types of actors, each of whom makes specific contributions that enrich the process. Another trait, linked to the former one, was that fluid communication and exchange of technological knowledge, organizational capabilities, and methodological experience contribute decisively to development of successful innovation processes. We also found that direct cooperation by specialists and technical staff with experimenting farmers can strengthen mutual learning and innovation, both in production systems and in organizational dynamics and methodological progress. Finally, active inclusion of women as well as men, preferably with other members of smallholder families, multiplies the effectiveness of the formal and informal exchanges of new knowledge and experience.

What else have we learned?

The exchange allowed us to learn about many other aspects, aside from those directly pertaining to environmental governance and innovation processes. While it is not possible to enter into great details here, we can briefly mention some of the things we learned about. Further details of these findings are available in the complete text of the technical report.

Regarding the scope of actions by the projects and about social inclusion in the processes they promote:

- Sustained agroforestry diversification of smallholder production systems in a specific area, as well as the combination of agroforestry with livestock raising, can actually transform a degraded cattle-ranching local landscape into one with forest cover and enhanced soil recovery by involving a growing number of farmers.

- The difficulty of attaining a concrete and tangible impact on sustainable use of natural resources and the development of agroecologically durable production systems, in this type of projects, tends to increase together with scale.

- Fostering organic agriculture and agroforestry systems has required support for marketing of harvests, and its future continuity depends partly on the existence of real opportunities to place the products in domestic and international markets under favorable conditions.

- There have been substantial achievements in the process of balancing active participation and representation of women and men, in various ways: training and sensitizing; activities directly geared toward incorporation of rural women, as well as the requirement for farmer community action networks in each place to assign this responsibility to at least one woman and one man. There is still much to be done, especially regarding adoption of this approach by certain institutional counterparts.

- Participation of youths of both sexes in the training and other activities is still inceptive in the projects visited, and should be strengthened. Formal and informal groups of conservationist youths show great potential to foster positive changes in the agroecosystems and in the environmental impact of various economic activities.

- In addition to agriculture and economic activities directly linked to it, we should consider other sectors that are important for rural development, broadly speaking, as occupational alternatives, including the service sector.

With respect to networks and interactions, we learned that:

- Establishment of formal mechanisms and associations whose members exchange technological knowledge amongst each other may, sometimes, weaken their informal exchanges with other members of the community. The farmer community action networks set up in various areas visited are formal but also informal networks. Technical outreach workers, specialists, trainers, and other persons who work in the communities or with producers are also members of their own formal and informal networks, and they interact with other networks, including the farmer community action networks and those that develop within grassroots organizations and communities.

- There is probably some link between the local scale of the grassroots organizations and the difficulty to expand the scale at which the projects act, to encompass the basin, the department or the broader region. "Social capital," based on mutual trust and reciprocal obligations, tends to be more significant locally because people know each other personally, they may be related, there are collective control mechanisms for transgressions or non-compliance with agreements or with implicit rules, and so forth. There may be some relations among neighboring communities, which can be positive or antagonistic, and in any case, they are important for initiatives encompassing several communities in a given area or basin. At the departmental and regional levels, if such ties

exist at all, they tend to be diluted, and solidarity has to be constructed by other means.

- Scientific/technical knowledge and local technological knowledge can enrich each other if they recognize their respective contributions and limitations. There is a need to overcome verticalized relationships regarding transmission or "transfer" of technological proposals. This involves acknowledging that knowledge is an interactive process in which participants jointly build an understanding of whatever they are studying or on which they wish to act.

- Trust, mutual knowledge, reciprocity and solidarity are key ingredients in relations among specialists, technical outreach workers, farmer community action workers or "promotores" and other farmers. Fully attaining them requires sustained interactions, shared experiences and transparent, mutually beneficial exchanges.

- It is useful and advantageous, despite inherent difficulties, to include a representative range of public institutions, non-governmental organizations and private sector groups. This, in turn, entails working relationships with local collective authorities, relating to strategic sources of information, and tapping the potential of numerous institutions.

Regarding educational processes, we learned among other things that:

- Participatory training is essential to attain positive results, and this involves negotiating its objectives and contents, paying special attention to training of farmer community action workers, as well as that of technical staff. It also requires addressing contradictions between persistence of conventional teaching methods and the need to increase active participation.

- It is important to renew the thrust of farmer literacy programs, perhaps linking technological training to adult education that prepares them to act as community action workers.

- Grade schools, secondary and vocational schools, as well as various agencies providing other types of education for adults and youths, are key counterparts in projects and initiatives that have a significant environmental component. It is worthwhile to include them systematically in the proposals, in their implementation, and in their evaluation.

- It is convenient to work together with commercial and non-profit local or regional radio stations, defining areas where there are common interests and where mutual support is feasible.

We also reflected on the role of strategic visions and of this exchange of experience among the projects:

- Each producers' group and each organization in charge of implementing projects must find its own middle ground between overly scattered efforts and focusing on a single objective to the detriment of other relevant issues, to effectively affect an interrelated set of fundamental processes so as to improve the living conditions of the people and their environment.

- There is a need for core medium- and long-term agendas, based on an understanding of processes that go beyond the short term, to build a consensus regarding a shared view of the future together with broadly representative sectors of local, regional, and national society.

- It is essential to prepare changes by means of training that transcends immediate situations and what is currently produced, to explore new possibilities, to better address risks, and to take advantage of future opportunities.

- The exchange of experience among the projects was necessary and useful. It must continue, and to do this, it is important that members of the other organizations participate in work sessions and regular activities of the groups they visit.

- Reflection on the experience of each of the projects from the standpoint of environmental governance led those responsible for them to become aware of the usefulness of explicitly including this approach in future proposals and in their work. Analysis of linkages between environmental management and innovation helps to better understand how they can reinforce each other to make a difference regarding the relevant issues, to improve natural and modified ecosystems, and to enhance the life of people living in the countryside in those regions.

- It is necessary to differentiate attainment of specific goals in each project from changes in the quality of life of the rural population. The latter requires following up on a whole set of both quantitative and qualitative indicators.

8

What conclusions *did we reach?*

Improvement of environmental governance and technological, organizational and methodological innovations in the management of agricultural ecosystems and natural resources are intertwined processes that can be mutually reinforcing. They also have direct or indirect effects on the durability of both natural and cultivated ecosystems.

Good management of agro/ecological systems entails actions to improve environmental governance. This progress strengthens and is strengthened by progress in organized grassroots participation, in work methods of government institutions and non-governmental organizations, and in the generation, testing and adoption of adequate technological options to creatively address the problems or opportunities for sustainable management and use of the agroecosystems and natural resources.

Most of the specific conclusions that we reached after the exchange refer to various aspects of environmental governance based on the experience of the projects:

- **Interiorizing ecological concepts** on interactions among plants, the soil, climate, pests and diseases, in connection with good on-farm environmental management practices, is essential for improvement of ecosystem management.

- While work may begin and be effective locally and at the farm level, there is a need to broaden its scope toward **larger geographical areas, basins and regions.** Influencing processes at the national level is also important.

- Protection and sustainable use of natural resources and efforts to develop environmentally, economically and socially sustainable agroecosystems are complementary, mutually reinforcing processes. It is feasible and useful to **integrate protection, recovery and**

enduring use of the forest or other natural resources, both programmatically and through local or regional initiatives, with actions to promote agroforestry, organic agriculture, integrated pest and nutrient management, or other forms of sustainable rural production.

- It is possible and useful to conduct **parallel, simultaneous and intertwined efforts regarding education and training, organizational strengthening and technical** as well as financial support for improvement of cultivated ecosystems and conservation of natural resources. Participatory generation, adaptation and adoption of ecological and agroecological knowledge tend to foster more effective and sustainable environmental management processes, as compared to official regulations and vertical transmission of technical recommendations.

- **Joint identification of environmental problems and setting priorities** through a dialogue between scientific/technical and local knowledge contribute to shared commitments, consensus on agendas and viable plans. Direct participation of scientists or other researchers alongside the technical staff, in training for farmer community action workers or other farmers, plays a significant role in making conceptual, methodological and technical tools available for farm households and rural communities to address unprecedented problems in the future.

- Informal communication among **farmer community action workers** and other members of rural communities is a key mechanism for circulation and interiorization of technological, agroecological and ecological knowledge among relatives, neighbors and friends. Farmer community action networks are an excellent way to enhance both the scientific/technical support resources and local capabilities, broadening the scale of efforts to improve environmental management efficiently and at a reasonable cost. Effective farmer community action workers tend to be born experimenters. They are usually very interested and willing to invest time in training and exchanges. They are also active members of their communities and organizations, often with formal or informal leadership roles in them.

- **Grassroots organizations** are places where sociable exchanges take place, and they are crossed by kinship and spatial structures in which relations among neighbors play a major role. This must be taken into account to understand their dynamics and build upon them to further environmental proposals.

- **Technical outreach workers and specialists** interact with farmer community action workers and other members of the communities, who in turn are involved in various formal and informal networks. Therefore, those who cooperate with the farmers become involved one way or another in said networks and influence their development. This is inevitable, and it is preferable to acknowledge it in a respectful and constructive manner.

- **The regional IPM and similar groups** also operate as networks, linking individuals as well as institutions. Their dynamics are quite variable, and their potential as such is realized to widely differing degrees. Interrelations between their composition and functioning as formal and informal networks should, therefore, be analyzed and taken into account.

- **Regular exchanges among farmers** who experiment and innovate, both locally and by visiting other places, allow them to reinforce and validate the knowledge acquired through training and experimentation, by discussing and comparing their formal and infor-

mal experiments, the results obtained and the options they plan to test with other farmers.

- The "zig-zag" training and experimentation method, following phenological crop cycles and actively involving researcher/trainers and technical outreach workers as well as the farmers themselves, has proven to be a useful tool for integrated pest management based on ecological knowledge. Other organizations have begun to include this methodology in their own activities.

- Adopting a gender equity policy in the appointment of farmer community action workers by communities, organizations or those in charge of implementing projects, has made it possible to actually balance the active involvement of men and women in a key function for project dynamics and local development. This is exemplified by policies requiring that one male and one female community action worker be appointed in each area, as well as for participation to be balanced on the boards of local associations.

- Positive experiences in local management of revolving credit funds by producers' organizations, committees or groups to fund small-scale environmental improvement projects on their farms, as well as certain community-level initiatives, make it feasible to envision emerging opportunities to extend this type of mechanism toward grassroots organizations able to manage greater financial resources for larger-scale projects to move from the local level toward the basin or regional levels.

- Progress attained through financial and technical support for the development of micro-projects by technical outreach workers has strengthened their abilities to prepare, implement and evaluate proposals. However, their administration costs are substantial, documentation work is tedious for the technical staff, and this effort may be unsustainable without support from a second-tier implementing agency. One possibility might be for several technical staff from various agencies working in an area or on a given issue to prepare, submit and implement larger project proposals. These could, perhaps, be developed jointly with farmer groups.

- Combinations and two-way linkages between formal agricultural research and farmer experimentation create a fruitful meeting ground for two routes, one coming from the research institutions and the other from the experience of producers. This encounter generates a range of modes of experimentation that are formalized to various degrees, as well as a number of forms of participation by specialists or technical staff and by farmers. This, in turn, originates dialogue and hybridization among their respective types of knowledge.

- Despite the unavoidable complexity involved, it is useful to combine multiple components into strategies for improvement of environmental management. These include experimentation and innovation by agricultural producers themselves; farmer community action networks; participatory training, extension, and research; and also formal investigation on relevant ecological and agroecological matters as well as regarding the agricultural and economic aspects of farming systems. Those strategies should also seek to strengthen the ability to develop proposals, to conduct prospective analysis, to participate in long-range planning and to influence public policy. They should include the study of relevant social networks, of communication processes, of circulation of technological knowledge and of interactions between scientific and local knowledge.

Finally, it is necessary to **assess and ensure future continuity of project initiatives to improve management of natural and modified ecosystems.** In this regard, we find significant strengths and certain weakness. The former include the adoption of ecological concepts and of methodological tools by individual farmers, by grassroots organizations, and by NGOs working at a local level, as well as by a growing number of technical outreach workers and specialists, and by some public institutions and decision-makers. Joint definition of environmental priorities in the communities and participatory planning, with concrete commitments by those involved in it, are also important to ensure durability of efforts undertaken. On the other hand, there is a need to enhance environmental information and its actual use; to develop long-term visions and joint strategic thinking, as a prerequisite for the collaborative preparation of strategic plans in departments, autonomous regions and larger regions encompassing several departments. It is also necessary to attain more direct influence on public policy formulation, from the municipal to the national level.

With regard to the factors that have affected the development of good practices for environmental management, the initial exchange of experience and subsequent discussion of results showed that internal factors may be linked to several components of environmental governance: participation rights of various actors, and especially of rural women, and decision-making at the appropriate level; actual

accountability practices, and also the contribution of scientific and technical knowledge to risk reduction, both for the population and for ecosystems. On the other hand, the external factors that have helped or hindered good management of ecosystems and agroecosystems have to do, primarily, with three components of environmental governance: institutions and laws; property rights; and the role of markets and financial flows.

Regarding the factors that should be taken into account in future projects and cooperative relationships, bearing in mind the above, we can point out the following, among others:

- Explicitly and systematically incorporating the **components and principles of environmental governance** and good environmental management practices.

- Exploring, strengthening, and enhancing **linkages between good environmental management and technological, organizational and methodological innovation processes.**

- Inclusion of the concepts of **expanded agricultural and environmental services** to assess the value of contributions to sustainable use of natural resources and to further development of agroecologically durable rural production systems.

- Strengthening of constructive interrelations between **scientific/technical knowledge and local technological knowledge,** set in the framework of developing knowledge and innovation systems to address uncertainty and environmental, market or other trends that affect natural resources and smallholder farming.

- Mechanisms to expand scale **from specific, isolated areas to the respective basin,** as the appropriate basic unit for environmental management.

- Identification and **inclusion of all relevant institutional counterparts,** both from the official sector and the research centers and universities, as well as among the farmers organizations and NGOs, together with professional groups acting as consultants

and private firms involved in generating alternative technologies or, for example, in marketing of products and inputs for sustainable and organic agriculture.

- Ways to influence relevant public policy formulation from the municipal level, through the departmental and regional ones, up to the national level.

- Establishment or further development of ties with the respective authorities and with other social and institutional parties in the sphere of action of the projects. Strengthening of relations with political and institutional decision-makers in the areas of work, in broader regions, and in the country as a whole.

- Explicit inclusion of public health considerations and indicators, both in areas where production takes place (e.g. intoxications, underground water contamination, etc.) and with respect to consumers (agrochemical residues in food, nutritional quality, and so forth).

- Differentiation between the strategies and technological options that are appropriate, respectively, for the dry and humid Tropics, to further regeneration of degraded areas, sustainable use of natural resources, and development of environmentally durable and economically viable production systems.

- Development of differentiated proposals and alternatives according to the characteristics of the main production systems and the diverse economic objectives of smallholders and other farmers.

- Real participation of farmers in decisions regarding priorities for work plans, hiring of technical services and other relevant matters.

- Explicitly taking into account ethnic, linguistic, and cultural diversity in work with the rural population of each region.

- Support for exchanges and cooperation among projects executed in the Pacific and Atlantic regions of Nicaragua.

- Assessment of the pertinence of developing cross-border project proposals, for example, to improve management of bi- or tri-national basins.

- Active involvement in processes geared toward the construction of prospective visions and medium- to long-term land use planning.

- Detailed study and enhanced use of informal networks and channels for communication and exchange of technological knowledge among farmer experimenters, farmer community action workers and other agricultural producers.

- Analysis and understanding of the local social networks with which technical outreach workers and researchers interact or in which they become involved as they work in each community.

- Consideration of the positive and negative associations between different types of technical outreach workers and of farmers in the process of exploring environmentally and economically sustainable technological options.

- Urgency of including **youths and children** in the training and other project activities of projects, so as to ensure cross-generational continuity.

- Exploring **occupational opportunities not limited to agriculture,** but linked to good environmental management in rural areas, such as ecotourism and agroecotourism.

- Options to further develop the **gender approach** in the work of institutional counterparts.

- Procedures to strengthen **accountability** with respect to communities, civil society, public opinion and government authorities.

- Improvement of **access to and use of information** on relevant prior and emerging environmental processes.

- Strengthening of relations with **local, regional and national educational institutions.**

- Support for, and joint initiatives with, local or regional media committed with environmental and agroecological agendas.

The exchange among the projects allowed us to identify a number of valuable lessons about technological, organizational and methodological innovations in their work. One of the main conclusions in this regard was the necessary interrelationship among improvement of farm management and use as well as conservation of natural resources, organized participation with enhanced decisionmaking power and farmers' control over their own affairs, and a work methodology that enables flowing and constructive dialogue between scientific/technical knowledge and local technological knowledge, with transparent and joint agendas.

The broader lessons from the exchange, discussed above, allowed us to further conclude the following:

- It is feasible to attain a locally-significant impact on the landscape and to generate soil recovery processes, as well as extended forest cover and overall improvement of ecological systems formerly degraded by destructive practices. In the experience we discussed, this was done through a sustained effort to diversify smallholders' agroecosystems by actively supporting agroforestry and the combination of forestry with livestock raising, as well as integrated pest, nutrient or crop management and organic agriculture, together with conservation and sustainable use of local natural resources. On the other hand, insofar as the agrarian structure in neighboring areas includes larger units of production, it will be necessary to develop a strategy geared toward them to complete the process of recovery and conservation.

- When a project supports organic production or agroforestry, it is important to explore opportunities to market those products, preferably beforehand or at least in a parallel manner. There have been certain initiatives to back local, national and international marketing of organic crops, but market research usually exceeds the possibilities of a local group or of an organization in charge of a project in a specific area. It may be necessary to conduct joint efforts, bringing together several groups and organizations.

Logistic and technical support from an institution with access to higher-level advisory services and information may also be required.

- Efforts geared toward **inclusion and empowerment of women** farmers in community organizations and farmer community action networks have been quite successful, though less so in regard to crop-specific associations. This may reflect a gender difference in the range of issues that interest rural men and women, that range being broader and more complex at the communal level. It may also respond to persistent mechanisms of exclusion in groups focusing on specific productive and mercantile activities. Emphasis on the farmer household was combined with a gender perspective, and participation of couples has been beneficial both for them and for the organizations. Efforts to include rural youths have been less successful, and they need to be strengthened to diminish gaps and to attain greater cross-generational continuity.

- **Coordination with environmentalist organizations and local media** is a promising option, one that has already proven its usefulness to enhance efforts and reach public opinion. It is still necessary to strengthen this line of work and incorporate other sectors in each township, department or region.

- **Formal education and training complement** each other, and literacy programs are required in certain communities for their members to have better access to information and other opportunities. Educational institutions, educators and students play an important role in environmental education, and they may play an even more valuable role in conjunction with grassroots groups and organizations in charge of executing projects.

- Both **formal and informal networks** are essential for circulation of technological knowledge and for various forms of reciprocity that foster rural development and environmental governance. We need to know more about the linkages among them.

- Inter-phases between **scientific/technical and local knowledge systems** are a key component of mutually enriching exchanges, and these are necessary to constantly generate innovative solutions to current, foreseeable or unforeseen problems, as well as to take advantage of present or future opportunities. Compatibility of values, mutual respect, transparency and quality of these interactions make a difference in terms of success or failure in such endeavors.

- **Inter-institutional coordination** is a recurring and unresolved need. IPM regional groups and other initiatives for concerted efforts that bring together several institutions in connection with a common interest are concrete steps in that direction, but they are still insufficient.

- The organizations executing projects, their institutional counterparts and the grassroots groups require a **medium- and long-term vision.** This does not only involve their own strategic plans, but also a systematic process of reflection on the development of each community or region. Active participation of all relevant social and institutional parties in this process is indispensable.

The overall balance of this exchange is quite positive, as it allowed us to exchange what we have learned, highlight strengths, specify shortcomings, and identify aspects that should be considered for future proposals. There is also a need to continue exchanges among the participating projects and to follow up on the specific collaborative agreements they reached.

Our general conclusions from this exchange among the projects are, briefly, the following:

- **Environmental governance** is a useful concept for projects that promote sustainable management of natural and cultivated ecosystems, even if they did not originally adopt this approach. In the future, we will include environmental governance as an explicit concept in project formulation or reformulation.

- Active and significant incorporation of agricultural producers, with full awareness and real participation at appropriate decision-making levels, is key for the effectiveness and continuity of **local, regional and national development initiatives.** It is also necessary to further involve other social and institutional parties for those initiatives to expand their scope, influence public policies and effect transformations that require concerted efforts.

- Systematically paying attention to **gender equity** as a cross-cutting theme in the projects, with sensitization processes and concrete policies to support it, makes a tangible and substantial difference in women's participation in decisions of grassroots organizations, especially communal ones. On the other hand, adoption of this approach in the work of institutional counterparts is still not widespread.

- An emphasis on **smallholder families** has been of fundamental importance in the work carried out to date, but there have been greater achievements regarding involvement of the adult couple than with respect to active participation of youths and children.

- Effective environmental management requires active **involvement of civil society in policy formulation** and decisionmaking about the environment. It is necessary to move toward this goal. The process is still just beginning, with some local progress but with substantial difficulties at the departmental or regional and the national levels.

- To improve environmental management, it is also necessary to understand and take into account the **contrasting viewpoints of various sectors**, but it is not always easy to do so. There has been certain progress in this regard, but there are also obstacles yet to be overcome. Representation of the various social and institutional parties needs to be improved, and their participation must become more significant.

- **Access to information** on environmental trends and projections, as well as the use of information already available, are clearly insufficient. This applies to grassroots groups, to institutional counterparts, and to the organizations in charge or project execution. While there is some knowledge about certain previous local environmental processes that can be observed, it is difficult to broaden the scale and to develop future projections.

- Far from being antagonistic to each other, efforts to ensure agroecological durability and socio-economic viability of smallholders' production on their farms may **complement initiatives geared**

toward conservation and sustainable use of natural resources. The former and the latter can, in fact, be mutually reinforcing.

- Continuity of good environmental practices after the projects will depend on effective incorporation of this approach in the manner of thinking and acting of farmers, technical outreach workers, specialists and other participants. An understanding of the basic concepts and values, strengthened by positive experiences and the development of management capabilities, is crucial for that goal to be attained. This, rather than provisional adoption of specific practices or recommendations, is what will enable them to creatively address current and future situations. Agroecological and environmental principles must be combined with the knowledge and values of the farmers themselves and based on mutual respect and trust between them and technical staff or scientists. Lasting development of this type of relationships is made more feasible by flexible projects that can take into account the interests of the various parties and by support that enables them to interact for protracted periods.

- Both the formal farmer community action networks or other organizations and the informal social networks (including kinship, neighborly and other social relations) are crucial for circulation of technological knowledge in smallholder communities. Despite their importance and the fact that farmer community action workers usually are involved in multiple formal and informal networks, we know little about their interrelations and mutual reinforcement, complementarity and potential interference.

- To improve environmental governance, it is essential for the parties involved to jointly build a vision of the future that is compatible or complementary. Dialogues and alliances must be based on knowledge and understanding of the relevant processes through retrospective and prospective analysis of a set of environmental indicators, development of shared medium- and long-range objectives, and participatory construction of a multi-sector strategy, a task still pending. This requires negotiation of partially contradictory interests, as well as overcoming inherited antagonisms.

- Agroecological, market, and political/institutional uncertainties make it necessary to explore lasting and flexible productive options, which, in turn, require agile forms of organization and support to face unforeseen situations and move toward the agreed-upon objectives. Mutual enrichment of local technological knowledge and relevant, high-quality scientific/technical contributions can make a positive contribution to this end.

9

What do we recommend?

The exchange of experience among the projects led to a number of suggestions for our own work, as well as others that donors, counterparts and organizations or institutions interested in these matters might want to consider:

- To systematically continue **exchange of experience** among the projects supported by NORAD in Nicaragua, by means of specific collaboration agreed upon already or later on, as well as through activities for this purpose included in future projects.

- To **share the results** of this exchange of experience among the projects, as well as future ones, with national entities and international organizations in related fields.

- To maintain and strengthen the **emphasis on gender equity** in all the grassroots organizations, especially in the product-specific associations, as well as in work with institutional counterparts and within the organizations in charge of executing projects.

- To strengthen the **emphasis of the projects on the smallholder family** by means of strategies specifically designed to promote active participation by youths and children in training, experimentation and exchanges among farmers, as a way to ensure cross-generational durability of agroecosystem improvement and of sustainable use of natural resources.

- To substantially improve mechanisms for **access to information on environmental trends and projections** and their use by grassroots groups, as well as by the organizations executing projects and their institutional counterparts, through components and activities geared specifically toward this end.

- To establish continuous follow-up mechanisms regarding key indicators of environmental governance and their use by producers' associations, counterparts and organizations in charge of executing projects, as inputs for their own prospective reflections and strategic planning, as well as to influence relevant public policy formulation and evaluation.

- To attain broader and deeper knowledge, understanding, and application of ecological and agroecological concepts for sustainable management of farms and natural resources, by means of participatory training, environmental education, coordinated efforts with the media, and other initiatives.

- To conduct a gender-differentiated analysis of the informal networks, regarding their role and potential in the circulation of ecological and agroecological knowledge, specifying the characteristics of participants and interactions both within the networks and among different types of networks, with various degrees of formalization.

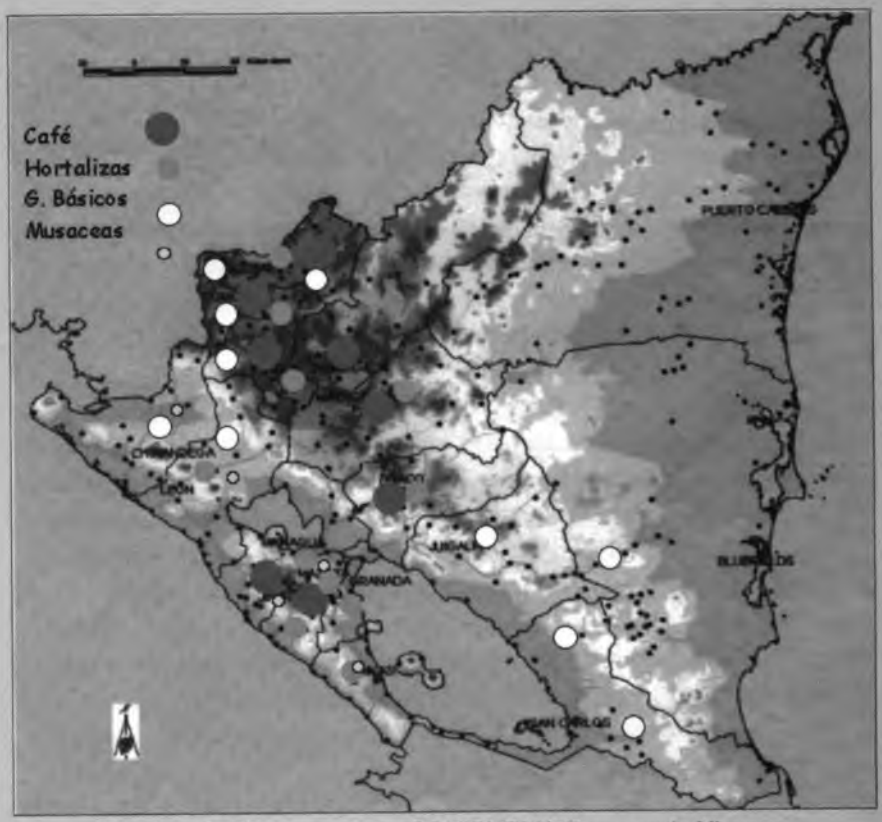
- To continue and strengthen dialogue with other relevant social and institutional parties at the local, regional, and national levels, to develop strategic alliances and joint actions directed at improving environmental management.

- To foster an expansion of the sphere of participation of grassroots and other civil society organizations making proposals in connection with environmental policy formulation, implementation and evaluation, from the municipal to the departmental level and that of the autonomous regions. Furthermore, to explore possibilities of influencing broader-scale processes up to the national and –insofar as pertinent- cross-border levels.

- To actively support strategic thinking by grassroots groups, institutional counterparts, and the organizations executing projects, in dialogue with relevant social groups and public authorities within the respective area, to construct shared visions of the future that enable sustained mobilization of resources and energy toward medium- and long-term environmental objectives.

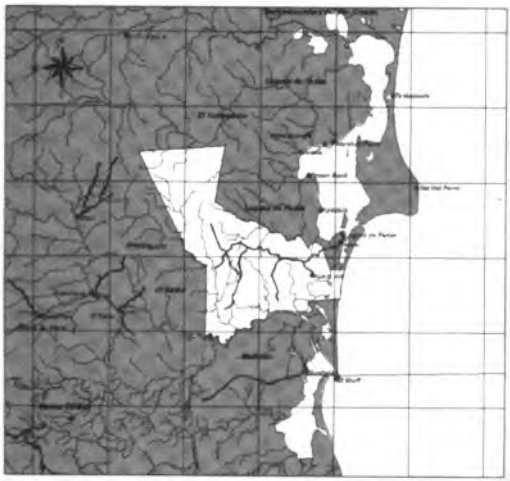
- For NORAD and other cooperation agencies to continue their support for extended rural development processes based on principles of environmental governance, gender equity and organized grassroots participation.

- For cooperation agencies to establish as a condition for their support the demonstrated ability of organizations executing projects to learn and innovate, as well as for development of this ability to be included in the projects themselves.



Location of work-sites by crops of CATIE-IPM/AF program in Nicaragua

Location of Humid Tropics Project of ADDAC in Pancasan, Matagalpa



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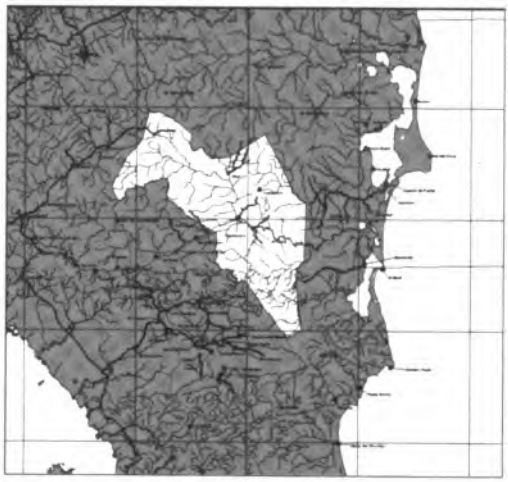
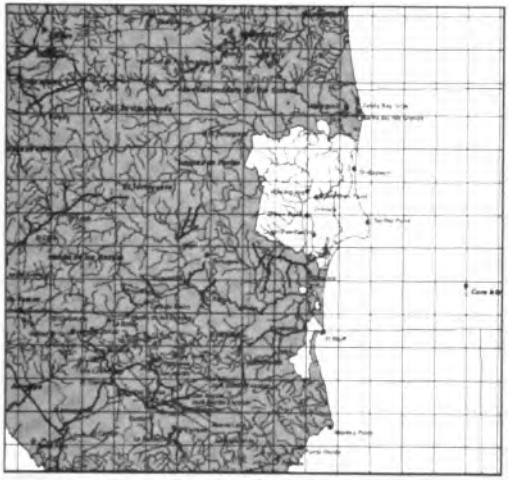
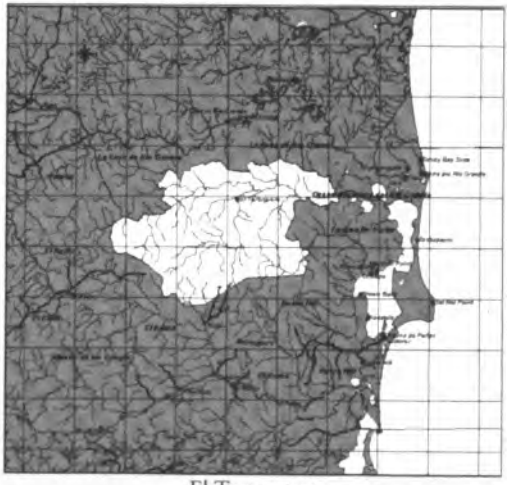


El Rama



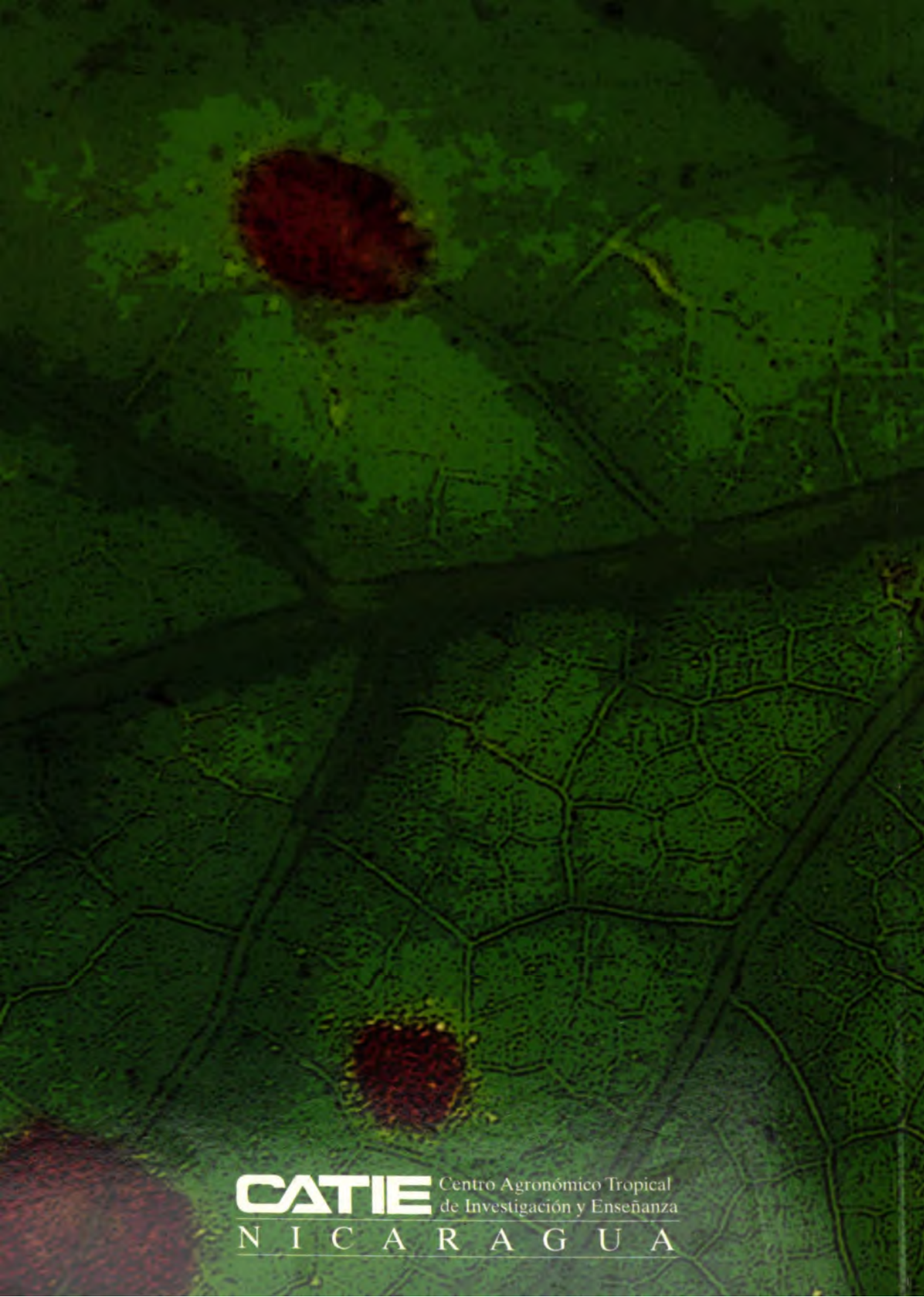
Laguna de Perlas



El Tortuguero

Bluefields

Location of the influence zones of FADCACNIC in RAAS in Nicaragua



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