

# POTENTIALS AND CONSTRAINTS OF THE FARMER-TO-FARMER PROGRAMME FOR ENVIRONMENTAL PROTECTION IN NICARAGUA

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## ABSTRACT

The natural environment in Nicaragua has been damaged by rural development policies geared for the export of cash crops, by uneven land distribution and the near absence of concerns about the environmental effects of the prevailing model of development. The demands made by market forces for the export of primary materials have been reasons for land degradation in the big farms, and the need to survive a poverty stricken existence has forced the peasantry to damage the marginal and fragile land they worked. Successive governments did not address these underlying causes of environmental degradation, and even the opportunities afforded by the environment programme that resulted from the 1979 Sandinista revolution, did not result in significant environmental improvements. The paper briefly considers the constraints faced by the Sandinista administration and how the farmer-to-farmer programme (Campesino-a-Campesino) was brought about as a result of the impacts of the Sandinista era. The substantive part of the paper considers PCAC's significance as an agroecological programme and its advantages and limitations for improving peasants' livelihoods via dissemination of land-protective measures. The viability of the programme is assessed by field work carried out examining in detail the case of three communities, and the paper concludes that the gains made in environmental protection and conservation are in jeopardy without structural policy changes. The paper proposes that for the programme to improve its potential, adequate political will, power and organization are necessary to facilitate greater access to secure land tenure among the peasantry. Copyright © 2003 John Wiley & Sons, Ltd.

KEY WORDS: farmer-to-farmer; conservation; protection; participation; Nicaragua

## INTRODUCTION

Nicaragua's environmental crisis is a product of unbroken development models in the region since the colonial conquests of the Americas. Authors such as Brockett (1988); Chomsky (1999); Faber (1993); De Janvry (1981) and Newson (1982), show how the conquest of Central America instigated a process of change that transformed environmental conditions and social relations of production. Colonialism and the development of the agroexport model gave rise to an economy dependent on the production of primary agricultural products such as coffee, cotton, sugar and beef and led to a highly unequal distribution of resources and power (Leonard, 1987; Utting, 1993a; Wheelock, 1980). At the centre of this unequal distribution process there is an impoverished mass of population, exploited environment and an enriched and empowered bourgeoisie (De Janvry and Garcia, 1992).

In Nicaragua the élite acquired and held on to political and economic power resisting change. Wealth and patronage gave the Somoza family the power to rule Nicaragua in a dictatorial and dynastic form (Black, 1981; Skidmore and Smith, 1984; Walter, 1993; Walker, 1997), supported by US political and economic interests in the region (Berman *et al.*, 1988; Chomsky, 1987, 1999; Dunkerley, 1988). The rural masses were deprived of adequate resources and forced to work as either semiproletarians or proletarians on the land holdings of the bourgeoisie (Brockett, 1988; Weeks, 1985) while overutilizing and degrading the limited natural resources available to them (Rigby and Caceras, 1997; Place, 1998; Shepherd, 1998). Limited access to land, natural

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resources and power have meant that the poor have been denied the opportunity to enact political change and to try more sustainable forms of livelihoods (Faber, 1993).

Environmental degradation is therefore a functional outcome of the country's development model based on the unequal distribution of resources and power. It can be advanced that since the causes of the environmental crisis in Nicaragua are essentially structural in nature, deriving from particular historical conditions of environmental degradation and social injustice, solutions require radical changes to the political and economic structures of society, and not just reformism. This paper considers how the political change brought about by the unseating of the Somoza family in 1979 from power by the Sandinista movement, opened-up the possibility of tackling environmental and social problems. The Programa Campesino a Campesino (PCAC) arose in the latter part of the Sandinista era under which conditions for its development were beneficial, and the paper considers its advantages and limitations for improving peasants' livelihoods via dissemination of land-protective measures, within what has been considered by Goodman and Redclift (1991a,b), Utting (1993a,b) and Redclift (1984, 1994), as a non-radical and reformist, managerial, legislative and technocratic approach. The viability of the PCAC is assessed via fieldwork examination of three communities in the San Dionisio area of the country.

### NICARAGUA: A LAND OF DIVERSE ECOLOGY

Nicaragua's four million inhabitants occupy a country that contains some of the most diverse and biologically important habitats in Central America (Leonard, 1987: 26; Mueller, 2001: 5; Weinberg, 1991: 84), containing 7 per cent of the world's biodiversity in only 0.5 per cent of the earth's land mass (Muller, 2001: 5). While the lowlands of the Pacific coast have been denuded of much of the original forest cover as a result of decades of cotton production, it retains Nicaragua's only examples of cloud forest (Muller, 2001: 9), as well as areas of tropical dry forest, a habitat that remains scarce in the region (Rains Wallace, 1997: 11–12). The Pacific coast's extensive system of lakes (Lake Nicaragua is the largest freshwater lake in the region) also exist as important habitats in terms of freshwater ecology and as a migration areas for birds (Mueller, 2001: 9). The central highlands, while also subject to generations of deforestation in pursuit of coffee and cattle production, still retain a patchwork of semievergreen forest remnants that provides habitats for a diversity of plant, animal and invertebrate species (IRENA, 1992). Nicaragua's Atlantic coast contains the country's and the region's largest tract of tropical rain forest (Mueller, 2001: 6) and represents an internationally important area in terms of its biological content.

A history of unfettered exploitation of these environments through agriculture and resource has degraded this rich ecology. Between 1950 and 1970 Nicaragua lost half of its forests as a result of the expansion of the agroexport production and campesino migrations to the agrarian frontier (IRENA, 1983: 7; EPOCA, 1990: I, 19; Faber, (1993: 43). Soil erosion, arising from this deforestation caused severe problems for agriculture, degrading the land of *campesinos* that were already farming marginal land (De Janvry, 1981: 81; Devereux and Courneyeur, 1994), and agriculture's high dependence on chemical pesticides and fertilizers left Nicaragua with an appalling record of pesticide poisoning and contamination (Murray, 1984; Swezey *et al.*, 1986; Thrupp, 1988). Under the Somoza regime, Nicaragua also lost important mangrove and dry forest habitats and saw increased pressure on wild animal populations through widespread hunting and a flourishing trade in the sale of exotic species as the regime encouraged the widespread exploitation of the environment (Karliner *et al.*, 1986: 5 (EPOCA, 1990: I, 6). Environmental degradation and unequal access to land and natural resources had an important impact on the people of Nicaragua.

According to Grindle (1986: 12), in 1971 only 5.9 per cent of rural households had access to potable water compared with 72.7 per cent in urban areas. According to the OAS (Grindle, 1986: 119), rural homes without sanitation in 1971 stood at 82.6 per cent compared with a figure of just 9.04 per cent for urban areas. The World Health Organization estimated that 17 per cent of all deaths in Nicaragua were due to polluted water (IRENA, 1983: 3). By 1979, in the period just prior to Nicaragua's revolution, the cumulative effect of these processes of agricultural change and exploitation was to leave 62 per cent of the population (80 per cent in rural areas) living in poverty (CEPAL, 1992: 26).

One consequence of this environmental and social degradation and its associated impact on livelihoods in the period before 1979 was increased militancy among the population and support for the revolutionaries of the FSLN

(Sandinista National Liberation Front). As Faber (1992: 37) suggests, the ecological and social conditions of subsistence agriculture have been important in the development of the revolutionary struggle in Nicaragua. The destruction of Nicaragua's environment and the exploitation of its people created an impetus for change and the need for an alternative approach to the environment.

#### SANDINISTA POLITICAL WILL, BUT ...

The unseating of the Somoza family from power by the Sandinista movement sparked expectations and the hope for improving the livelihoods of ordinary people and opened-up the possibility of tackling social as well as environmental problems. However, Sandinismos' own ideological limitations, coupled with political, economic and administrative constraints, proved to be a difficult barrier. The Sandinista's environmental programme began within weeks of the revolution of 10 July 1979. From this point to the late 1980s a number of initiatives were undertaken which encompassed both local projects and national programmes for natural resource protection. The Sandinistas instigated a programme of natural resource protection through the designation of national parks (EPOCA, 1990: I, 24; Ramirez, 1993: 142), the creation of the country's first environment agency, Nicaraguan Institute for Natural Resources and the Environment (IRENA) (Karliner 1989a: 800) and legislative measures that banned the hunting of endangered species (Karliner *et al.*, 1986: 5; EPOCA, 1990: I, 6), restricted the use of pesticides (Atkinson, 1985; Neitschmann, 1990) and committed Nicaragua to endorse a raft of international environmental treaties (Faber, 1993). Projects for reforestation (IRENA, 1988a: 12; Heiner *et al.*, 1989), watershed management (Pfeiffer, 1986), renewable energy (Kuhn, 1983: 25, Weinberg, 1991: 79) and development and measures to combat soil erosion (IRENA, 1988b: 4; CAHI, 1989: 9) were also created to redress decades of natural resource degradation and to reduce the country's impact on the environment. The Sandinista's environmental initiatives represented some of the most extensive environmental programmes ever attempted in the region. In addition to these more reformist conservation measure, attempts were made to redistribute land and to address Nicaragua's legacy of acute resource inequalities.

Under the SAR (Sandinista Agrarian Reform), Somoza's land was confiscated and released to state farms and to a lesser degree to campesinos who were also provided with the resources to produce effectively. Other large land owners would be allowed to continue to hold their land so long as they continued to produce or did not undermine the new state. The SAR, while important in its confiscation and redistribution of Somoza's land, was still limited in its effect upon the wider agrarian bourgeoisie and upon the reorganization of export agriculture. The limits of the SAR are illustrated by the FSLN's own policy document, The Historical Programme of the FSLN (1969) (Utting, 1988: 3, 1992: 159), clearly stating the intention to compensate 'patriotic landowners' who are affected by the agrarian reform.

While the environment programme was credited with a number of important successes, particularly in relation to reforestation, pesticide reform, resource distribution and legislative measures, few of these initiatives progressed successfully beyond the early years of the revolution. Despite what Faber has described as 'some of the most innovative and comprehensive environmental programmes of any country in Latin America' (1992: 37), the actual long-term successes of the Sandinista environment programme were limited and failed to meet the enthusiastic expectations of the early years of the revolution.

The programme was undermined by a number of interrelated factors. A primary cause of its demise was the United State's concerted attempts to destroy the revolution through economic blockade and another was the military means of the proxy-army of the Contra (counter-revolutionaries), resulting in, as Jerez and Marchetti noted, the 'wearing down of the Sandinistas and imposing an unbearable economic cost on the Nicaraguan People' (1990: 58). Not only were the infrastructure and personnel of the programme targeted (Ruiz, 1987, Paper presented at 1st Central American Environmental Conference, Managua; Rice 1989; Norsworthy and Barry, 1990), but the economic crisis caused resources to be redirected away from it, leaving it underfunded and undermanned (CAHI, 1989; EPOCA, 1990; Faber, 1993; Utting, 1993b). The fear of the Contra caused some campesinos to refuse or abandon SAR lands, thus undermining the SAR's ability to improve campesinos' access to adequate land and so reducing their impact on the environment. As an officer of the PCAC in the town of San Dionisio explains:

During the 1980s there was a lot of fear and there was the Contra. A lot of people didn't take the land that was offered. Therefore, the agrarian reform [here] didn't have such an effect, and those that did get land had to fight for it. In this area there wasn't a lot of access to land through the agrarian reform (pers. comm).

The war and the economic crisis it produced cost the Sandinista state and the Nicaraguan economy an estimated US\$18 billion (Anderson, 1983; Faber, 1993; INEC, 1988; Siegal, 1987). The pressure exerted on the government by the war to maintain agroexport production in order to generate foreign exchange, created a climate in which production predominated above other social and environmental considerations. It also helped to reinforce the predominance of intensive, export agriculture.

### THE LIMITS OF THE REVOLUTION AND THE SAR

The agrarian bourgeoisie successfully lobbied for the continuing domination of intensive agroexport production and state subsidies to their sector, despite its implications for the environment and small producers. The limitation of financial support for small and middle peasants, their intimidation by the Contra, and the pressure exerted by the middle peasantry and agrarian bourgeoisie, resulted in a redirection of finances towards agricultural production in the private sector and away from other areas of state spending.

The Sandinismo's inability to diversify agricultural production methods was also in part a product of the limitations of the SAR itself. Large sections of the agrarian bourgeoisie had retained their lands under the SAR, and combined with the Sandinista's policy of creating a broad political front in the wake of the revolution, enabled conservative forces to retain significant influence over economic and agricultural policy. The work of Vilas (1992) in particular, has shown how members of the families of the landed and business elites obtained positions of power within the new state or within nationalized state industries. Vilas notes, for example, how the chairman of the Central Bank, members of the Council on Internal Affairs, Deputy Minister of the Interior, chairman of the National Finance System, the Minister of Foreign Trade, the Minister of Budget and Planning, members of the directorate of INRA (Nicaraguan Institute for Agrarian Reform) and MIDINRA (Ministry of Agricultural Development and Agrarian Reform) and certain representatives of the National Directorate (the FSLN's ruling body) were members of long-established landed and business families. In all, Vilas identifies almost one hundred deputy ministers, director generals and managers with links to the agrarian bourgeoisie. In effect these positions, and the retention of much of their landholdings enabled the agrarian bourgeoisie to influence state policy and the direction of agriculture, maintaining many existing structures of export agriculture. The agroexport model was favoured, as Linkogle (1998; 96) notes, by the 'sizeable number of technocrats and professionals from traditional bourgeoisie families' that were involved in the agrarian reform. The Sandinistas' own policies not only denied them effective control over large areas of agricultural land, but essentially divested much of the power over agriculture into the hands of those least likely to bring about change.

The continued concentration on agroexport production came at the expense of natural resource protection (Nations and Leonard, 1986: 70). This, the increased spending on defence, which by 1988 had reached 62 per cent of the national budget (CAHI, 1989; Conroy, 1990), the intimidation of campesinos, and the war, were reasons for the worsening economic climate and consequent waning institutional strength.

However, as the environmental and economic conditions deteriorated, and institutional state constraints precluded environmental protection, a number of community-based agroecological programmes emerged in the latter half of the 1980s. These initiatives were on the one hand independent of wider state agricultural and environmental policies, but at the same time a product of the changes that have occurred under Sandinismo. The revolution created a political and social space within which campesinos were able to organize more freely (Brown, 1990: 57; Selbin, 1995: 58). As one campesino notes:

During the time of Somoza it was very hard for the campesino. Then under the revolution we were able to live more freely, to organize. Some of us joined UNAG [trades union], it gave us confidence (pers. comm., fieldwork, 1998).

The creation of UNAG itself was crucial. UNAG's links to campesino organizations in the region resulted in the farmer-to-farmer methodology being transferred to Nicaragua in 1988 (Holt-Gimenez and Cruz-Mora, 1993; UNAG, 1991, 1995a,b).

The economic and political limitations of Sandinismo (Quandt, 1995; Selbin, 1995; Polakoff and La Ramee, 1997) were also important in causing many in Nicaragua to look for alternatives to traditional forms of production and natural resource use (EPOCA, 1990). Predominant among these new programmes was the PCAC. Small producers undertook these programmes as a means to both address environmental degradation, and to offset the lack of resources available to them. In effect a vacuum had opened up in Nicaraguan politics into which an increasingly independent community movement was moving. As Weiberdink and Van Ketel (1988: 22) suggest, these changes were the beginning of 'a new form of grassroots environmentalism' that was to influence the direction of environmental protection in Nicaragua throughout the following decade.

### CAMPESINOS' ORGANIZATION AGAINST ALL ODDS

Sandinista initiatives attempted to increase local participation and to introduce a more integrated approach to agriculture and the environment. Towards the end of the Sandinista revolutionary era non-governmental organizations (NGOs) and community-based organizations started to provide an alternative approach to the State-centred, agroexport emphasis. The elections of February 1990, however, saw the Sandinistas removed from power and the UNO (United National Opposition) coalition formed a new government with a commitment to dismantle the agrarian reform and other objectives of the Sandinistas. The UNO's implementation of an IMF structural adjustment programme and the privatization of state resources, ushered in a neo-liberal direction in economic and social planning, but the new government inherited a growing trend in community-based initiatives and involvement of NGOs in the development process.

The considerable community-based and NGO involvement kept growing under the UNO. In 1987 there were just 45 members of PCAC operating in only two municipal areas. By 1996 it was estimated that there were around 6600 direct beneficiaries of the programme with a further 13 600 who were indirectly benefiting from its work (UNAG, 1996). Most recent estimates of national membership put the figure at around 9000 direct beneficiaries and 16 000 indirect beneficiaries, some 25 000 in total, working in 90 of the country's 143 municipal areas (UNAG, 2001). Lack of data on other agroecological programmes in Nicaragua makes comparison with the PCAC statistically impossible. However, a number of researchers (Holt-Gimenez and Cruz-Mora, 1993; Holt-Gimenez, 1996a, 1997; Rocha, 2002) believe the programme to be the most successful of its kind in Nicaragua in terms of its membership, geographical reach and innovative methodology.

The relative success of the PCAC lies in its flexibility, diversity and other related essential elements that remain at the core of the programme's methodology and approach. The diversity of techniques and methodologies, described as the 'methodological basket' (SIMAS, 1995; Scarborough, 1997: 46), is used by campesinos to teach the ecological and organic production techniques that underpin the sustainable agriculture that the programme promotes. Sustainable agricultural practices are being taught using experimental plots, site visits, demonstrations and workshops, as well as games, literature, music, poetry and song. The exact composition of the techniques used is dependent upon the needs and abilities of the particular local community concerned, but the methodology of the 'basket' does comprise three essential elements: (1) problem analysis, (2) experimentation and (3) promotion (UNAG, 1991; SIMAS, 1995).

After analysis of the problem a process of experimentation seeks to identify the necessary solution or combination of techniques that can best be employed to address it. The transfer of the skills and techniques necessary to achieve this occurs between campesinos in a horizontal structure. Likewise, the promotion of the experimental outcomes and the spread of the programme to other areas is done through the campesinos themselves and in particular through the work of the promoters, a highly motivated group of volunteers.

The role of the promoters is an essential component of the programme. Within each community, volunteer promoters take on responsibilities as programme representatives, innovators and extensionists. While many campesinos within the programme have a part to play in undertaking these roles, the promoters are the most active and motivated of the participants. They act, as Holt-Gimenez and Cruz Mora have suggested (1993: 62), as

catalysts, often initiating experimentation and innovation, organizing training sessions and acting as links between campesinos, technicians and representatives of supporting NGOs. The UNAG sees them as being those who hold the most important position within the programme (UNAG, 1991: 13). They are the ones who undertake the innovations for environmental protection and through whom the expertise is transferred. It is the promoters who drive the programme towards a new model of agricultural development, which is appropriate for campesinos.

Promoters, unlike many professional extensionists, are utilizing the same techniques on their own farms as they are trying to provide to others. Their own land acts both as production units and as experimental plots on which other campesinos can see the new protection and production techniques being tried out. Their neighbours know that the promoters, having to live off the land as they do, would not be adopting practices that were not working. The scepticism with which campesinos have often treated external extensionists and their ideas is generally absent from the relationship with the promoters, who live among them. Promoters use their own experiences to show others the use and value of the new techniques. Demonstrations in the field and a hands-on approach are used to show the techniques working in the environment that is most important to the campesinos: their own fields. Promoters are aware of the problems neighbours face, the solutions that have been tried and failed in the past, the realities of individual family incomes and abilities; in short, they recognize what is required and what is possible for those around and with whom common realities are shared.

While highly motivated, promoters have also gone through a process of learning and change themselves, developing the knowledge and the skills necessary to impart their experiences. Indeed, the work of being a promoter has been a transforming process for many. It represents the first opportunity for most to take on responsibilities beyond the home, to speak in public and to have their experiences and lives valued. Promoters either volunteer for the position or they are proposed by the local PCAC or by others in the community. Motivation and enthusiasm appear to be essential ingredients, but equally volunteers need to have or to obtain the acceptance and trust of the community. Without this, it is hard to see how they could properly undertake their work. However, this acceptance is not guaranteed, promoters must be seen to be successful in the work they do on their land and in their ability to share their knowledge and experiences with others. While promoters undoubtedly enjoy high status in their communities, the relationship between themselves and those they work with can be endangered if the promoters are seen to be obtaining 'too many advantages'. The adoption of the techniques of the programme and the relationship with the promoters is fundamentally based on the premise that 'what is possible for the promoters is possible for the rest'. If promoters are perceived as being in a more advantageous position than other producers, the techniques they promote may be seen as beyond the economics of other, non-promoter campesinos.

Some of the most compelling evidence which suggests that the PCAC is working is that campesinos are continuing to use it and to spread it to their neighbours. Data on the development of the PCAC (European Commission–UNAG, 1993; UNAG, 1998) show that since its beginning in Nicaragua in 1987 its membership and the number of municipal areas it operates in increased (see Tables I and II).

Examples of NGO and PCAC activity can be drawn from the communities in the San Dionisio area of central Nicaragua which were investigated during the field work for this research. The international NGO, Swiss Aid,

Table I. Changes in PCAC membership (producers and promoters), national figures 1987–2000

Year	1987 <sup>1</sup>	1998 <sup>1</sup>	2000 <sup>2</sup>
Producers	30	7267	8320
Promoters	15	683	790

Sources: <sup>1</sup>UNAG, 1998; <sup>2</sup>UNAG, 2001.

Table II. Changes in the number of municipal areas in which PCAC operates, 1987–2000

Year	1987 <sup>1</sup>	1990 <sup>1</sup>	1991 <sup>1</sup>	1992 <sup>1</sup>	1993 <sup>1</sup>	1995 <sup>2</sup>	1998 <sup>2</sup>	2000 <sup>3</sup>
Municipal Areas	2	9	21	33	39	65	78	90

Sources: <sup>1</sup>European Commission–UNAG, 1993; <sup>2</sup>UNAG, 1998; <sup>3</sup>UNAG, 2001.

provided funding for the building of a water system in the community of Piedra Larga in the early 1990s and the PCAC was introduced to the San Dionisio area. The PCAC had spread to 13 communities in the San Dionisio area by 1998, when it was estimated that there were almost 700 members, representing some 190 families, including 85 promoters or facilitators (PCAC, 1998: 10). The PCAC estimates that it also has some 170 members of their youth organization whose main role is in relation to cultural events, and that for every one direct beneficiary, there are three others benefiting indirectly from the programme: some 2000 people in total.

The PCAC's work has acted to change the agricultural practices and methods of its members. Campesinos undertake projects that involve measures to protect and increase local natural resources and diversify their agricultural production. The environmental problems common to rural communities in Nicaragua are addressed by the programme through projects for soil conservation, reforestation, crop diversification, integrated pest management and the use of organic fertilizer. On the steep-sided fields that they are often forced to farm, campesinos are instructed in the building of barriers to arrest the loss of topsoil. The field's hill contours are mapped using a simple A-frame. These are devices that allow the barriers, constructed out of either stones or plants, to be placed in positions to give maximum effect. Dikes or ditches may also be constructed to direct water runoff and further alleviate the rain's effect on the soil. In small tree nurseries, groups of programme members work together to grow tree seedlings. These are replanted on the land of members to protect the soil and water sources, to provide shade, construction materials, foodstuffs and the constituents for natural pesticides. Campesinos families depend on fuelwood for cooking and for heat, burning the fuel on inefficient, open hearths. As a response to this, the programme has helped campesinos to construct fuel-efficient (*cocina-lorena*) stoves that reduce the volume of fuel used.

Traditional campesino practices of burning fields in order to clear the ground for planting, has left the land bare and vulnerable to erosion. In response, the programme has shown campesinos the detrimental effects of burning and has encouraged them to deal with the problem by promoting intercropping of maize and beans to create almost continuous ground cover during the rainy season and so reducing soil loss and the need for burning. The intercropped beans, as well as suppressing weed growth and providing a food crop, also act as nitrogen-fixers, providing valuable soil nutrients. Campesino families are also encouraged to diversify their crop production. As well as reducing the vulnerability of their crops to pests by increasing diversity, new varieties of beans are being used to improve diet and provide cheap animal foodstuffs. The growing of small vegetable gardens on houses plots also provides new sources of food and medicinal plants. Within these projects campesinos not only learn the means to protect and develop local resources but as Holt-Gimenez (1997: 38) suggests, gain confidence in their own worth and abilities. But the benefits of the programme appear not to be restricted simply to the PCAC's membership.

Non-participants are adopting PCAC practices as a result of observing its work and in communication with their member neighbours. Non-members in the community are benefiting, the PCAC argues, from general improvements in local resources, such as reforestation and soil protection projects. As TA, a local PCAC officer from San Dionisio, suggests: 'The programme has been providing some good returns for the campesinos working in it. People have seen the soil improving and their crops doing better. We have more trees, more options' (Pers. comm., fieldwork, 1998).

Although the changes in campesino involvement through the PCAC have occurred in Nicaragua since 1990, the underlying problems which led to the revolution in the first place, still continue. The natural environment and the social infrastructure that depend upon it are being increasingly degraded by these continuing problems. The conclusions of post-revolutionary officials are that environmental degradation continues to hinder Nicaragua's social and economic progress. As a representative of the environmental NGO, NICAMBIENTAL suggests: 'Things have changed, but that's not to say that before, the state of the environment was good, or that it's better now. Mistakes have been made and repeated now. The result is that the natural resources are under grave threat and so are the people' (Pers. comm., 09.08.1998). Continuing financial and institutional constraints have marred the relative good uptake of the PCAC as it did the environmental efforts of the Sandinista resulting in further environmental damage.

#### THE 'UNWILLINGNESS' OF THE PRESENT POLITICAL ORDER

The disparate nature of the new community-based approaches, the myriad of programmes that encompasses it and the NGOs which fund them, has resulted in a largely unorganized and uncoordinated response to the environmental

problem. The new political order that came to power after the Sandinistas has not given the adequate and necessary support to campesinos' organizations and environmental degradation has accelerated considerably.

Despite the recent interest in alternative agricultural practices and the prominence of the PCAC in these new approaches, the programme has received no support from the state or from large international agencies such as the World Bank, IMF or USAID. It instead relies on funding from international aid agencies such as Oxfam, Swiss Aid and also the Nicaraguan trades union (UNAG) that has been the primary organizer and facilitator for the programme. The governments' unwillingness to support the PCAC may be in part explained by the state's antagonism towards organizations specifically associated with Sandinismo. As a representative of the environmental NGO FUNCOD notes, because of UNAG's close association with the Frente (the FSLN—Sandinista National Liberation Front), government has viewed the PCAC with distrust because of UNAG's prominent role in it. This is, as he notes, the most likely explanation for the state and other supra-national institutions' lack of financial support for PCAC:

One problem is UNAG's continued involvement with the PCAC. The government sees UNAG as the Frente and so they won't give support [to PCAC]. Ideally, PCAC should be independent from UNAG' (pers. comm., fieldwork, 1998).

The state's disinterest in the PCAC may also reflect an underlying disinterest in agroecological initiatives, favouring instead large producers and export agriculture. The Chamorro administration has, for example, been criticized for its failure to engage local populations in environmental projects (FOGN, 1993: 62; Ramirez, 1993: 13; MARENA, 1994: 17), while the World Bank (2001b, c) has criticized the Aleman government for its failure to implement many elements of its environmental and poverty reduction strategies.

Even an organization such as the PCAC, which has wide geographical reach, does not have a full nationally coordinated approach to environmental problems. The PCAC's local autonomy, while creating high levels of local democracy and participation, suffers from fragmentation—a product of the poverty of many of these types of organization. It has to be recognized that the limited staff, resources and means of communication all restrict their ability to develop effective national projects.

The growing disengagement of the post-Sandinista governments from environmental action has severely limited ability to develop national strategies. State policies and political backing are vital for these projects to develop successfully (Thrupp, 1996: 1). Neo-liberalism has acted to reduce the ability of the state to coordinate and organize national resources for the protection of the environment. Dwindling state budgets, declining public services and the privatization of natural resources are all part of this process. Carney (1995: 2) also notes that the impact of neo-liberalism has been to reduce the number and quality of state personnel in relation to the management of the environment, a condition readily observed in Nicaragua.

Despite the end to the Contra war, the lifting of economic sanctions and receiving considerable foreign aid, the new Nicaraguan government has failed to pay adequate attention to the environmental problem. Between 1990 and 1994 Nicaragua received the highest per capita foreign aid of any developing country, US\$182 million annually, but 94 per cent of this had to be used against debt repayments (CAHI, 1995: 5) and the country continues to be affected by tremendous environmental and social problems.

One indicator of environmental degradation is deforestation. While data from a number of sources showed that the rate of deforestation has remained largely unchanged from the mid-1980s to the early 1990s, from 1993 the rate has increased significantly (see Table III). At this level of degradation it is estimated that all of Nicaragua's forests will be removed between 2020 and 2025 (Holt-Gimenez and Cruz-Mora, 1993: 51).

Table III. Rates of deforestation in Nicaragua, selective dates 1985–95

Year	000's ha yr <sup>-1</sup>	Annual percentage loss of forests
1995 <sup>1</sup>	1508	2.5
1993 <sup>2</sup>	1500	2.5
1990 <sup>3</sup>	1200	2.1
1985 <sup>4</sup>	1200	2.1

Source: <sup>1</sup>World Bank (2001a); <sup>2</sup>Holt-Gimenez and Cruz-Mora (1993); <sup>3</sup>World Bank (1997); <sup>4</sup>World Bank (1993).

Table IV. Volume of exported wood from Nicaragua, 1992–95

Year	Volume (m <sup>3</sup> )
1992	4650
1993	7210
1994	26 870
1995	55 390

Source: ESECA (1996: 64).

The immediate cause of deforestation remains, as it was before the revolution, the clearing of land for agriculture, whether by ranching or subsistence. As in previous times poverty and displacement from the land since 1990, has forced campesinos to migrate to the agrarian frontier and clear forests (Standfield, 1995: 17). Demand for fuelwood and lumber, though much less significant than the effects of agriculture (van Buren, 1988: 34) has also contributed to the problem. Research by ESECA (1996: 64) shows that the wood product exports have risen sharply since the early 1990s (see Table IV), suggesting that the loss of forests is in part due to the relaxation of export controls and the access to forest resources by commercial interests. Deforestation and inappropriate use of land has resulted in continuing soil erosion and accompanying loss of soil fertility.

As R.V., the rural development NGO, CIAT's representative in Managua points out:

'Accelerated deforestation is contributing to reduced rain and increased irregular rain patterns. This in turn is causing more erosion and desertification of soils and the deterioration and drying up of water sources' (pers. comm., 07.08.1998).

Some 7.7 million ha of land are subject to erosion (CAHI, 1996: 16) of which 2.5 million ha is considered moderate and 1.1 million ha is regarded as severe (MARENA, 1994: 51). In the Pacific region alone, some 15 000 km<sup>2</sup> are affected by soil erosion (Devereux and Courneyeur, 1994: 13). In severe conditions, up to 100 t ha<sup>-1</sup> yr<sup>-1</sup> can be lost from affected areas. Both moderate and severe levels can have a serious impact of agricultural productivity.

The silting and contamination of water sources also present a serious problem. Deforestation, the release of untreated domestic and industrial waste and agricultural run-off contaminated with pesticides, inorganic fertilizers and coffee by-products have all contributed to leaving almost 40 rivers and 8 major lakes in a serious condition (Devereux and Courneyeur, 1994: 14). As Rino Santamaria, professor of ecology at the Central American University in Managua warns:

All of the rivers in Nicaragua have problems. Their basins are being deforested indiscriminately and their water gravely contaminated (Anon., 1996: 5). Twenty-two per cent of people have no access to potable water (80 per cent in rural areas) and only 30 per cent have any form of sewage service (PCN, 1996: 29).

Evidence from the field illustrates the environmental problems being faced, and campesinos have testified to the threat to their local water supplies from deforestation of watersheds and the sale of essential land to community water supplies. As the testimony from the San Dioniso area shows, land disputes and issues over essential resources reflect the continuing power of large landowners as well as the unresolved impacts of the SAR during the Sandinismo. Communities are at the mercy of unscrupulous landowners whose control of essential common natural resources threatens entire ecosystems and the agricultural systems which are dependent upon them.

Those who own the trees where the water comes from have threatened to cut them all. They say we can buy the land off them, but how can we afford it? It's hard enough for campesinos to try to buy land to grow crops, but we don't have the money to buy all this land to protect the water as well (PLA-018, fieldwork, 1998).

Campesino poverty means options are limited and redress through the courts is often beyond their finances:

The [land] owner says that he wants a lot of money or he will destroy it [the forests on the watershed]. We have denounced the new owner to the judge but we would have to pay US\$300 to pay the legal costs to look at the case. It's a lot of money: yesterday I worked eight hours in the fields and earned ten Cordobas [approx. US\$1] (PLA-018, fieldwork, 1998).

Loss of habitats, hunting, overexploitation and inappropriate use of farm chemicals continued to endanger much of Nicaragua's wildlife. Increasing use of pesticides in the wake of the expansion of agroexports for example, has seen many predatory animals approach extinction point (Devereux and Courneyeur, 1994: 17). Recent figures show that 65 species of animals and higher plants are threatened with extinction (WRI, 2001). Coastal estuaries, mangroves swamps and their accompanying ecology have been seriously degraded by demand for fuelwood, and by pesticide contamination and the establishment of a largely unregulated shrimp industry (UNCED, 1992; Devereux and Courneyeur, 1994: 16).

But the underlying causes are poverty and unequal resource distribution that remain unresolved. While there is some recognition by international institutions of the impact of poverty on the environment in Nicaragua (World Bank, 1996: 4), there is no suggestion of redistribution of wealth to redress the imbalance. Instead, these institutions propose reformist projects of agricultural modernization, infrastructure building, education, poverty alleviation and environmental legislation, alongside the obligatory structural adjustment programmes, rather than more help for grass-roots organizations such as the PCAC, let alone the redistribution of wealth and power.

The engine for social change has been the struggle of ordinary people against the oppression of the landed aristocracy in Nicaragua. The new political order, however, has shown an inhuman indisposition to tackle the environmental and poverty problems in the country and support for the PCAC is thin on the ground. Instead the agroexport sector has expanded with all the accompanying environmental problems. Both the Chamorro and Aleman administrations embarked on an expansion of the production of cotton and other non-traditional export crops (Henson, 1990: 6; Faber, 1993: 18), and there was a redistribution of land from the land-poor to larger landowners, reversing the limited outcomes of the Sandinistas agrarian reform.

The agroexport strategy can be seen as an attempt to increase foreign exchange earnings in the face of huge debt and a crippled economy. Ironically, as Bulmer-Thomas (1991: 43) notes, the expansion of exports is in part a reaction to the depression of internal markets as a result of the draconian policies of structural adjustment implemented by the Chamorro government. The need to obtain foreign exchange under extreme economic conditions has parallels with the problems faced by the Sandinistas in the 1980s. However, agroexport production under the post-Sandinista governments became more than an agricultural process. It became a socio-political tool used for the rapid accumulation of wealth and power at the expense of campesino subsistence agriculture, their livelihoods and the environment that sustains them.

The reversal of the SAR programme (the counter-reform) benefited large landowners, exacerbated poverty and increased environmental degradation still further. While the roll-back of SAR has not gone as far as the instigators of the counter-reform would like, as Jonakin, (1997: 101) points out, they can just sit back and let market forces take their effect. This sit-back approach by government, combined with a lack of financing of small farmers has been the last nail in the coffin for many SAR beneficiaries. As a representative of the Comunidad Indigena in Nicaragua explains:

There hasn't been enough financial support, so many of the cooperatives have been forced to sell their land in order to survive . . . the problems began in the 1990s. There was a feeling of menace and a lack of confidence [among peasants] so people sold up.

This is supported by testimony from other campesinos:

When the cooperatives we all broken up, there were people hired by the rich landowners who came and threatened us. We were afraid, so we sold up (ELJ-021, fieldwork, 1998).

It was too difficult to go on. We had debts and when the man from the finca [large farm] came and wanted to buy the land we had to sell it. Now we just rent. (OAB-016, fieldwork, 1998).

Despite the agrarian reform of the 1980s, many SAR beneficiaries, deprived of adequate credit and technical support have been unable to cope. As a number of researchers (EPOCA, 1990: 14; Holt-Gimenez and Cruz-Mora, 1993: 53; WRI, 2001) note, these difficult economic- and resource-related conditions have resulted in a fall in production, further increasing the economic and political pressure on small producers. The unwillingness of the new political order to give adequate support to the PCAC has also increased environmental pressure.

The numbers of campesinos either engaged in the programme, or who have benefited indirectly from it (approximately 25 000: UNAG, 2001) represent a small proportion of campesino producers. The work of the programme means that these producers are undertaking agroenvironmental practices that in most cases they would otherwise not have adopted. Yet the ability of the PCAC to reach large sections of the rural population is restricted by the highly unequal distribution of land and natural resources. Some 2.0 per cent of farms are over 140 ha in size, and these large producers control some 24 per cent of Nicaragua's farmland (Rocha, 2001: 24). Therefore, almost a quarter of Nicaragua's farmland is likely to remain beyond the reach of environmental protection or sustainable agricultural practices under the current ownership regime.

Limited land ownership and the need for many campesinos to rent land from large producers excludes many of the former from participation in the PCAC. As campesinos explain, renting land prevents long-term commitment to conservation measures on the land:

If you only rent, you can't do the work with the programme. What would be the point of improving the land for someone else to lose it all next year, you would be crazy (OAB-018, fieldwork, 1998).

No, without your own land it's hard to do the programme. A lot of campesinos are interested but they are too poor, they don't have land or not enough' (OAB-016, fieldwork, 1998).

Large producers priorities are often very different from campesinos with an emphasis on export production which has direct effects not only on the latter's livelihoods but on the conservation measures which they want to implement. Again, campesino testimony from the field illustrates this:

You can't do a lot on the land that you rent. The landlord doesn't want you to change the land, he thinks it will make it poor for the cattle so doing the work of the programme is difficult if you only rent land. Sometimes you can't get the land at all. When the landlord wants to get more cattle, there's less land for the campesino (ELJ-017, fieldwork, 1998).

The issue of the unequal distribution of natural resources and the power to decide how land is used is therefore a critical factor in understanding the impasse in finding a solution to environment degradation in Nicaragua.

## CONCLUSION

Removing the Somoza regime opened-up considerable opportunities to deal with the socio-political problems responsible for environmental degradation. However, Sandinista and UNO's governments did not make the best use of the political and economic resources at their disposal to exploit these opportunities. The pressures exerted by the external and internal opposition, especially the Contra war, thwarted the Sandinistas political will to effect a lasting redistribution of land under the SAR. Sandinistas started to rely on the production of larger farmers for the export market. This reliance increased under post-revolutionary and undermined the hopes and ability of campesinos to make their farms and livelihoods economically sustainable while protecting the environment.

The reason behind the failure of successive Nicaraguan governments to deal with the environmental problem is due largely to their inability to tackle the political and economic structural factors that underline the degradation of the environment. Attempts to deal with the social and environmental problems have so far been reformist. The lack of governmental support for campesinos' organizations such as the PCAC, is not only a function of the particular strategic planning of Sandinista or non-Sandinista governments, but it is also part of wider economic, political and institutional state constraints. The state under the Sandinista government, faced constraints resulting in contradictory

policies that damaged the environment, and maintained dependency on unsustainable forms of agricultural production. Post-revolutionary governments have not only reversed a considerable number of outcomes of the previous Sandinista government, such as those of the SAR, but also do not facilitate the operations of the PCAC. The MIDINRA and IRENA have consistently and steadily been starved of funds and staff, denying the necessary support needed for their facilitatory role with PCAC.

However, the PCAC has been growing in strength regardless all the constraints. The flexibility and diversity of PCAC's 'methodological basket' is used to teach ecological and organic production techniques that underpin sustainable agriculture. The facilitatory work of promoters in experimental plots, their site visits, demonstrations and workshops, using games, literature, music, poetry and song, are surviving participatory didactic strategies from the time of the Sandinistas. The PCAC, however, needs to consolidate more of these achievements, make them sustainable, and expand their capacity.

The expansion of the PCAC and the protection of the environment and livelihoods of campesinos require the commitment and improved capacity of the state, once again, to redress the balance of power between large and small landowners. It is paramount that Nicaraguan governments support the PCAC's projects by the implementation of a long-lasting solution to land ownership security and environmental protection. The contribution PCAC can make to environmental protection, furthering the sustainable livelihoods of campesinos and crop production has the potential to play an important role in the overall strategy of sustainable and democratic rural development.

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