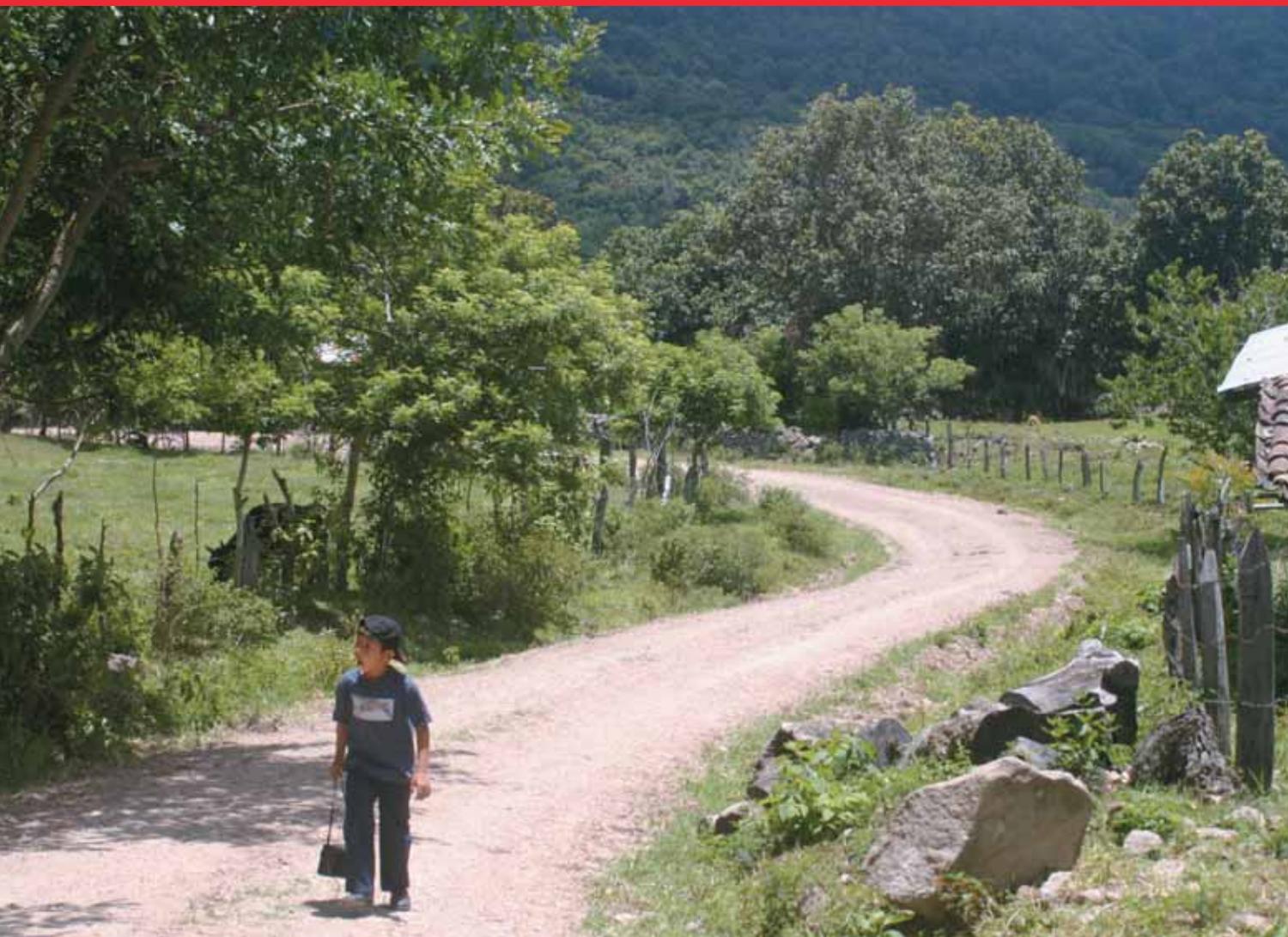




**IMPACT EVALUATION OF DANIDA SUPPORT  
TO RURAL TRANSPORT INFRASTRUCTURE  
IN NICARAGUA**

**evaluation**

2010.01



MINISTRY OF FOREIGN AFFAIRS OF DENMARK  
**DANIDA** INTERNATIONAL  
DEVELOPMENT COOPERATION



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# **Impact Evaluation of Danida Support to Rural Transport Infrastructure in Nicaragua**

MAY 2010



**GOSS GILROY INC.**  
Management Consultants  
Conseillers en gestion



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May 2010

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Responsibility for the content and presentation of findings and recommendations rests with the authors.

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- Annex 2: Data Annex – Quantitative Survey (Partly in Spanish)
- Annex 3: Community Reports (Qualitative community fieldwork reports in Spanish)
- Annex 4: Documents Reviewed
- Annex 5: Persons Interviewed
- Annex 6: Technical Report on Road Quality (Partly in Spanish)

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## Abbreviations and Acronyms

<i>ATR</i>	Regional Technical Officer/Asesor Técnico Regional
<i>CED</i>	Executive Committee/Comité Ejecutivo de Dirección
<i>CRT</i>	Regional Transport Council/Consejo Regional de Transporte
<i>Danida</i>	Danish International Development Assistance
<i>DD</i>	Double Difference Measurement
<i>DKK</i>	Danish Kroner
<i>EMNV</i>	National Household Living Standards Survey/Encuesta Nacional de Hogares sobre Medición de Nivel de Vida
<i>FOMAV</i>	Road Maintenance Fund/Fondo de Mantenimiento Vial
<i>GFPRT</i>	Project Development Guide/Guía de Formulación de Proyectos en la Red Terciaria
<i>HH</i>	Household
<i>IDR</i>	Rural Development Institute/Instituto de Desarrollo Rural
<i>INIDE</i>	National Statistical Institute/Instituto Nacional de Información de Desarrollo
<i>MARENA</i>	Ministry of Environment/Ministerio del Ambiente y Recursos Naturales
<i>MINED</i>	Ministry of Education/Ministerio de Educación
<i>MINSA</i>	Ministry of Health/Ministerio de Salud
<i>MTI</i>	Ministry of Transport and Infrastructure/Ministerio de Transporte e Infraestructura
<i>MOI</i>	Labour Intensive Methods/Mano de Obra Intensiva
<i>MTR</i>	Medición del Tiempo de Recorrido
<i>PAST</i>	Transport Sector Support Program/Programa de Apoyo al Sector Transporte
<i>RAAN</i>	North Atlantic Autonomous Region/Región Autónoma del Atlántico Norte
<i>RAAS</i>	South Atlantic Autonomous Region/Región Autónoma del Atlántico Sur
<i>RDE</i>	Royal Danish Embassy
<i>SIMOIN</i>	Impact Monitoring System/Sistema de Monitoreo Socioeconómico (PAST)
<i>ST</i>	Technical Secretary/Secretaría Técnica (of the CRT)
<i>TM</i>	Municipal Technical Officer/Técnico Municipal
<i>ToR</i>	Terms of Reference
<i>TPD</i>	Average Daily Traffic/Tráfico Promedio Diario

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# Glossary

## Impact Assessment Terminology

**Causality**, how x causes y. Expectations with regards to causality is typically expressed in the intervention logic captured in linkages in the results chain from activities through to outputs, outcomes, and impacts. The causal linkages in the chain together with sound logic underpin and supplement the attribution analysis. Examination of causality also answers questions concerning the relation between outputs and impacts.

**Attribution**, an assessment of the degree to which impacts can be linked back to the outputs delivered by, and “credited” to, the interventions. At the impact level, attribution is generally accepted to be at the level of some contribution of outcomes in combination with many other important factors. The impacts referred to are those indicated by the double difference estimates described below.

**Counterfactual**, an assessment of what would have been the situation (the status of impacts) if the intervention had not taken place.

**The treatment group**, households (HHs) or individuals who have been affected by the interventions.

**The comparison group**, HHs/individuals who have NOT been participating themselves, but who prior to the intervention possessed similar observable characteristics as those in the treatment group.

**Propensity Score Matching**, mathematical technique used to select members of the comparison group through estimation of a statistical model based on matching characteristics which relate directly to the probability of participation.

**Pipeline Approach**, a technique for comparison group selection where the comparison group will be composed of individuals who have been selected (eligible) to participate, but have not (yet) been involved nor have benefited from intervention activities. This assumes that such a pipeline exists, that there has been no change in selection criteria, and that applicants have not been ranked for participation.

**Double Difference Measurement**, the double difference measures the difference in the observed change between the treatment and comparison group, based on baseline and end-data. Thus the double difference eliminates external determinants of the outcome, in cases where these are the same for the treatment and comparison group during the intervention period. The double difference approach assumes common time effects across groups and no composition changes within each group.

**Contamination**, can arise from two sources – “own” and “external”. Contamination can come from the intervention itself due to spill over effects (own contamination). This type of contamination can occur if the comparison group is selected from a geographical area too close to the intervention area. Comparison groups from distant locations can also be contaminated through interventions by other agencies (external contamination).

**Selection bias**, is bias introduced from the way beneficiaries have been selected for participating in the intervention. When beneficiaries are not randomly selected, but some kind of selection process has taken place, then the comparison group should not be randomly selected either, but rather drawn from a population with same characteristics as the participants group using the same selection criteria.

**Statistical significance**, in statistics, a result is called statistically significant if it is unlikely to have occurred by chance. In this analysis, the *significance level* is used to measure the statistical strength of a data finding. The significance level is here *the risk of concluding a data relationship that may not exist*. Frequent levels of significance used for statistical testings are 10% (0.1), 5% (0.05), 1% (0.01) and 0.1% (0.001). If a significance test gives a value lower than the test levels, the null hypothesis (a hypothesis that an observed difference between two data sets is random/due to chance) is rejected. Such results are referred to as being 'statistically significant'. For example as in this report, if an observed difference between data from a treatment group and a comparison group is found to be significant at the 10% level, it means that the null hypothesis (that the observed difference is by chance/random) can be rejected with 90% certainty. The lower the significance level, the stronger the certainty that the null hypothesis can be rejected. Cases with relatively few observations (data) and large variation, increase the uncertainty and makes it more difficult to reject the null hypothesis.

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# Executive Summary

## Background

Danida has been supporting the transport sector in Nicaragua since the 1980's. At first, support was focused on providing project assistance to the rehabilitation and reconstruction of rural transport infrastructure in the North and South Atlantic Autonomous Regions (RAAN and RAAS). In 1995, institutional development activities were added to infrastructure support.

In 1999 support to rural transport infrastructure was extended to cover Las Segovias in addition to RAAN and RAAS and was re-organized under the Transport Sector Support Program (PAST from its Spanish name Programa de Apoya al Sector Transporte). Phase One of PAST (1999-2004) also included institutional support to the Planning Directorate of the Ministry of Transport and Infrastructure (MTI) as well as support to reconstruction of the primary road connecting Managua to Rama (and of two primary road bridges destroyed by hurricane Mitch).

The overall objective of PAST has been to contribute to poverty reduction through a general improvement of the socio-economic conditions in isolated rural communities by reducing transport costs and improving access to social services and economic and administrative centres. The design and administrative structure of the program went through important developments during Phase One. Specifically:

- Management and implementation arrangements for supporting infrastructure projects were streamlined based on previous best practice and common technical and administrative procedures developed for use in all three regions;
- Labour-intensive methods (MOI for Mano de Obra Intensiva)<sup>1</sup> for road construction were developed together with relevant technical and procedural manuals and guides;
- Community level routine maintenance systems and municipal level periodic maintenance systems were introduced to ensure sustainability;
- Mechanisms were developed for transfer of responsibility for managing the implementation of projects to more capable municipal governments; and
- Regional Transport Councils (CRT) were formed near the end of Phase One to approve and prioritise project proposals submitted by the municipal government.

The first phase of PAST was subsequently replaced by Phase Two, which covered the period from 2005 to 2009. In the transition to Phase Two, institutional support at national level was continued under Component One which provided support to MTI and the national Road Maintenance Fund (FOMAV). Direct support to tertiary transport

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1) MOI is one of the defining features of the program since it influences how the supported infrastructure is designed, constructed, financed and maintained and it requires significant capacity development work at community level along with considerable community member participation at all stages of the supported projects.

infrastructure in Las Segovias, RAAN and RAAS was continued under Component Two, while Component Three provided support to spot improvements in secondary infrastructure.

Component Two, which is the primary focus of the evaluation, had four immediate objectives:

1. To improve access in Las Segovias, RAAN and RAAS by connecting rural areas with difficult access to social services and economic and administrative centres.
2. To ensure sustainable maintenance of the improved transport infrastructure, sharing responsibilities at municipal and community levels.
3. To strengthen the capacities of CRTs, as well as local and regional government for planning, defining priorities, negotiating and maintaining the transport infrastructure, so as to progressively assume PAST activities.
4. To establish and implement strategies on the cross-cutting issues gender equality, environmental protection and the rights and needs of indigenous people and ethnic groups, taking into consideration the priority themes, including gender and environment<sup>2</sup>.

In terms of total budgets and expenditures, the elements of Phase One which correspond to Component Two of Phase Two accounted for 164.4 million Danish Kroner (DKK) in expenditures. (PAST Phase One, Final Completion Report of May 2006, p. i.). Final data is not yet available for Phase Two of PAST, but the budgeted amount for Component Two is 185 million DKK as indicated in the Final Programme Document for Component Two. Thus when the program is completed, expenditures for investments in tertiary transport infrastructure in RAAN, RAAS and Las Segovias should total 349 million DKK (all figures are current and not adjusted for inflation).

In 2006, the program completion report for Phase One of PAST found that its outcome objectives had been achieved, and that it had been successful in improving the socio-economic conditions of the targeted communities. However, it also pointed to a continuing need to capture the impact in a formal way and recommended an impact evaluation of the support. The resulting impact evaluation was carried out from January 2009 to April 2010.

## **Purpose and Objectives of the Evaluation**

The purpose of the impact evaluation was to contribute to the justification, design and implementation of future rural transport infrastructure programs in Nicaragua.

The objective was to assess the impact on the beneficiaries' socio-economic situation and physical well being, of the rural transport infrastructure interventions supported by Danida under PAST's Component Two. The evaluation covered interventions from

- 
- 2) Operationally, gender as a theme was incorporated in PAST during the period under review by requirements for women's participation in committees and in employment for infrastructure development as well as through training. Environmental concerns have been addressed through training and by requiring infrastructure projects to be reviewed for environmental impacts based on Government of Nicaragua requirements.

1999-2004 and completed interventions under the current phase. Where relevant, interventions initiated prior to 1999 have been included. Impacts have been addressed at household and at community level.

A further objective was to assess whether capacity development and institutional change, as well as other prerequisites for sustainability, have been attained as part of the broader impact of the interventions. This was addressed at community, municipal and regional level, with the main focus on aspects directly related to transport infrastructure.

More specifically, the evaluation was intended to include, but not necessarily be limited to:

- Assessment of the economic impact of the interventions, with regard to income and consumption, and potentially production patterns and economic conditions.
- Assessment of the social impact of the interventions with regard to access to education, health and other services.
- Assessment of the broader impact of the interventions with regard to capacity development and institutional change, as part of the prerequisites for sustainability and longer-term impact.

## Methodology and Approach

The evaluation relied on three main methodologies: econometric analysis of impacts at household and community level; qualitative evaluation of impacts at community level; and, key informant interviews with stakeholders at community, municipal and regional level.

### *Econometric Impact Analysis at Household and Community Level*

In order to quantify the economic and social impacts of Danida supported investments in rural transport infrastructure, the evaluation relied on econometric analysis of the difference in changes occurring in communities benefiting from Danida supported investments in rural transport infrastructure (program communities) and a carefully selected set of comparison communities. This *matched double difference* approach to measuring program impacts is recommended in current evaluation literature as the most appropriate method for measuring community program impacts when the required data is available.

Applying this approach required the evaluation to identify a reliable set of baseline data for households in both program and comparison communities and then to compare that data to the situation in the same households using data gathered through a re-survey in 2009. Fortunately, it was possible to identify baseline data gathered during the National Household Living Standards Survey in 2001 and 2005 and the National Census of 2005, covering nearly 800 households divided between program and comparison communities. For technical reasons relating to sample size, the re-survey and double difference analysis could only be carried out, with reasonable confidence, in the Las Segovias region. This meant that qualitative evaluation methods were the main source of evaluation information on program impacts in RAAN and RAAS.

*Participatory Qualitative Evaluation of Impacts at Community Level*

The qualitative assessments of PAST impacts at community level relied on community members themselves to identify, discuss, map and illustrate the impacts and effects of the program and the infrastructure it supported using a set of participatory evaluation methodologies. In both program and comparison communities community members mapped out economic and social developments including: access to transport and traffic volumes; economic development, production and employment; access to health and education services; basic services such as electricity and water; and environmental changes. The qualitative evaluation of community impacts was carried out in 39 communities covering all three regions and including 26 program communities and 13 comparison communities.

*Key Informant Interviews*

The evaluation undertook key informant interviews with the Ministry of Transport and Infrastructure and other agencies of the Government of Nicaragua, with program staff in the national and regional PAST offices, with CRTs in all three regions and with Regional Government staff in RAAN and RAAS. The evaluation conducted structured interviews at the municipal headquarters offices of 16 different municipalities in order to assess the institutional and capacity development impacts of the program at the municipal level. In each of the three regions, municipalities were chosen to represent different geographic zones, different degrees of program engagement, and different levels of municipal capacity and development.

*Phased Approach*

An important feature of the evaluation was a phased approach involving completion of the survey and preliminary econometric data analysis prior to qualitative impact assessments at community, municipal and regional levels. This allowed the evaluation to use qualitative methods to test and inform the preliminary findings of the econometric impact analysis.

**Overall Conclusions**

The evaluation has identified positive impacts resulting from Danida supported investments in rural transport infrastructure at the community, municipal and regional levels. At the level of participating communities the evaluation found positive economic and social impacts which are supported by both quantitative and qualitative evaluation evidence.

More specifically, the econometric analysis of survey data using a double difference methodology comparing the same variables across participating and comparison communities found notable, statistically significant impacts attributable to program supported infrastructure investments in the areas of:

- Reductions in the time required by community members to access services outside the community;
- Increases in the level of paid employment among heads of households (importantly, the employment gained was predominantly located in the same municipality as the project);

- Gains in household resources reflected in the size of homes;
- Increased access to publicly provided electrical supply; and,
- Greater inflows of development projects to the participating communities.

The qualitative evaluation of community impacts reported specific confirmation of these types of economic impacts in project communities, positive economic changes which were generally not reported by comparison communities.

In combination, quantitative and qualitative evaluation evidence supports the conclusion that PAST interventions have resulted in other positive economic impacts including the direct effects of increased access to markets and inputs to production. For example, quantitative and qualitative findings on agricultural production point to increases in employment within agriculture and increases in the value of land for agriculture as well as changes in what is produced and how it is marketed.

In the area of *social impacts*, qualitative evaluation methods indicate that communities that have participated in PAST have improved their access to services in health and education services and have more frequent and reliable contact with both than comparable communities that have not participated in the program. One very important result has been an improved and more secure access to emergency transport services by community members. In terms of women empowerment, it was found that women's economic and social participation has improved due to PAST interventions, at least in the Las Segovias region.

At the *organizational and institutional* level, the evaluation found that communities and municipalities have gained in their capacity to organize around issues of community development and to identify, develop, design, implement and maintain development investment projects and the resulting infrastructure. The program has also contributed to an improvement in the engagement between the municipal and community levels, with communities showing an increased ability to interact with municipal government officials who are, in turn, better able to respond to community needs for technical and administrative support in developing and maintaining rural transport infrastructure.

New regional institutional structures for the coordination and prioritization of transport infrastructure have also been established and strengthened with support from PAST.

An important question is whether the observed impacts of the PAST interventions are predominantly a result of improvements in access resulting from the infrastructures themselves (improved roads, bridges, wharves, etc.) or do they result from other aspects of the program such as institutional capacity development, the training of community members, experience gained through project employment, and the short-term economic impacts of project wages and the use of labour-intensive methods. In other words: is it the what (infrastructure investments) or the how (other program characteristics) of PAST program activities which contributes most to economic impacts?

The quantitative and qualitative evaluation data point to a combination of these factors contributing to impacts. It seems most likely that the improvement in *access* which accompanies PAST projects is the single most significant contributor to economic impacts since it is difficult to see how the noted economic gains could be sustained over time

without the direct improvements in year-round access. Community members point to the decreases in travel times and costs and the improvements in year-round access as key factors in achieving and sustaining impacts.

At the same time, however, they point to other program characteristics as factors which contribute to their ability to realize and sustain economic benefits. For example, experience gained by community members during construction and maintenance of PAST projects is cited as an element which allows them to have access to paid construction employment in municipal centres. Similarly, the PAST program's strong focus on the maintenance of transport infrastructure can be seen as an element in sustaining improved access and its benefits. The same observation can be made regarding capacity development at the community and municipal levels since both were necessary to strengthening maintenance practices and sustaining the benefits of improved access.

It appears that the improvements in access resulting from PAST supported infrastructure are essential to securing economic impacts but the other characteristics of the program including community participation and the use of labour intensive methods are contributing to those impacts.

In more specific detail, the conclusions of the evaluation are as follows.

### **Evaluation Conclusions Based on Econometric Impact Analysis and Supported by Qualitative Evaluation Findings**

Impacts which have been demonstrated as statistically significant using the double difference method include:

*PAST projects have reduced the travel time required for community members to travel to social services, measured in terms of time required to travel to the nearest health post.*

This central finding of reduced travel time as a result of PAST projects was confirmed by the econometric analysis and by all forms of the qualitative evaluation research undertaken. In some ways it is both the least surprising and the most important evaluation finding. Many other results can be expected to flow from improved year round access as measured in reduced travel times for community members. The reduction in travel times found in the survey results is further supported by project monitoring data on the increase in traffic volumes and intensity experienced by program communities.

The significance of this impact is further compounded by the fact that community members often pointed to the increased safety and security of travel which could now be undertaken in all seasons, more rapidly and (in the case of transporting agricultural goods) with less damage.

Specifically, the infrastructure supported by PAST is:

- Increasing the volume of traffic flows into and out of the communities.
- Allowing communities access to communal transport on a regularly scheduled basis.

- Reducing the time and cost taken to access health posts and other essential services.
- Improving the safety and reliability of transport services, especially emergency services.

*PAST projects have contributed to considerable increases in the portion of heads of household in program communities who are in paid employment.*

Program communities increased the percentage of heads of households in paid employment a full 17% more than did comparison communities. In the baseline periods, before completion of the transport infrastructure projects, program communities reported levels of employment which were lower than comparison communities but this situation was dramatically reversed by 2009.

It should be noted that the definition of construction employment used in the surveys did not include rural road construction and maintenance so the observed increase in employment should not be linked to direct employment on PAST projects.

Overall, the majority of new jobs have been created in within the agriculture sector but the construction sector has also increased its share of employment of heads of households. This observation was further confirmed by qualitative data collection methods which confirmed that community members with experience in the methods of construction used on PAST supported infrastructure projects were finding paid employment in the local municipal centre.

*PAST projects have contributed to making community members able to increase the size of their homes.*

The econometric analysis of survey data confirms that average house size has increased significantly more for program communities than for comparison communities. The evaluation considers housing size to be a very durable indicator of the quality of housing when compared to others such as the quality of roofing material because it is much less subject to contamination effects resulting from, for example, housing programs targeted to poorer communities.

This impact was also confirmed by qualitative evaluation research at community level with community members pointing to the reduced cost of transporting housing materials resulting from the new and rehabilitated roads, bridges, wharves and canals supported by PAST. Of course, it may also be a result of increases in the financial resources among households in treatment communities related to gains in employment.

There are also proxy indicators of positive improvements in household wealth which, while not statistically significant in double difference terms, are indicative of an overall positive impact by PAST supported projects on the economic well being of households and are supported by the qualitative findings. More specifically:

- The average size of landholdings used for agriculture by households in PAST program communities has increased nearly 50% in the period from 2005 to 2009 while it has remained nearly unchanged within comparison communities. There has also been a greater increase in land values in PAST program communities than in the comparison communities.

- Households in PAST program communities and comparison communities have both increased their holdings of durable goods significantly in the 2005 to 2009 period, with households in program communities showing a somewhat larger increase.

*The inflow of development projects from other programs and organizations has increased for PAST program communities but decreased for the comparison communities over the period 2005 to 2009.*

The improved year-round access which accompanies PAST supported transport infrastructure projects may be associated with higher levels of engagement by both government and non-governmental agencies engaging in provision of basic services such as electricity and in introducing new development investments in project form. It may also be associated with an increase in the capacity of community organizations to organize in support of increased engagement by external agencies.

*The percentage of households in program communities with access to publicly provided access to electricity has increased substantially in the period from 2005 to 2009 compared to households in the comparison communities.*

As with the inward flow of development projects, it is not totally clear whether the improved access associated with PAST infrastructure investments is the predominant factor in inducing changes in community electrification or if it derives from organizational or political factors. Nonetheless, PAST communities have gained new connections to the public supply at a greater rate than comparison communities.

## Evaluation Conclusions Based on Qualitative Impact Analysis

### *Economic Impacts*

In all three Regions of the program there are identifiable economic impacts of PAST projects although they are more clearly indicated in Las Segovias and in the central zones of RAAN and RAAS, where there are better links to larger markets in the Pacific area of the country. In particular, members of PAST supported communities pointed to more frequent, more timely and less expensive contacts with markets and buyers for community agricultural products. They also pointed to improved prices for their products resulting from lessened damage and/or the ability to transport higher value products such as fresh milk. The economic gains reported by PAST project communities were not reported by members of comparison communities.

### *Health Impacts*

Improved access to health services is one of the impact areas given the highest priority by community members and was often discussed with real enthusiasm during community consultations. In this area, and directly connected to the PAST program infrastructure, the most frequently and vehemently mentioned impact was the improvement in access to emergency care through safer and faster transport for pregnant women with complications in delivery and for the very ill.

After access to emergency care, improved health infrastructure (health centres and health posts) and more frequent attention from health personnel are among the main impacts in health identified by community members. These positive changes were not reported by community members in the comparison communities.

### *Education Impacts*

In education, PAST project community members identify impacts arising from improvements in education services provided to the communities by the Ministry of Education in the form of increased supervision, more regular teacher attendance, more materials, and new or rehabilitated schools. They also point to easier and safer access to schools outside the community, especially secondary schools.

### *Basic Services*

One clear and important impact in basic services is an increase in the availability of regularly scheduled, year round communal transport which is very important and very frequently cited during consultations with community members. Comparison community members often pointed to the lack of regularly scheduled communal transport as a key factor in their isolation.

### *Environmental Impacts*

For the most part, PAST supported transport infrastructure appears to be neutral in its impact on the local environment. There are indications from the participatory community evaluation work in all three Regions, however, that rehabilitation of roads has contributed, in selected cases, to deforestation and increased logging of community forest resources by those outside the community. This is perhaps a consequence of improving access to a forested area by medium sized trucks. It is most notable in Las Segovias and in the central zones of RAAN and RAAS.

## **Institutional Impacts and Sustainability**

PAST has contributed to an important set of institutional capacity development results at the community, municipal and regional level, but there are continuing concerns regarding the financial sustainability of Regional Transport Councils (CRT) and continuing support of the CRTs by the municipal governments. Further, the evaluation evidence suggests there is a continuing need for some source of programmatic technical and administrative support to both the municipalities and regional structures such as the CRTs.

### *Community Level Organizational Capacity*

Municipal interviews and qualitative consultations indicate that PAST communities have demonstrated an ability to organize and to continue to support ongoing operation and maintenance of the transport infrastructure built or rehabilitated with program support.

PAST trained project and committee members remain active in many communities and some continue to play a leadership role long after project completion. PAST project and maintenance committee members also play an important role in liaising with municipal officials and others from outside the community who can support development over time.

The experience of developing, implementing and maintaining PAST projects has also deepened the relationship between communities and municipal government offices. Municipal officials are more engaged in dialogue with PAST communities and the communities themselves are more articulate regarding their needs and responsibilities and more demanding of municipal support. Further, the municipal officers now have more technical and administrative capacity to respond to these demands.

*Strengthening Technical and Administrative Capacities of Municipalities*

Training and material support (including equipment) to municipal technical officers, social promoters, administrators and planners at municipal level has been both comprehensive and effective. Municipal officials have upgraded their skills and capacities through involvement with PAST and have used these skills in project preparation and management both inside and outside the area of rural transport infrastructure. The higher quality of project support submissions by municipalities experienced in the PAST program process was noted by Road Maintenance Fund (FOMAV) staff dealing with proposals from municipalities across Nicaragua.

For the most part, technical and administrative staff trained with PAST support remain in their assigned functions, and there has been relatively little turnover of PAST trained staff at municipal level. Training of community leaders in PAST methodologies as an element in community participation in the program has also created a cadre of technically competent individuals who can be recruited into municipal positions.

On the other hand there is a continuing need in many municipalities for technical support, especially in the area of engineering and logistics.

*Transport Infrastructure Planning, Maintenance, Budgeting and Implementation by Municipal Governments*

Depending on the amount of time municipalities have been engaged with the PAST program, they show very different levels of professional and financial capacity to plan and budget infrastructure interventions.

PAST has also had an important impact on municipal practices for managing and financing infrastructure maintenance, especially in Las Segovias where more than half the municipalities visited for the evaluation have adopted MOI as their primary method for maintaining transport infrastructure, including infrastructure not supported by PAST funds. This pattern is much less predominant in RAAN and RAAS where municipal staff indicated that the very short construction (dry) season may mitigate against use of MOI for construction.

*Regional Capacity and Regional Transport Councils*

PAST Phase Two has seen the Regional Transport Councils (CRTs) rise to a higher operational level and take on a leading role in coordinating PAST infrastructure investments among municipalities in each region. They can potentially play a broader role in coordinating rural transport infrastructure for projects funded outside of PAST. At the same time, there is a need to ensure continuing financial and technical support to the operation of the CRTs if they are to continue to play the roles they have achieved under Phase Two.

*Design, Maintenance and Sustainability of Project Works*

PAST supported infrastructure is clearly well designed and well suited to the use of MOI methods in both construction and maintenance phases. Further, PAST supported and improved infrastructure has been demonstrated to be quite durable and to remain in reasonably good condition. Further, qualitative evaluation data gathered at the community level indicates that most communities which have implemented PAST projects in the past continue to have functioning maintenance committees in place which are able to raise local funds for routine maintenance.

### Recommendations

The recommendations which follow are not specifically directed to Danida or to the Government of Nicaragua. Rather, they focus on the general subject of financial and technical investments in rural transport infrastructure in Nicaragua. They are intended to answer the question: should investments of the type supported by Denmark through PAST and its predecessor programs continue? Further, if these types of investments do continue, how can they be made as effective as possible?

Notwithstanding the above, the findings and conclusions of the evaluation do strongly suggest that there is merit in Danida undertaking initiatives to share its experience in support of PAST (particularly with the community participation elements of PAST such as MOI) as a potential model for supporting investments in rural transport infrastructure. A wider audience within Danida and among other agencies supporting investments in rural transport infrastructure could benefit from exposure to the lessons learned by PAST.

### Securing and Extending Program Impacts

Having demonstrated positive impacts at community, municipal and regional level of Danida support to tertiary transport infrastructure in Nicaragua, the evaluation submits the following recommendations aimed at continuing and, perhaps, broadening these impacts.

1. As indicated repeatedly over the course of the evaluation, the positive impacts arise both directly from the improved access which results from the infrastructure investment and from the way in which support has been provided, through a community-focused program administered through municipal and regional structures and relying on labour-based approaches. The primary recommendation of the evaluation is that (regardless of the source of finances) support to rural transport infrastructure should be continued while maintaining the core elements of the PAST program approach. Further, as the basic architecture of the PAST program has proven effective in producing projects with economic and social impacts, the evaluation recommends strong consideration of expanding the program model to other regions. Similarly, the evaluation recommends that PAST type projects continue to be supported in RAAN, RAAS and Las Segovias for the next 2-3 years or until there are very few communities which meet the current criteria for program support. This would allow the program to take full advantage of the capacities which have been developed in communities and at municipal government level in all three regions.
2. There is an apparent need to better coordinate investments in transport infrastructure so that these investments do not conflict with decisions made at municipal and community level and result in waste and duplication. The evaluation recommends that MTI should implement a consultative framework to involve other key decision makers such as FOMAV and the Institute for Rural Development (IDR) (and bilateral donors) in more coordinated decisions to allocate investment resources to transport infrastructure. The CRTs could play an important role in this process as regional forums for coordinating across tertiary, secondary and primary transport infrastructure.

3. Despite the progress made in capacity development by the participating municipalities, there is an ongoing need (which varies across municipalities depending on their level of experience with the program) for, in particular, technical support by trained engineering and administrative staff to be provided to municipalities in support of rural transport infrastructure development and maintenance. The Department of Municipal Roads of MTI and the infrastructure commissions or departments of Regional Governments, (where they exist) provide potential sources of technical and administrative support to municipalities. The evaluation recommends that the MTI and the Regional Governments collaborate on a plan to provide technical support to municipalities implementing rural transport infrastructure projects using the PAST model and that the PAST national and regional offices provide needed human resource support to this effort during the remaining transitional phase in the program.
4. Given the apparent correlation between more significant economic impacts created by projects and their ability to link the communities to well developed secondary and primary roads and, ultimately, to urban markets, it might seem logical to modify the criteria for prioritizing projects to give this connection even greater emphasis. The evaluation has found that community members place very high value on the improved access to health and education services and improved transport safety. Thus the evaluation recommends retaining the current emphasis on reduced isolation and the change in physical access as key, but not exclusive, factors in project approval.
5. The evaluation recommends that key stakeholders investigate the possibility of further maximizing the impacts of PAST investments by linking them to other interventions relating to economic and social development at community level. For example, targeted support to private sector development (small village shops or *pulperias* for example), technical and management support to agricultural producers and their associations, market development initiatives, and efforts to strengthen social services. Municipal governments may be best positioned to attempt to identify other sources of economic and social development assistance which could magnify the impact of PAST-supported interventions.
6. The evaluation has also demonstrated the high quality and reliability of the main technical components of the PAST program approach. In particular these include detailed and extensive manuals and guidelines on design, construction, rehabilitation and the maintenance of rural transport infrastructure as well as the guidelines and manuals for community capacity development and community and municipal level participation. The evaluation recommends that these features be retained in national or regional programs of support to investments in rural transport infrastructure in Nicaragua.
7. In order to both sustain investments already made and solidify the institutional basis for continued support to rural transport infrastructure, there is a clear need for continued short-term financial, technical and administrative support to different institutional elements of the PAST system. The evaluation recommends that the program should institute a transitioning strategy and action plan so that, in particular, PAST national and regional offices can transfer responsibilities to municipalities and to CRTs in an orderly way. This would allow for a more measured and sustainable completion of the decentralization strategy which was so crucial to Component Two during Phase Two of PAST.

The evaluation results indicate that a great deal has been achieved in developing and strengthening the institutional framework to plan, implement and sustain successful investments in rural transport infrastructure in Las Segovias, RAAN and RAAS. On the other hand, there is still work to be done to secure the sustainability of the institutional capacity development which has already taken place. Most specifically, there is a requirement to identify and further strengthen the capacity of some municipalities which were not fully ready for decentralization. There is also a need to establish CRTs on a more sustainable basis with longer term support from the municipalities and, where appropriate, regional governments.

### Recommendations on Impact Evaluation

8. The evaluation has clearly demonstrated the essential role of national statistical capacity, especially in the national authorities responsible for the census and national living standards surveys. In particular, national capacity in survey sample design, questionnaire development, survey enumeration and computerized record keeping, data analysis and reporting represent key foundations for successful impact evaluations. National governments and development partners should continue to support their development.
9. The success of the evaluation was also dependant on ready access to Nacional de Información de Desarrollo (INIDE) technical and operational staff on the part of the evaluation team. It also relied heavily on the use of census and survey data, proprietary codes and mapping information which is the property of INIDE. The evaluation recommends that INIDE should continue to share this essential information with evaluation researchers who are working to fulfil mandates for Departments and Agencies of the Government of Nicaragua, including MTI. The availability of much of this data in electronic format on-line greatly facilitated the work of the evaluation.
10. The PAST program's internal system of impact monitoring (SIMOIN) does not include baseline data for comparison communities and does not, therefore, allow for a full evaluation of project impacts. On the other hand, SIMOIN does provide important information on, for example, the growth in traffic volume and intensity in program communities. The evaluation recommends continued gathering and reporting of the SIMOIN information as an important element in the system for monitoring program outcomes.
11. The evaluation recommends that future impact evaluations in the transport sector give careful consideration to following a phased approach with sufficient time scheduled between the quantitative survey and data analysis phase and qualitative field data collection phases. This allows community consultations and intensive qualitative field work to be informed by and help explain (or refute) the findings of quantitative impact analysis.
12. During the inception phase of impact evaluations it is essential that the evaluation team is able to verify data availability in the field and to carry out consultations with program and project staff in participating municipalities and communities in order to identify appropriate comparison communities. It is only after such a review that appropriate samples can be developed and questionnaires designed. This

is also a pre-condition for a fully costed and realistic survey plan which can then be approved by the project authority.

13. The evaluation recommends that field survey teams take part in intensive training (approximately five full days in the case of the PAST evaluation) and that enumeration in the field is supervised by core evaluation team staff.
14. The evaluation recommends field testing of all participatory, qualitative evaluation methods in advance of the main qualitative data collection period. This should be augmented by a significant allocation of time (three days in the case of the PAST evaluation) to a joint workshop to analyze the main evaluation results. The workshop should include members of all regional qualitative data collection teams.

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# 1 Introduction to the Evaluation

Danida has been supporting the transport sector in Nicaragua since the 1980's. At first, support was focused on providing project assistance to the rehabilitation and reconstruction of rural transport infrastructure in the North and South Atlantic Autonomous Regions (RAAN and RAAS). In 1995, institutional development activities were added to infrastructure support.

In April 1999 support to rural transport infrastructure was extended to cover Las Segovias and was re-organized under the Transport Sector Support Program (PAST from its Spanish name Programa de Apoya al Sector Transporte). Phase One of PAST (1999-2004) also included institutional support to the Planning Directorate of the Ministry of Transport and Infrastructure (MTI) as well as support to reconstruction of the primary road connecting Managua to Rama (and reconstruction of two primary road bridges destroyed by hurricane Mitch).

The overall objective of PAST has been to contribute to poverty reduction through a general improvement of the socio-economic conditions in isolated rural communities by reducing transport costs and improving access to social services and economic and administrative centres<sup>3</sup>.

The overall design and administrative structure of the program went through important developments during Phase One. Specifically:

- Management and implementation arrangements for supporting infrastructure projects were streamlined based on previous best practice and common technical and administrative procedures developed for use in all three regions;
- Labour intensive methods (MOI for Mano de Obra Intensiva) for road construction were developed together with relevant technical and procedural manuals and guides;
- Community level routine maintenance systems and municipal level periodic maintenance systems were introduced to ensure sustainability;
- Mechanisms were developed for transfer of responsibility for managing the implementation of projects to more capable municipal governments; and
- Regional Transport Councils (CRTs) were formed near the end of Phase One to approve and prioritise project proposals submitted by the municipal government.

The first phase of PAST (1999-2004) was subsequently replaced by PAST Phase Two which covered the period from 2005 to 2009. In the transition to Phase Two, institutional support at national level was continued under Component One which provided institutional support to MTI and the Road Maintenance Fund (Fondo de Mantenimiento Vial, FOMAV). Direct support to tertiary transport infrastructure in Las Segovias, RAAN and RAAS was continued under Component Two, while Component Three

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3) PAST. *Final Programme Document*. Managua, October 2004, P. 15.

provided support to spot improvements in secondary infrastructure in the three program regions.

Component Two, which is the primary focus of the evaluation, had four immediate objectives:

1. To improve access in Las Segovias, RAAN and RAAS by connecting rural areas with difficult access to social services and economic and administrative centres.
2. To ensure sustainable maintenance of the improved transport infrastructure, sharing responsibilities at municipal and community levels.
3. To strengthen the capacities of CRTs, as well as local and regional government for planning, defining priorities, negotiating and maintaining the transport infrastructure, so as to progressively assume PAST activities.
4. To establish and implement strategies on the cross cutting issues gender equality, environmental protection and the rights and needs of indigenous people and ethnic groups, taking into consideration the priority themes, including gender and environment<sup>4</sup>.

The projects covered during both phases of PAST were primarily rural roads and bridges that can be built and maintained by the communities themselves using labour intensive methods. Other projects – wharves for small boats, pedestrian tracks and footbridges – are also included where the community gives these a priority. Phase Two of PAST was ongoing at the time of the evaluation, still including support to rural transport infrastructure, but with an enhanced focus on reaching most of the municipalities in the target regions.

In 2006, the program completion report for Phase One of PAST found that its outcome objective had been achieved, and that it had been successful in improving the socio-economic conditions of the communities of the targeted communities. However, it also pointed to a continuing need to capture the impact in a formal way and recommended an impact evaluation of the support.

In October 2008, the consortium of Orbicon A/S of Roskilde, Denmark and Goss Gilroy Inc. of Ottawa, Canada was chosen to carry out an impact evaluation of Danida support to rural transport infrastructure in Nicaragua. The evaluation was carried out between January 2009 and April 2010.

### 1.1 Purpose and Objectives

The purpose of the impact evaluation was to contribute to the justification, design and implementation of future rural transport infrastructure programs in Nicaragua. The objective was to assess the impact on the beneficiaries' socio-economic situation

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4) Operationally, gender as a theme was incorporated in PAST during the period under review by requirements for women's participation in committees and in employment for infrastructure development as well as through training. Environmental concerns have been addressed through training and by requiring infrastructure projects to be reviewed for environmental impacts based on Government of Nicaragua requirements.

and physical well being, of the rural transport infrastructure interventions supported by Danida under PAST's Component Two. The evaluation covered interventions from 1999-2004 and completed interventions under the current phase. Where relevant, interventions initiated prior to 1999 have been included. Impacts have been addressed at household and at community level. Further, the objective was to assess whether capacity development and institutional change, as well as other prerequisites for sustainability, have been attained as part of the broader impact of the interventions. This was addressed at community, municipal and regional level, with the main focus on aspects directly related to transport infrastructure (technical capacity, organizational set-up etc.).

More specifically, the evaluation was intended to include, but not necessarily be limited to:

- Assessment of the economic impact of the interventions, with regard to income and consumption, and potentially production patterns and economic conditions.
- Assessment of the social impact of the interventions with regard to access to education, health and other services.
- Assessment of the broader impact of the interventions with regard to capacity development and institutional change, as part of the prerequisites for sustainability and longer-term impact.

The evaluation analyses attribution wherever possible, and addresses plausible contribution, when data does not allow for specific attribution analysis.

### 1.2 Scope

While concentrating on interventions initiated during PAST Phase Two (initiated in 2005), the evaluation includes interventions carried out from 1999 onwards as instructed in the ToR.

The main focus of the quantitative impact assessment was expected to be on rural roads and transport infrastructure that relates directly to roads and bridges. This was based on the expectation that more clearly defined evaluation information would be available in the case of roads<sup>5</sup>. Data availability studies carried out for Danida during the planning phase of the evaluation indicated that baseline econometric data was more complete in Las Segovias when compared to RAAN and RAAS. At the same time, the communities selected for participation in the qualitative, participatory evaluation methods, especially in the two autonomous Atlantic Regions (RAAN and RAAS) have benefited from a diverse cross section of PAST supported infrastructure including foot paths, wharfs, canals, suspended foot bridges and, of course, tertiary roads. In fact, communities were purposely selected for participation in the evaluation in order to provide a cross section of the different types of infrastructure investment common in each of the three program regions.

The evaluation combined an overall assessment of the impacts of supported infrastructure with separate analyses of impacts by region. In addition, the evaluation assessed the effect of the program on capacity development and institutional change at the communal, municipal and regional level, with the main emphasis on the first two levels.

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5) *General Study of the Impact of Rural Roads in Nicaragua*. COWI A/S. Lyngby, 2008. P. 41.

### 1.3 Evaluation Team

The evaluation team included researchers from Denmark, Canada and Nicaragua. The core team included four international evaluation consultants from Orbicon and Goss Gilroy and two Nicaraguan researchers. It should be noted that none of the core team members have had any previous involvement with PAST.

During Phase Two of the evaluation (the re-survey of households in Las Segovias) a Managua based research firm was contracted to carry out a survey of nearly 800 households. During the qualitative field work in Las Segovias, RAAN and RAAS, three separate teams of Nicaraguan researchers facilitated participatory community level evaluation activities in 39 different communities. Each regional field team was accompanied by one or more members of the core team for all or part of its activities. All international and Nicaragua based evaluation personnel were independent researchers not employed by the PAST or by Danida.

### 1.4 Organization of the Report

The report is organized as follows:

- Chapter 1 provides an introduction to the evaluation.
- Chapter 2 describes the program of support to rural transport infrastructure in Nicaragua, including expected results and impacts.
- Chapter 3 details the evaluation approach and methodology.
- Chapter 4 presents the detailed findings of the evaluation in terms of impacts at the community, municipality and regional levels, along with their sustainability.
- Chapter 5 addresses the issue of the institutional impacts of the program.
- Chapter 6 discusses issues relating to design, maintenance and sustainability.
- Chapter 7 details similarities and differences in impact.
- Chapter 8 presents the conclusions of the evaluation.
- Chapter 9 describes the lessons learned during the evaluation.
- Chapter 10 lists the recommendations resulting from the evaluation.

The Terms of Reference is shown as Annex 1.

Additional annexes to the Evaluation Report can be found on the attached CD-ROM or viewed on the website [www.evaluation.dk](http://www.evaluation.dk):

Annex 2: Data Annex – Quantitative Survey (Partly in Spanish)

Annex 3: Community Reports (Qualitative community fieldwork reports in Spanish)

Annex 4: Documents Reviewed

Annex 5: Persons Interviewed

Annex 6: Technical Report on Road Quality (Partly in Spanish)

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## 2 Program Background

### 2.1 Program Evolution

#### Program History

Danida support to the transport sector in Nicaragua began in the 1980s with the financing of the rehabilitation of the primary road from Nandaime to Peñas Blancas and with transport infrastructure projects in RAAN and RAAS. From 1993 to 1998, support was provided to a range of infrastructure investments in canals, wharves, and dredging activities (alongside some roads). The objective during this period was to directly address the special tertiary transport infrastructure problems experienced on the Atlantic Coast of Nicaragua.

“The Atlantic Coast has the additional problem of very poor coverage of transport infrastructure having 46% of the territory but only 8% of the roads. Waterways, which constitute the only reliable access for much of the Atlantic Coast communities, have received negligible funding for essential infrastructure”.<sup>6</sup>

Thus the primary rationale for these early investments in transport infrastructure was to relieve bottlenecks in access to transport which were contributing to isolation and constraining economic and social development in RAAN and RAAS.

By 1999, when Phase One of PAST was approved, the program had expanded to include five components:

1. Continuation of support to investment activities on the Atlantic Coast.
2. Improvement of tertiary roads in the region of Las Segovias.
3. Institutional support to the Planning Directorate of Ministry of Transport and Infrastructure (MTI).
4. Reconstruction of an 80 km stretch of the primary road connecting Managua and Rama.
5. Reconstruction of two primary road bridges destroyed by Hurricane Mitch.

Before the establishment of Phase One, Danida supported construction of wharves, jetties, a canal and some roads in RAAN and RAAS by working directly with communities and municipalities. During Phase One, from 1999 to 2004, procedures were established for project selection with the regional government participation and implementation methods evolved with a strong emphasis on community involvement. Specific developments in program design during Phase One included:

- Management and implementation arrangements were streamlined and harmonized across RAAN, RAAS and the new region of Las Segovias based on previous best practice.

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6) *Transport Sector Programme Support (PAST) Phase 2 Component 2: Final Component Description*. PAST, 2004, P. 2.

- Common technical and administrative procedures were developed to be applied in all three regions.
- MOI methods for road construction were developed to produce high standards of work along with the relevant technical and procedural manuals and guides.
- Community routine maintenance systems were introduced to ensure the sustainability of infrastructure even when municipal funding is limited.
- Municipal periodic maintenance systems were introduced to ensure sustainability of what became municipal infrastructure.
- Mechanisms for transfer of project responsibilities from PAST to the municipalities were developed so that the more capable ones could gradually take over responsibility for project management.
- CRTs were formed late in Phase One in order to prioritize and approve projects on an annual basis.

By 2003 Components (iv) and (v) of Phase One were essentially complete. A joint Nicaraguan/Danish Progress Review was carried out in September 2003 to assess the progress of the remaining three components and the Nicaraguan Government's request for continued support to the transport sector.

By October 2004, design documents had been prepared for PAST Phase Two with three components:

**Component One:** Continued institutional support to MTI and FOMAV, with particular emphasis on improved planning procedures and sustainability of implemented projects (including a reformed road law and decentralization of responsibilities to the municipalities).

**Component Two:** Continued support to the improvement of tertiary transport infrastructure in RAAN, RAAS and Las Segovias. During PAST Phase One, the different program components had already been re-organized under a common administrative system. Component Two would continue to deliver projects using that system but with a focus on institutionalising planning, construction and maintenance procedures and strengthening capabilities within local government.

**Component Three:** Support to spot improvement of secondary transport infrastructure in RAAN, RAAS and Las Segovias in order to address the bottlenecks in the respective regional transport networks, to ensure there are satisfactory linkages between infrastructure under municipal responsibility and the primary road network.

Component Two, which is the primary (but not exclusive) focus of the evaluation, was designed to provide the necessary support for municipalities in RAAN, RAAS and LAS Segovias to deliver tertiary infrastructure investments, targeting those areas and communities in the most need and projects that give the most sustainable results. A key strategic orientation of Component Two was a commitment to transfer responsibility for planning, management, procurement, and supervision (largely undertaken during Phase One

by the PAST regional transport support teams) to regional, municipal and community partners.

This strategy meant that Component Two, during Phase Two, would work even more closely than during Phase One with municipal authorities and with CRTs by providing training, advice, systems support, equipment and mentoring to try and ensure that local partners could undertake project and program functions in a sustainable way.

In terms of total budgets and expenditures, the elements of Phase One which correspond to Component Two of Phase Two accounted for 164.4 million Danish Kroner (DKK) in expenditures. (PAST Phase One, Final Completion Report of May 2006, p. i.). Final data is not yet available for Phase Two of PAST, but the budgeted amount for Component Two is 185 million DKK as indicated in the Final Programme Document for Component Two. Thus when the program is completed, expenditures for investments in tertiary transport infrastructure in RAAN, RAAS and Las Segovias should total 349 million DKK (all figures are current and not adjusted for inflation).

The overall development objective of Component Two was to contribute to poverty reduction through the improvement of socio-economic conditions of the population in the isolated rural areas of Las Segovias, RAAN and RAAS. This included addressing both the social and economic well being of the poorest elements in the target regions.

The four immediate objectives of Component Two are:

1. To improve access in Las Segovias, RAAN and RAAS by connecting rural areas with difficult access to social services and economic and administrative centres.
2. To ensure sustainable maintenance of the improved transport infrastructure, sharing responsibilities at municipal and community levels.
3. To strengthen the capacities of CRTs, as well as local and regional government for planning, defining priorities, negotiating and maintaining the transport infrastructure, so as to progressively assume PAST activities.
4. To establish and implement strategies on the cross cutting issues gender equality, environmental protection and the rights and needs of indigenous people and ethnic groups, taking into consideration the priority themes, including gender and environment<sup>7</sup>.

The design document for PAST Component Two identified ten specific outputs required to achieve these four objectives.

### Objective One: Improved Access

- Transport infrastructure improved, using labour intensive methods, and handed over to administrative owners.

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7) Specific programme guidelines were prepared on gender and indigenous issues: "Lineamientos de la integración de derechos y necesidades de pueblos indígenas y comunidades étnicas" (PAST, 2005) and "Lineamiento de Género para Componente II" (PAST, 2005). Operationally, gender as a theme was incorporated in PAST during the period under review by requirements for women's participation in committees and in employment for infrastructure development as well as through training. Environmental concerns have been addressed through training and by requiring infrastructure projects to be reviewed for environmental impacts based on Government of Nicaragua requirements.

- Road construction by labour-intensive methods institutionalized in the target municipalities.

### For Objective Two: Sustainable Maintenance

- Routine maintenance for improved transport infrastructure provided using labour intensive methods.
- Periodic maintenance for improved transport infrastructure provided using labour intensive methods.

### For Objective Three: Strengthened Capacity

- Regional Transport Councils institutionalised.
- CRTs define responsibilities of each party involved in project implementation, management, and maintenance and each party complies with its responsibilities.
- CRTs develop the organizational capacity to plan, pre-select, prioritise and approve the implementation and maintenance of infrastructure projects.

### For Objective Four: Cross-Cutting Issues and Priority Themes

- Gender strategies and implementation guidelines established and implemented.
- Strategies and guidelines for the integration of rights and needs of indigenous people and ethnic groups established and implemented.

The establishment of PAST Phase Two in 2004 also saw the development of a revised and updated project formulation and approval guide which represents the main program instrument for guiding the work of the CRTs, the staff of participating municipalities (including mayors, technicians, and social promoters) and the staff of PAST offices in Managua, Estelí, Bluefields and Puerto Cabezas.

The Guía de Formulación de Proyectos en la Red Terciaria (GFPRT) lays out in detail the criteria to be used in project identification, assessment, and approval. It also describes the programming cycle in detail.

The GFPRT identifies a series of conditions which must be met for a given project proposal submitted by a municipality to be pre-approved for submission to the annual meeting of the CRT; where it is prioritized and, if approved, funding is allocated.

- Projects must be situated in areas with good agricultural production or another social or economic justification which is documented (such as access to basic social services by indigenous communities).
- The infrastructure addressed by the project must have weaknesses which create problems of access.
- The project should provide a year-round connection to the secondary and primary transport system and access to an urban centre or market.

## 2 PROGRAM BACKGROUND

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- It must be possible to construct the project using MOI.
- There must be sufficient manpower available in the community to construct the project.
- The project must be capable of execution within two years, normally with a maximum of 15 km length for a road.
- Preferably the project should provide the single means of access for the community rather than an alternative.
- The project should not be the object of investments by other organizations.

In the process of prioritizing and approving project proposals, the CRT and the Executive Committee (CED) must address a number of key guidelines which are used to establish projects priorities and allocate funding. In particular key criteria relate to the cost per kilometre of road (or other measure for wharves, bridges and canals), the cost per capita per beneficiary of the project, the net change in access measured on a scale of one to five and the ability of the community to provide 5% of the capital costs of construction. Because of higher costs and lower population density of communities in RAAN and RAAS, the guidelines on cost criteria are less stringent for those regions than for Las Segovias.

Table 1 provides an overview of how cost criteria are adjusted on a regional basis.<sup>8</sup>

**Table 1: Regional adjustments in cost criteria (in Cordobas<sup>9</sup>) for project approval**

Prioritization Criteria	Las Segovias	RAAN and RAAS
Cost Per Capita in Cordobas (Roads)	Up to 3,500	Up to 4,600
Maximum Cost Per Kilometre (Roads)	400,000	450,000

### Basic Program Logic

At its most direct level (the provision of direct support to community-led investments in tertiary transport infrastructure) the key characteristics of PAST are common across Phases One and Two. Indeed, they were basically established during Phase One. The most important characteristics of the PAST model of support to rural transport infrastructure include the following:

1. Clear and objective criteria for setting priorities and approving projects including a required improvement in the level of access, a minimum number of beneficiaries per kilometre of infrastructure, and maximum project costs per kilometre of road and per beneficiary.
2. A well defined process of technical, economic and organizational assessment to be carried out in each community prior to submission of the proposal through the municipality to the relevant CRT. These assessments were carried out by the socioeconomic teams of the regional PAST offices prior to decentralization but are carried out by the technical staff of the municipal governments in decentralized municipalities.

8) *Project Development Guide for the Tertiary Transport Network (GFPPRT)*. PAST-Danida, 2005.

9) As of October, 2009, 20 Nicaraguan Cordobas equalled one US Dollar.

3. A requirement for clear commitments in advance by the communities submitting proposals for program supported infrastructure projects. Because neither MTI nor the municipalities involved have sufficient financial resources to carry out all aspects of maintenance of the infrastructure created by PAST projects, communities must establish their ability to provide 5% of the cost of construction of the asset as well as all of the costs of routine maintenance. The initial 5% cost is gathered either through a subscription charge of producers or through “in-kind” provision of land, materials or services by community members. The cost of routine maintenance is usually financed through tolls or a combination of subscription and toll charges.
4. In order to allow for low cost routine maintenance by the community after completion of the infrastructure investment, PAST relies on the maximum practical use of MOI for both project execution and maintenance of the assets which result. This allows the community to contribute labour as an input to both phases (in return for specified wages) and ensures broad community participation. The commitment to MOI as the fundamental principal for construction and maintenance of PAST supported infrastructure projects has the direct result that project design guidelines must be developed with the use of MOI for construction and maintenance in mind.
5. In keeping with the requirement for community commitment of financial resources there is an ongoing requirement for community members to participate in all phases of PAST projects including design, development, execution, and maintenance. This is done under the management of a project committee during the stages leading up to execution. The project committee normally evolves into a maintenance committee after the execution phase.
6. Along with community financial and labour commitments and a central role for community members in all stages of the project, a key characteristic of the PAST model is the critically important role of municipal governments. It is municipal governments who provide support to communities during the development and execution phases of the project<sup>10</sup>. Municipal governments also submit project proposals for consideration by the CRTs and are the main decision makers within the CRT structure. Municipal governments are responsible for financing and providing periodic maintenance to the infrastructure resulting from PAST projects.
7. A strong program emphasis on mobilization, training and capacity development at both the community and municipal government level. In recent years responsibility for social mobilization and capacity development at community level has been shifted more to the municipal technical and administrative officers. PAST office staff in each region continued to provide capacity development support to the municipal level during the same period.

### **Institutional Arrangements**

The institutional structure of Danida’s support to rural transport infrastructure in Nicaragua, as it was developed during PAST Phase One and further refined during PAST Phase Two, is multi-leveled and operates from a national to a community perspective.

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10) During PAST Phase One, these technical services were usually supported by a PAST resident engineer in the program’s regional office.

- At the national level an Executive Committee (CED) with representation from the Regional Transport Committees (CRT), from the Ministry of Transport and Infrastructure (MTI) and from the Royal Danish Embassy (RDE) meets to give final approval to the budgetary framework and release of funds for the upcoming year and to receive and review monitoring reports.
- Within each of the three program regions a CRT meets to receive, prioritize and approve project proposal from municipalities for sending on to the CED.
- In RAAN and RAAS the Regional Governments have established slightly different relationships with the CRT and are represented there. As Las Segovias lacks a regional government there is no corresponding regional body for the CRT there to relate to.
- Each municipality is responsible for identifying and promoting potential projects at the community level, for preparing and screening proposals in cooperation with community members and for eventual project implementation, including the administration of funds for labour and for procured inputs. In the earlier stages of PAST and for some municipalities until quite recently, procurement of external inputs from outside the community was done by the PAST support offices. This has now been decentralized to all the participating municipalities.
- PAST has one national and three regional support offices which work to support their counterparts at each level.

### 2.2 Expected Program Results

Planned and expected results for PAST Phase Two, Component Two can be identified from a range of different programme information sources, including:

- The purpose and objectives of the evaluation as described in the ToR.
- The results reported by PAST in detailed and summary reports at a national and regional level.
- The results indicators monitored by PAST for its Impact Monitoring System (SI-MOIN)
- Results predicted in project proposals from 2001 to 2009.
- Results of the field testing of qualitative methods undertaken by the evaluation in three communities in Las Segovias in June.
- Conversations with PAST national and regional offices staff, with municipal staff and with community members, all of whom largely endorsed the expected results noted in official documents.

The sources reviewed during the Inception Phase of the evaluation placed emphasis on expected results at community, municipal, and regional levels (as emphasized in the ToR).

### **Community Level Results**

#### *Improved Access to Transport and Changes in Traffic Levels*

The criteria used for approving projects (especially the change in access ranking and its influence on project priorities) points directly to an expected result of improved access. Similarly, the statement in projects proposals of both the problems encountered and the expected benefits of projects at community level link directly to an expected immediate result of improved access and increased traffic flows, especially during the rainy season for rural roads. The proposals emphasize communities' severe isolation due to poor transport infrastructure. The completion of the execution phase of the project should see this isolation (whether year round or seasonal) come to an end.

#### *Access to and Use of Social Services: Especially Education and Health*

Given the basic improvement in access to transport and decrease in isolation, whether it was year round or seasonal, infrastructure investments can be expected to allow community members to access critical social services, especially in health and education. This was often expected to come about through lower costs and less time required for community members to leave the community to attend schools, health posts, and health centres. Indeed municipal staff and community members contacted during the inception phase of the evaluation often pointed out that suspension foot bridges were allowing school children to attend schools they could not otherwise reach in a reasonable time or were completely cut off from during heavy rains. Similarly, teachers living outside the communities were reportedly able to reach the schools more regularly and provide teaching on a consistent basis.

Through community members travelling to services or through service providers travelling to the community, the investment projects are intended to increase the frequency of community member contact with social services and the quality of those. Due to a major change in the national policy for local health service delivery, there has been an increased effort to improve immunization coverage through intensified campaigns and improved staffing of nurses in the communities since 2007.

#### *Immediate Economic Benefits*

During the execution phase of PAST projects, community members undertake paid labour at a wage which is calculated to be similar to local day labour rates using a formula that also takes into account the wages of local municipal workers. While the overall cost of the works undertaken is moderate and usually slightly less than would be the case if machine-intensive methods are used<sup>11</sup>, the wage bills and purchases of local materials during execution have been noted by community members as representing a considerable benefit.

There is also continuing employment of local labour during routine maintenance which is the responsibility of the community. This latter employment is not based on a net inflow of resources to the communities since it is most often raised through a subscription payment by small, medium and large producers. In some cases, however, these funds are raised through a system of tolls and thus may, to some extent, represent an inflow of resources to the community.

#### *Medium to Longer Term Economic Benefits (Income and Employment)*

The gains in access and reduction in isolation noted in the first part of this section on community results are intended to bring about a number of different economic benefits

11) IT Transport, 2009

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to community members. The program design documents, program and project monitoring reports, project proposals, and interviews (as well as reviews of impact evaluations of rural roads in other jurisdictions<sup>12</sup>) point to expected economic results in:

- Reduced costs of consumer goods and staples for community members as transport costs are reduced, either because the goods are brought to local vendors (pulperias) at lower cost and by more suppliers or because community members travel at less cost to outlets in other locations.
- Reduced costs of inputs to production, especially agricultural production (seeds, fertilizer, inoculants, pesticides, etc.).
- Increased prices and/or a greater share of producer prices accruing to local producers who have better access to markets either because transport costs are reduced or because they are able to negotiate directly with buyers in other locations instead of through intermediaries.
- Changes in production patterns with increased production of higher value end products, because improved access may allow for the marketing of produce which would otherwise be spoiled or damaged. Increased prices for local assets including land when local producers realize gains can be made from increasing production as a result of improved access.
- Improved access by community members to other employment opportunities although this will vary greatly from community to community depending on its distance from a larger centre of employment and/or employment conditions in the regional generally.

*Medium to Longer Term Economic/Social Benefits: Household and Community Infrastructure*  
During the Inception Phase, some community members point to developments in household and community infrastructure which may accompany development of tertiary transport infrastructure. Examples include:

- Decreased cost and improved feasibility of improvements to housing allowing for upgrades to floors, walls, roofing material, cooking facilities, etc.
- Electrification and improved sanitation and water supply at the community level due to improved access by service providers.
- Improvements in shared local infrastructure, especially schools and health posts including electrical supply and quality of materials for floors, roofing, walls, lighting, due to improved ability to bring materials into the community on a year-round basis.

PAST may also have a longer term impact on economic development in a community because of improvements in the ability of the community to attract development investments and projects from municipal, national and NGO sources. This might be expected to occur because of the simple improvement in access which now allows, for example, an

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12) Van de Walle and Mu (2007). Rural Roads and Poor Area Development in Vietnam. World Bank, Washington. Van de Walle (2008). Impact Evaluation of Rural Roads Projects. *Journal of Development Effectiveness*. Vol. 1, No 1. March 2009.

NGO to work in the community on a year round basis. It might also occur as a result of community experience with PAST which leads, in turn, to an improvement in its ability to formulate proposals, and to manage relations with external actors.

### *Improved Community Organization and Development Capacity*

The experience of planning, executing and maintaining an infrastructure investment with PAST support can be expected to result in some improvements in the communities' capacity to attract and execute other investments. Specifically these include:

- Improved development planning.
- Strengthened community leadership through the work of the project and maintenance committees.
- Better linkages to municipal officials and improved ability to secure services from the municipality.
- Improved community capacity to maintain and manage infrastructure created through its own and outside investments.
- Capacity to attract and execute other investment projects.
- Improved Capacity to Withstand/Respond to Natural Disasters.

While this result was not necessarily designed into the program, preliminary discussions with municipal staff and community members point to some improvement in capacity to evacuate communities in RAAN and RAAS during hurricane warnings.

### **Municipal Level Results**

Municipal government offices have been among the most important target groups for PAST with program results at this level almost entirely articulated in terms of the capacity of municipalities to identify, plan, prioritize, approve, execute and maintain investments in tertiary (and to some extent secondary) transport infrastructure.

The expected results include:

- Greater legitimacy and higher political profile for investments in rural transport infrastructure among municipalities.
- An increased emphasis on maintenance of the network of secondary and tertiary transportation infrastructure including provision of periodic maintenance (as opposed to routine maintenance provided by community members) as needed.
- Improved knowledge of MOI and its technical aspects at municipal level.
- Greater acceptance and use of MOI across municipalities for maintenance of transport infrastructure whether PAST funded or not.
- Increased technical capacity among municipal staff (TMs, social promoters, administrators and mayors) in the use of MOI for rural transport infrastructure.

- Increased administrative capacity at municipal level for managing projects including procurement, financial planning and reporting – especially for decentralized municipalities.
- Improved municipal capacity for outreach to isolated rural communities.
- Improved capacity to take part in regional and national coordination bodies including CRTs and the CED.

### **Regional Level Results**

The main expected results attributed to PAST at the regional level are associated with the establishment and operation of the CRT. They include:

- Improved technical and administrative capacity in support of the CRT through the work of the Secretaria Técnica (ST).
- Improved capacity among the Alcaldes participating as full members in the CRT as they engage in regional priority setting and interface with national authorities at MTI, FOMAV, the Ministry of Environment (MARENA) and the national office of PAST as well as the Royal Danish Embassy. To some extent this may be seen as result which is more municipal than regional but the key dimension to this change is the ability of the mayors to act as a group and to discuss and agree on priorities on a regional basis.
- Improved interactions between the mayors in RAAN and RAAS who participate in the CRT and the regional governments there (there is no counterpart regional government in Las Segovias since it brings together municipalities from three different departments which are not associated in a formal regional body).

### **2.3 A Note on Program Context**

One of the themes raised by virtually all of the key informants interviewed during the evaluation has been the complexity of the program environment faced by Danida's efforts to support tertiary rural transport infrastructure in Las Segovias, RAAN and RAAS and how this has evolved, and continues to evolve, over time.

There is insufficient space in this section for a complete description of the complexities of the program environment. Nonetheless it may be useful to highlight just a few factors which can help the reader in understanding both the challenges of the sector and some of the differences which arise in the impacts produced by the program in different communities. Without attempting to be comprehensive, it is worth examining the factors of geographic isolation, main economic activities, ethnicity, and community and municipal governance. It is also important to remember that these factors are interdependent, each tends to influence the other, and they may change over time.

#### **Geographic Isolation**

One of the historical facts of Danida assistance to rural transport infrastructure in Nicaragua is its early focus on the most geographically isolated regions of the country, RAAN and RAAS<sup>13</sup>. During the evaluation, team members travelled to municipal centres and

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13) PAST, 2005.

remote communities in Las Segovias, RAAN and RAAS. This exposure made it clear that most project communities in the Atlantic Regions were relatively more isolated from both their respective municipal centres and larger urban markets than those in Las Segovias.

There are also, of course, important differences in the level of geographic isolation within each of the three regions. In RAAN and RAAS the regional evaluation teams conducting participatory, qualitative evaluation work in the communities identified three major geographic zones with different challenges in terms of isolation.

The first of these could be called the coastal or littoral zone with communities living near the sea, usually on the edge of one of the major lagoons. These communities had access to the municipal centres only by boat and sometimes had to cross dangerous open water to reach a larger centre such as Bluefields.

However, coastal communities were somewhat less isolated than some of the communities located farther up the major navigable rivers and sometimes lacking year-round road connection from an inland position ten or more kilometres from the river itself. For these community members, travel to a larger centre involved a difficult and lengthy (and expensive) journey on foot or horseback and then by boat.

Perhaps the least isolated group of communities (but still needing support to connect to the secondary and primary road network) were those communities located in the central zones of RAAN and RAAS which could be connected by project roads to year round and relatively easy access over land to urban markets in the Pacific area of Nicaragua<sup>14</sup>.

It is also important to note that this pattern of geographic isolation is linked to the patterns of ethnicity, patterns which themselves are changing over time.

### **Economic Activity and Production and the Agricultural Frontier**

Perhaps most closely related to the question of geographic zones both across and within regions is the question of primary agricultural or fisheries production and how that may influence the impact of rural transport infrastructure.

In Las Segovias, for example, ranching and cultivation of basic grains are important agricultural activities in almost all the communities studied for the evaluation. On the other hand, as the field teams moved north and into more mountainous municipalities in Las Segovias, coffee production became more important (while tobacco was grown in some of the more southern municipalities).

In general terms, however, there was more commonality of production across the PAST project communities in Las Segovias than in RAAN and RAAS. In the latter regions, coastal communities and those located on the main rivers were often engaged in fisheries including shrimp, crab and different species of fresh and saltwater fish as the goods they traded in the marketplace, while they maintained small scale crops and animals mainly for self-consumption.

In the central zones of RAAN and RAAS, production of basic grains for sale and commercial meat and dairy cattle production was much more common, sometimes influenced by market linkages created by PAST projects.

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14) Technical Mission to the Transport Sector Programme Support in Nicaragua. Hvalkof, 2007. PP. 7-27.

Since one of the most important ways rural transport infrastructure may influence economic activity is by connecting producers to markets and to lower cost inputs, it is evident that those impacts will vary depending on the value, price-level and level of demand in the market for the main products of the communities concerned. These impacts may also be quite volatile over time. A period of high prices for coffee, or for shrimp and crab, could mean that communities with those commodities as their main traded product see relatively high impacts.

The important point is that the type of production prevalent in a given area and community may influence both the overall level of economic benefit and the relative scale of that impact over time when compared to other communities. The evaluation tried to control for this element of variability by selecting treatment and comparison communities which were as well matched as possible in both their degree of isolation (pre-project) and their main productive activity.

### **Ethnicity**

As noted by the central PAST office in Managua, Nicaragua's national Law of Autonomy officially recognizes six distinct ethnic communities in RAAN and RAAS: Miskitos, Garifunas, Creoles, Mestizos, Ramas, and Mayagnas. Similarly, Henriksen (2008) identifies six different ethnic groups living on Nicaragua's Atlantic Coast. They include Spanish speaking Mestizos many of whom are landless peasant migrants to the region from the Pacific areas of Nicaragua as well as Miskito, Sumu and Rama indigenous groups, Creoles of African descent, and Garifuna people who are also of African descent but with a distinct language and cultural background.

While there are patterns of settlement with the more Western parts of RAAN and RAAS more heavily Mestizo in character and with more Creole communities on the coast, the patterns are becoming increasingly complex over time. Program staff and municipal officers noted that communities which were predominantly Miskito or Rama are now mixed in character and some have a patchwork of different ethnicities in the same community<sup>15</sup>.

Whether communities are mixed or mainly of one ethnic character, they often have distinctly different ways of organizing, for instance, land tenure. Predominantly indigenous communities on the Atlantic coast normally hold land in common while Mestizo communities are characterized by individual landholdings. The evaluation encountered this difference when it tried to compare the price of land and size of individual landholdings across communities. Tracking the impact of a road or bridge on land prices and average landholding size makes eminent sense in a Mestizo community, but very little in one where land is held in common.

Further, as Henriksen points out, the historical political allegiances of different ethnic groups come into play in influencing current relationships. For a complex set of reasons having to do with the sudden arrival of state institutions and an influx of Mestizos which coincided with the Sandinista revolution (which Henriksen compares to the absence of a state presence under the Somoza regime), many men and women from communities on

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15) *Ethnic Self-Regulation and Democratic Instability on Nicaragua's Atlantic Coast: The Case of Ratisuna*. Henriksen (2008). Henriksen describes in considerable detail the inter-relationship of spatial/territorial/ethnic factors and its influence on, for example, land tenure arrangements. In Ratisuna he delineates the existence of a colony of landless Mestizo migrants within the boundaries of a predominantly Miskito ethnic community where Creole is the main language.

the Atlantic coast fought against the Sandinistas during the 1980s. Further, as pointed out by PAST staff members, there were differences between communities in close proximity but of different ethnic makeup. Indigenous communities and their organizations were reported more likely to be anti-Sandinista while Creole communities were more often pro-Sandinista during the conflict.

Not surprisingly, the ethnic makeup of communities in RAAN and RAAS can give rise (along with other factors) to tensions both between communities of different ethnicity and within a given community. It could also be expected to influence the level of isolation experienced by a community and the nature of its contacts with social services such as health and education.

Velleman (2009) in a recent assessment of factors affecting access to health care in RAAS, argues that, while geographic and transport barriers are important, the single most important factor limiting access by Miskito community members to health care was discriminatory treatment by health workers (Creole nurses and Mestizo doctors). Without either accepting or rejecting this claim it seems clear that, for example, linguistic problems in accessing health care could be a major factor for some ethnic groups.

### **Local Governance**

Since the strategic orientation of PAST Phase Two has been clearly focused on transfer of project responsibilities to municipalities and communities in a process of decentralization, the quality and strength of local government institutions could clearly be expected to be a factor in the relative success of projects and in their impacts and sustainability. The quality of municipal government engagement in Danida efforts to support rural transport infrastructure can be expected to be a compound of two distinct factors: capacity and interest.

#### *Municipal Capacity*

In all three regions of program activity there are clearly substantial differences in municipal capacity measured in terms of the number and level of training of technical and administrative staff and the energy and engagement of municipal politicians, especially mayors. Key informant interviews with municipal officials confirmed very different levels of financial, human and technical resources available to be committed to working on PAST supported projects. Hvalkof (2007) also documented very different levels of resource availability and engagement.

The capacity of municipalities can also be expected to vary across different zones of geography and economic productivity. One observation from the municipal interviews carried out for the evaluation concerns the relatively stronger municipal structures among the four municipalities in the central zone of RAAS. These four municipalities have more extensive road networks combined with better linkages to markets in urban centres and are visibly more prosperous than their cousins on the coast.

#### *Municipal Interest*

While some municipal governments may lack the capacity to effectively engage in the program in support of rural transport infrastructure, others clearly lack interest. This was perhaps more readily apparent in Las Segovias where some of the better resourced municipalities preferred to focus on constructing and maintaining their road network using mechanized methods. For these municipalities, there was apparently little interest in the longer term work of community mobilization and construction and maintenance using MOI.

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In summary, PAST has been operating in an environment in which multiple factors may influence both the success of project design and implementation and the impacts which result. Further, these factors are inter-related in complex ways and changing over time. It is important to keep this background in mind when considering the results of the evaluation's efforts to assess the impact of program support to rural transport infrastructure over a long period of time in Nicaragua.

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## 3 Methodology

### 3.1 Phasing and Overall Approach

The evaluation has been planned and implemented in four main phases:

- **Phase One:** The inception phase, which took place from early January to May 29, 2009.
- **Phase Two:** The quantitative Survey Phase (in Las Segovias) was carried out from June 1 to August 10, 2009. In addition, Phase Two included testing methods and approaches for qualitative data collection in three communities in Las Segovias during the week of June 8 to June 12.
- **Phase Three:** The fieldwork phase was carried out from August 15 to October 6, 2009. A pre-field mission to RAAN and RAAS from August 16 to August 22, 2009, allowed for planning fieldwork logistics and final selection of communities to be covered by the fieldwork. The fieldwork mission (qualitative) took place from September 14 to October 6, 2009.
- **Phase Four:** Reporting was started immediately upon completion of the fieldwork. A Draft Evaluation Report was delivered on January 11, 2010 and presented at a stakeholder workshop in Managua on January 20, 2010. The Final Report was submitted in April, 2010.

The overall purpose of the phased approach has been to allow the evaluation to build on the findings of the quantitative survey in Las Segovias regarding the impacts of Danida PAST at community and household levels measured in econometric and social terms. These results were then tested and explored more thoroughly through the qualitative methods implemented during Phase Three. In addition, the qualitative methods have examined issues that were not fully covered by the quantitative analysis.

### 3.2 Econometric Impact Analysis

An initial concern to the evaluation was whether it would be possible to access data which would allow for a rigorous impact evaluation of a number of the key areas affected by the Danida PAST interventions. Of particular concern was:

- The availability and quality of existing data sets, in particular baseline data.
- The types of socio-economic impacts to be expected from the various types of projects.
- The possibility of identifying a sufficiently large number of comparison communities.

Based on a thorough assessment of data availability and quality, the evaluation recommended only considering a re-survey in Las Segovias. In RAAN and RASS the number

and quality of household data observations from project communities and potential comparison communities would be insufficient to carry out an econometric impact analysis. In addition, compared to Las Segovias, RAAN and RAAS are characterised by more heterogeneous communities, project impacts are mainly of social and less of economic nature and logistics are more difficult and resource requiring.

Baseline data was provided by the Instituto Nacional de Información de Desarrollo (INIDE). The PAST data base (SIMOIN) included useful data on project results but only for treatment communities. These data were therefore not particularly well-suited for rigorous impact assessment since they lacked a baseline for comparison communities. The evaluation was able, however, to use some SIMOIN data to help explain developments within the treatment communities.

#### **Identifying Comparison Communities**

A particular challenge to the evaluation was the identification of a sufficiently large number of suitable comparison communities for the re-survey in Las Segovias. The evaluation therefore visited all project municipalities within Las Segovias, where round-table discussions were held with technical staff from the municipalities and Danida PAST staff. The following main selection criteria, which are also used by Danida PAST for pre-selection of Project Communities, were used for identifying the potential comparison communities within each municipality:

- *Production.* The communities should be located in areas with good agricultural productivity.
- *Access.* The communities should have serious road access problems. In fact, comparison communities were only selected if their access ratings were and continued to be at the same level as Project Communities at the time they entered the program.
- *Connecting.* The potential road connection from the communities should connect to primary/secondary transport infrastructure.
- *Population Size.* The population size of the communities should be, at least, 50 persons per project km. This was checked by referring to census data from 2001 and 2005 and by reference to the 2004 Transport study which included size estimates for all communities.
- *Distance.* The distance of the potential project should not be more than 15 km in total. This criterion was matched by identifying comparison communities which are similar in their distance from the nearest secondary road to Project Communities.
- *“New” Project.* The communities should not previously have been part of other similar interventions by the Government or other organizations.

A number of the selected comparison communities are part of the 2010 municipal project proposals to PAST and can therefore be considered as “pipeline projects”. This is a particular strength, since it provides a clear indication that these communities would actually qualify for the project.

In impact evaluation literature the importance of unobservable community characteristics (such as communities' own ability to organize and develop) is often highlighted as a potential selection bias that is not captured within traditional impact measurements. In the case of PAST, this type of potential selection bias seems quite limited, for two reasons.

First, there was a good deal of initial scepticism within the communities for applying the labour-based infrastructure project modality, since it presented a new and very different way to implement road projects. Municipal officers and Danida PAST staff argue that, for some time at least, many communities were reluctant to request projects from PAST, regardless of their initial capacity. This could indicate that it has not necessarily been those communities with the highest potential for development that have applied for PAST projects.

Second, the Municipal Offices prioritized the community project proposals by using an index composed by two factors: 1) Expected *change* in access due to road construction and 2) Project *cost per capita*<sup>16</sup> This again is an indication, that project selection has not been biased automatically towards the more well-organized communities<sup>17</sup>.

### **Establishing a Baseline Using Censo and EMNV Data**

The evaluation was granted full access by INIDE to databases with EMNV 2001/2005 and Censo 2005 data, including household codes. This enabled the evaluation to conduct a re-survey of a number of the same households in Las Segovias that had been surveyed by INIDE in 2001/2005, and to link household data information across the different data databases.

From the databases, it was possible for the evaluation to establish a 2005 Socio-economic Baseline for HHs within both treatment and comparison communities (and for those communities that were covered by the EMNV 2001, it was possible to use this data as a second comparison point).

The EMNV questionnaire includes highly detailed questions on household income, consumption, access to education and health centres, migration patterns, employment opportunities, agricultural choices, land ownership and prices, consumer prices and many other variables directly or indirectly hypothesized to be influenced by rural roads. The census has less detailed information on each subject. However, it covers all communities in Las Segovias, which improved the statistical validity of the results obtained.

The evaluation has focused on analysing a battery of parameters that are all indicators and proxies for HH income and welfare instead of trying to estimate specific values for possible production and income increases that could be attributed to Danida PAST interventions. One reason for this is that, due to budget limitations, it was not possible for the evaluation to fully repeat the EMNV 2005 questionnaire interview.

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- 16) This selection approach has been used for the PAST projects formulated and implemented from 2004, which is the period that covers the full sample for the quantitative survey, except from one EMNV project. Up to 2004 project prioritization was criteria based on criteria related to equity, poverty and maintenance. Selection based on these criteria is however also supporting the argument that selection bias in favour of potentially more well-organised and dynamic communities is not a major concern here.
- 17) Organizational "assessments" of the communities were also carried out by the regional PAST team or the municipal technical staff before submission of proposals through the municipality to the relevant CRT. These assessments were however by the municipal and regional PAST offices not considered determining factors for the community selection.

Another is that direct production and income measurement at HH level is often problematic due to the tendency for HHs to under report to avoid any possible tax penalty. While this might not mask percentage changes over time (since a given HH could presumably under-report income consistently), it would lead to a lower point estimate of the value of HH income. To this should be added the yearly fluctuations in production arising from natural disasters and/or particularly rainy/dry seasons. In the case of Las Segovias, the agricultural production in some areas was negatively affected by Hurricane Felix in 2007 and extensive rainfall in 2008.

Finally, the negative economic and price developments observed during the last one to two years, globally as well as nationally in Nicaragua, would also tend to underestimate potential impacts from the PAST interventions on production and income.

It was therefore decided to carry out the re-survey in Las Segovias using a selection of the questions from the EMNV questionnaire along with the complete census questionnaire.

#### **Econometric Analysis**

For the econometric analysis a *double difference* (DD) approach has been applied, which first takes the difference between outcomes in the treatment communities before and after the Danida PAST interventions was implemented, minus the (second) corresponding difference in comparison (non-PAST) Communities.

However, since this conventional double difference estimator does not allow for initial conditions or time-varying factors that also influence subsequent changes in outcomes over time, the estimator is combined with a matching approach controlling for the initial conditions or time variant factors that simultaneously influence the placement of roads and subsequent growth rates<sup>18</sup>.

In the analysis we have limited the *matching variables* to *household size*<sup>19</sup> and to the following *five community characteristics* that are being used in the census as structural indicators for poverty and social development:

*Crowding* – refers to the use of the area of housing accommodation in relation to the number of HH members.

*Quality of housing* – refers to the level of quality (adequate/inadequate) for the construction materials of walls, roof and floor of the house. A house is deemed as “appropriate” if the presence of any two combinations of wall materials, ceiling and floor, are considered acceptable. Otherwise (with only the presence of one acceptable material if any) it is considered as “inappropriate” housing.

*Basic service levels* – refers to whether HHs is deemed to have an adequate supply of water and an adequate system of sewage disposal.

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18) The *matched double difference approach* is recommended in the economic literature by, for instance, Van de Walle (see Van de Walle, 2009) when panel data is available.

19) Household size is the only HH specific criteria that was used for matching (in addition to the community characteristics) since this information was available from all filled-in questionnaires. The evaluation tried to use also different types of HH access criteria for matching but since this type of information was missing from a number of the filled-in questionnaires, it would have left the evaluation with too few observations for the econometric analysis.

*Education* – measures access to basic education services, by children who are at school age. Education would qualify as low to the HH, if there was at least one child between seven and 14 years of age, not currently attending school.

*Economic dependency* – refers to both the educational level of the HH head, and access to employment for its members by building a labour dependency ratio.

In the analysis the evaluation has controlled for all these HH and community characteristics and the results show that *the simple DD and the matched DD estimates throughout the analysis yielded highly similar results*. This is a good indication that the strong efforts made by the evaluation in the selection and matching of comparison communities and HHs have succeeded.

The robustness of the results from the data analysis has been tested at the 1% (most significant), 5% and 10% (least significant) significance level. In the following sections, where the results of the analysis are presented, the respective significance levels will be indicated with (\*):

- (\*\*\*) shows that the result is significant at the 1% level
- (\*\*) means significant at the 5% level
- (\*) is showing significance at the 10% level

If no (\*) is shown, this means that the result is not statistically significant (although the changes in absolute numbers may indicate a trend or direction). In some cases where the number of observations has been relatively low, variation has been too high to show any statistical significance. In this last case, the small number of observations means that the trend or result shown cannot be statistically confirmed with a defined level of confidence (1, 5 or 10%).

This does not necessarily mean that any observed trend is meaningless if it does not indicate statistical significance. Instead, to the degree possible, the evaluation has used triangulation of findings from other data collection methods to assess the validity of positive but non-significant data results.

### **The Re-survey in Las Segovias**

The re-survey in Las Segovias included collection and analysis of data at three different levels:

1. *EMNV household data*. From the EMNV 2005 and 2001 databases, it was possible to identify 140 households covered by PAST (treatment communities) as well as 171 households, that fulfilled the pre-selection project criteria established by Danida PAST and thereby qualify as comparison communities, within 17 communities in Las Segovias. The survey instrument for this group was based on a combination of the EMNV 2001/2005 and the Census 2005 questionnaires.
2. *Census household data*. In addition to the 311 households available from the EMNV's, another 60 communities were selected for the Censo re-survey: 30 treatment communities were selected from the Danida PAST project database (2005-2008 projects), and one comparison community match for each of these project communities was identified (see list of pre-selected community matches in Annex 2). In

each community eight households were randomly selected for the re-survey. This survey instrument was based on the Census 2005 questionnaire.

3. *EMNV commodity price data.* The EMNV's in both 2001 and 2005 included a separate Price Module, where a number of commodity prices have been recorded at the pulperías within each survey community. This module was repeated in the 2009 re-survey.

After completing the 2009 re-survey, the evaluation made strong efforts to check the consistency of the data, ensuring that it was in fact the same households being interviewed in both 2005 and 2009. Moreover, a data cleaning process was undertaken excluding all inconsistent answers and missing observations. This data cleaning process left the evaluation with 201 EMNV households (84 treatment households and 117 control households) within 14 different municipalities and 37 communities (16 treatment and 21 control) and 595 Censo households (258 treatment households and 337 control households) within 17 municipalities and 73 communities (36 treatment and 37 control).

More details on the re-survey in Las Segovias, including an overview of the municipalities and communities covered by the re-survey, are provided in Annex 2.

### 3.3 Key Informant Interviews

Leaving aside the process of direct consultation with community members through focus groups and community mapping, the set of key informants interviewed during the evaluation included:

- Senior Program staff at the Royal Danish Embassy and MTI.
- Current and former officers working in the PAST offices in Managua, Estelí, Bluefields and Puerto Cabezas.
- Technical Secretaries for each of the three CRT.
- Regional Government representative members of the CRT in RAAN and RAAS.
- Regional Government commission heads in RAAN and RAAS.
- Mayors (Alcaldes) in a sample of municipalities in each program region.
- For the same municipal governments, Municipal Technical Officers (TM), social promoters, procurement officers, administrative officers and municipal council members.
- In selected municipal centres, officers of MINSA, MINED and other relevant ministries responsible for services such as water and sanitation, rural electrification etc.
- Community leaders and heads of project and maintenance committees in project communities.

One of the most important sets of key informant interviews took place during the qualitative data collection phase of the evaluation from September 14 to October 1 in Las Segovias, RAAN and RAAS. During that phase, evaluation team members conducted interviews at the headquarters of 16 different municipalities in order to assess the institutional and capacity development impacts of the program at the municipal level. For each municipality, interviews were conducted with mayors or vice-mayors, TMs, administrators, planning officers, and members of the municipal council. In Bluefields in RAAS and Puerto Cabezas in RAAN, interviews were also held with members of the Regional Government.

Table 2 lists the municipalities where structured interviews were carried out.

**Table 2: Municipal interviews by region**

Las Segovias	RAAS	RAAN
Condega	Rama	Siuna
Somoto	Muelle de Lo Bueyes	Rosita
Pueblo Nuevo	Bluefields	Bonanza
Palacaquina	Kukra Hill	Waspam
Quilali	Laguna de Perlas	Puerto Cabezas
Jicaro		

In each of the three regions, the municipalities chosen included both large and small, more and less prosperous, and different agro-climactic zones characteristic of the region.

### 3.4 Qualitative Assessments at Community Level

#### Participatory Methodologies Used

The qualitative assessments of PAST impacts at community level relied on community members themselves to identify, discuss, map and illustrate the impacts and effects of the program and the infrastructure it supported using a set of participatory evaluation methodologies.

In comparison communities, where there was no PAST supported infrastructure, community members mapped out the changes that had occurred in their municipality in recent years. They described economic and social developments around the same set of factors explored with treatment communities including: access to transport and traffic volumes; economic development, production and employment; access to health and education services; basic services such as electricity and water; and environmental changes.

The methods used in both treatment and comparison communities included:

- Participatory focus groups with men and women community members (held separately and including large, medium and small scale producers to the extent possible).
- A community in transition mapping exercise which involved community members

drawing and illustrating detailed maps of their community and the physical changes which have occurred in the period since the PAST project was implemented or over a similar time-frame in the case of comparison communities.

- An opportunities mapping exercise which allowed community members to explicitly identify both the different organizations and structures working within the community before and after the project and the related changes in services and products.

A plenary session in which all the groups met to review the material produced by the four groups listed above and to identify positive and negative impacts of the PAST projects. For comparison communities this part of the day was spent summarizing the challenges they face relating to poor transport infrastructure.

In each of the three regions of the program, a field team of five researchers animated and recorded the participatory methods outlined above. For each community the field teams spent a full working day in the community and then compiled a photographic and written record of the day. These were then consolidated in community evaluation reports.

These participatory evaluation methods were field tested in two communities in Las Segovias in June and subsequently implemented during the main qualitative data collection mission in September. A total of 39 communities took part in the qualitative evaluation exercise, 14 in Las Segovia, 13 in RAAS and 12 in RAAN. Twenty-six of the communities were treatment communities benefiting from PAST supported investments in transport infrastructure. Thirteen were comparison communities carefully selected because they would have qualified for support from PAST based on their poor access to transport and had similar characteristics to PAST communities.

#### **Selecting Participating and Comparison Communities**

There were two different strategies chosen for selecting treatment and comparison communities for the qualitative evaluation field work.

In the case of Las Segovias, the quantitative analysis of survey data provided a very strong information base on both treatment and comparison communities spanning different types of infrastructure, different agro-climatic zones, different levels of production and income and different degrees of municipal and community organizational capacity. Given this basis the decision was taken to match one treatment to one comparison Community in Las Segovias. The result was the selection of seven treatment and seven comparison communities.

In RAAN and RAAS, without the strong base of quantitative information, the evaluation focused on choosing a larger number of treatment communities with experience with PAST infrastructure projects and a smaller number of comparison communities. This strategy was chosen to allow the evaluation to spend most of its resources on assessing the lived experience of community members where the program would have its impacts. Comparison communities were then used as a qualitative check on the validity of these findings, rather than a statistical control.

Within that framework both treatment and comparison communities in RAAN and RAAS were chosen in order to ensure the maximum possible coverage of:

- As large a proportion as possible of the municipalities in the Region.

- A cross-section of types of infrastructure (roads, bridges, wharves, canals).
- A cross-section of projects by time elapsed since project completion.
- A cross-section of communities by ethnicity and community type<sup>20</sup>.
- A cross-section of agro-climactic zones.

Table 3 provides details on the type of coverage achieved by these methodologies in RAAN and RAAS.

**Table 3: General characteristics of evaluation communities**

Characteristics	Region and Number of Communities		Totals
	RAAN	RAAS	Totals
Program Communities	9	10	19
Comparison Communities	3	3	6
Coverage of Municipalities	7 of 8 municipalities	9 of 12 municipalities	16
Ethnicities	9 Indigenous and 3 Mestizo	9 Mestizo, 1 Creole, 3 Indigenous	15 Mestizo, 9 Indigenous and 1 Creole
Project Types	1 Canal, 3 Wharfs, 4 Roads and 1 Road/Bridge Combination	4 Wharfs, 2 Roads 3 Bridges (including Vado and Colgante) and 1 Road/Bridge Combination	1 Canal 7 Wharfs 6 Roads 3 Bridges 2 Road/Bridge Combinations
Project Completion Dates	1998 – 1	1998 – 1	1998 – 2
	2003 – 1	2004 – 2	2003 – 1
	2005 – 1	2005 – 1	2004 – 2
	2006 – 2	2007 – 3	2005 – 2
	2008 – 3	2008 – 2	2006 – 2
		2009 – 2	2007 – 3
			2008 – 5 2009 – 2
Other Factors	Coverage of coastal, river and central zones.	Covered coastal, river and central zones Included older and newer communities including “colonias”	

20) As well as differing by ethnic type, communities in RAAN and RAAS often differ by their history and physical layout. For example, established Creole settlements around Pearl Lagoon are often quite compact with houses arranged around the wharf, church, community centre and schools. They also usually have quite a long history as an established community. In the central zones of RAAN and RAAS communities are sometimes called “colonias” and are relatively new collections of farms and ranches inhabited by “immigrants” from the western part of Nicaragua. They may have a health post or school nearby but they are widely dispersed and often have no identifiable centre.

Care was taken in selecting the comparison communities to find communities which are experiencing the same levels of isolation (access rated by TMs at the levels characteristic of project communities at the time of project proposals) and with similar production characteristics as the treatment communities. An effort was also made to ensure comparison communities were in need of a range of infrastructure improvements (roads, wharves and bridges) and represented the different zones of RAAN and RAAS. Finally, comparison communities chosen in RAAN and RAAS represented different ethnic groups.

Three of the comparison communities are predominantly Mestizo in ethnicity while the other three are indigenous (Miskito). The six comparison communities also represent six different municipalities spread across coastal, river and central zone communities.

### 3.5 Challenges and Limitations

The key challenge in implementing the econometric analysis of census and survey data was identifying both treatment and comparison communities which had participated in the EMNV of 2001 and 2005 in order to generate a sufficiently large sample promising statistically significant results. Because the EMNV sample in 2005 for RAAN and RAAS was much smaller than for Las Segovias, it became clear that this was not possible for RAAN and RAAS. Consequently, the re-survey of 2009 and the econometric analysis of survey and census data were confined to Las Segovias.

The question of how to infer impacts for RAAN and RAAS was addressed by having the same qualitative methodologies used in all three regions and by comparing the qualitative results for RAAN and RAAS with the quantitative and qualitative results reported for Las Segovias. Where qualitative and quantitative methods give consistent results and where determining conditions are similar, the evaluation can express reasonable confidence that findings are valid in all three regions. Of course it is important to point out the differences which arise both between qualitative and quantitative results and across regions. Interestingly, there are important differences within some regions (especially RAAN and RAAS) in the impacts of PAST as assessed by the evaluation.

The matches and differences across methodologies and regions (and other characteristics) are reported in the evaluation findings sections which follow.

In the case of qualitative methods, the key challenges have been logistical and linguistic. Because of the duration of the study, field collection of qualitative data was concentrated in September of 2009 which meant that in RAAN and RAAS the teams contended with heavy rainfall and its effects on transport, especially in travelling to comparison communities with poor or nonexistent roads, bridges and wharves.

Finally, it was somewhat difficult to find suitable comparison communities in RAAN and RAAS given the long history of the program in the Atlantic regions.

### 3.6 Analysis and Reporting

Immediately after completion of the fieldwork in early October 2009, a three-day team workshop was held in Grenada to discuss and analyse the various data and information collected from Las Segovias, RAAN and RAAS. Two national experts from each of the three regional field teams as well as the international team members participated in the workshop.

Based on the synthesizing done at the team workshop, a power point presentation with the preliminary results and findings from each of the three regions was prepared and presented at a seminar at the Royal Danish Embassy (RDE) in Managua on 6 October, 2009. The seminar was attended by the Vice Minister of MTI and staff from the PAST offices, as well as by Danida Embassy staff. After the presentation at the seminar, the team received a number of comments and suggestions from the participants, which have been taken into consideration during the subsequent report drafting.

The final reporting process has included finalization of the community reports from the qualitative fieldwork, additional testing of the quantitative data sets, as well as further triangulation and synthesizing of the various results and data sources.

On January 20, 2010, a Draft Evaluation Report was presented and discussed at a key stakeholder workshop in Managua. This Final Evaluation Report has taken into consideration the comments and feed-back received from the workshop participants.

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## 4 Community Impacts

As mentioned in previous chapters, in Las Segovias the evaluation carried out a quantitative survey as well as qualitative fieldwork. This provides a more robust platform for the analysis compared to RAAN and RAAS where no survey data is available. During the subsequent analysis on RAAN and RAAS the report does, however, make reference to the data survey analysis from Las Segovias wherever relevant.

In the case of Las Segovias, a preliminary assessment of the quantitative data was carried out prior to implementation of the qualitative fieldwork. This had the advantage that, on the one hand the quantitative results could be verified while, on the other hand, it became possible to investigate those specific factors and processes that had contributed to impacts (or their absence) from Danida PAST interventions.

In the following section, the quantitative and qualitative analyses are linked together for each impact area where there are both quantitative and qualitative findings. Within some areas, mainly social, there is no survey data available and only qualitative findings are presented.

### 4.1 Quantitative and Qualitative Assessment of Impacts in Las Segovias

In cases with both survey data and qualitative fieldwork observations, the two sources of information are linked and compared to establish to which extend the fieldwork findings sustain and explain the survey data.

#### Travel and Transport

Before-After estimates on average daily traffic intensity<sup>21</sup> show that there has been *a considerable absolute and percentage increase in the traffic intensity to/from treatment communities<sup>22</sup> with regards to most traffic means (Table 4)*. The increases are most pronounced for trucks (loads), buses, cars, motorbikes and bicycles but there have also been increases in the case of beast and cart transport and in the number of pedestrians. This indicates a general increase in the traffic intensity to and from treatment communities after PAST projects have been completed.

**Table 4: Average daily traffic intensity for different transport means (Aggregated traffic to and from 26 project communities)**

	Trucks loads	Buses	Cars	Cars NGOs	Motor-bikes	Bicy-cles	Carts	Beasts	Pede-strians
Before	53	24	212	45	267	1517	226	1426	5732
After	163	99	1036	94	1087	6350	305	3354	13208
Percent change	207.5	312.5	388.7	108.9	307.1	318.6	35.0	135.2	130.4

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21) Traffic data have been collected by the PAST Danida Programme twice a year (one week in the summer and one week in the winter, from Monday to Sunday, 6 a.m. to 6 p.m.) and entered into the SIMOIN data base.

22) In this section, communities which benefited from a PAST supported investment in construction or rehabilitation of transport infrastructure are referred to as treatment communities.

*Note to Table 4: Before-After estimates and calculated percentage increase in average daily traffic intensity between the baseline and ex-post (after-project) data collection. The traffic data is collected twice a year, during one week in the summer and one week in the winter, from Monday to Sunday, 6 a.m. to 6 p.m. Data are from the PAST monitoring database (SIMOIN) and are collected in treatment areas only. The information presented is collected data on traffic going in and out of project communities between 2002 and 2008 for a total of 26 projects.*

Findings from the qualitative field work within the PAST communities in Las Segovias strongly support the quantitative results on large increases in traffic intensity for a number of transport means. All seven treatment communities visited reported an increase in the number of children using bicycles to/from school (mostly secondary schools that are normally located distant from the communities). Likewise, a sharp increase was reported from all treatment communities in the traffic related to commercial activities, both in relation to the frequency and number of commercial dealers entering the community as well as community people travelling to urban markets to sell their products or work. Five of seven treatment communities reported that public transport services (buses, taxis) had improved after road construction. The large increase in the number of pedestrians was explained by an easier more secure access allowing children to travel to school (mainly primary school)<sup>23</sup> as well as by a general higher level of social and economic interaction with neighbouring communities.

Since a similar set of traffic data is not available for the comparison communities it cannot simply be concluded that the observed increases in traffic intensity and volume to/from treatment communities can be fully attributed to the PAST interventions. However, as seen from Table 5 below, the quantitative data point towards an increase in travel time within comparison communities which is an indication that road conditions have deteriorated. In addition, the qualitative fieldwork carried out within the comparison communities found no indication of increases in traffic levels over the past five year period. None of the seven comparison communities visited could report on any notable increase in traffic levels of any transport means. It seems therefore to be a plausible conclusion that the PAST projects have strongly contributed to the considerable increases in traffic levels of several transport means within the treatment communities.

#### *Travel Time*

The survey data (Table 5) shows that *HHs within treatment communities have reduced travel time to the nearest health centre/post compared to HHs within comparison communities. This estimate is highly significant (at the 1% level)*. Since it was found from the qualitative fieldwork that the location of health posts had in general not changed over the period, the relative decrease in travel time for treatment communities may be attributed to PAST project interventions<sup>24</sup>.

The fact that access improves due to transport infrastructure projects is of course not a surprising finding. What is more interesting to note from these data, is the relation between travel time in treatment communities and comparison communities before project interventions and the before-after change in travel time for the comparison communities. As can be seen, travel time was higher for treatment than for comparison communities

23) Before the PAST project intervention, many children needed to pass a river in order to arrive to school. In winter time this often became very risky due to increases in the water levels.

24) It is worth noting that whenever the DD estimate comparing the change in the treatment communities to the comparison communities is statistically significant, it is valid to conclude that the difference can be attributed to the PAST interventions at the significance level indicated.

prior to project interventions. Since travel time per km is considered a good proxy for road quality, this indicates that sampled comparison communities on average had better roads than treatment communities before the interventions.

On the other hand, it can also be seen that average travel time within comparison communities has increased significantly, which indicates that road quality within comparison communities has deteriorated over the period. This suggests that if no systematic road maintenance is taking place, there is a tendency for road conditions to become worse. In view of this, the before-after estimate for the treatment communities would have tended to underestimate the real gain in travel time attributed to PAST project interventions. Similarly, the average travel times reported do not necessarily account for periods when travel was impossible due to, for example, heavy rains. This may also contribute to an under-estimate of the improvement in average travel time for households in PAST communities.

**Table 5: Travel time (minutes) per km to walk to closest health post/centre**

	Before	After	Difference
Treatment communities	22.011 (209)	18.897 (209)	-3.114** (209)
Control communities	17.488 (260)	20.241 (260)	2.753** (260)
Difference	4.523*** (469)	-1.343 (469)	-5.867*** (469)

*Note: Difference-in-difference estimates. Dependent variable: time use per kilometre to closest health centre/post<sup>25</sup>. Number of observations in parenthesis. \*, \*\*, \*\*\* indicate significance at a 10%, 5% and 1% level, respectively. (Data source – Censo question No. 9: Desde esta vivienda al centro de salud más cercano: Qué distancia hay? Qué medio de transport usan para ir? Que tiempo tardan en llegar?)*

The difference in before-after estimates on average travel time (walking time) per km (as a proxy for road conditions) between treatment and comparison communities is important to keep in mind during the data analysis of the economic and social impacts from PAST interventions. *If road access conditions influence the level of economic and social development then it must be expected that the survey data will show a tendency that HHs within comparison communities were better off prior to PAST interventions, while HHs within treatment communities are better off after PAST project interventions.*

### **Economic Impacts: Employment, Production and Prices**

#### *Employment*

The survey data (Table 6) shows that *average employment for HH heads has improved substantially within treatment communities compared to comparison communities. The estimate is highly significant (at the 1% level), meaning that the DD estimate strongly supports the conclusion that the gain in employment experienced in the treatment communities can be attributed the effects of the PAST supported infrastructure project.*

25) The evaluation has used time converters applied by the World Bank in their Living Standard Measurement Study Surveys in cases where respondents have made use of transport means (bicycles, cars etc) instead of walking to/from the health clinic/post.

This result is almost entirely driven by a highly significant increase in average employment of the main HH provider within the treatment communities; from 69.7% in 2005 to 85.5% in 2009. Within the same time period, the average employment figure for main HH providers from comparison communities has shown a slight decrease. The share of temporary/permanent employment before and after is unchanged for both treatment and comparison communities, meaning that approximately 1/3 of the newly created jobs are permanent.

**Table 6: Employment – Percentage increase in employment of main HH provider**

	Before	After	Difference
Treatment communities	69.7%	85.5%	0.158***
	(165)	(165)	(165)
Comparison Communities	75.2%	73.9%	-0.014
	(222)	(222)	(222)
Difference	-0.055	0.116***	0.171***
	(387)	(387)	(387)

*Note: Difference-in-difference estimates. Dependent variable: Main household provider has employment. Number of observations in parenthesis. \*, \*\*, \*\*\* indicate significance at a 10%, 5% and 1% level, respectively. (Data source – Censo question No. 19, 27 and 28: Trabajó en la semana pasada? El trabajo que realiza es 1) Temporal o 2) Permanente? Qué hizo/hacía en su trabajo principal?)*

Most HH providers within the treatment communities are working in the agricultural sector and it is also within this sector that the majority of the new jobs have been created. However, while around 90% of the main HH providers worked in agriculture in 2005, this share has declined to 85% in 2009.

It is interesting to note that the construction sector has increased its share of employment among HH providers within treatment communities, from 1% in 2005 to 7% in 2009<sup>26</sup> (Annex 2, Table 18). Data also shows that nearly all new jobs were created within the same municipality and nearly all of the new main HH providers who have entered the job market recently are now working in agriculture. This indicates that entry into the job market has gone through the agricultural sector and that those obtaining employment in other sectors (here mainly the construction sector) come from previous work in agriculture. The qualitative fieldwork suggested that one explanation for this is that those community members who received training and provided labour for the PAST projects were, to a large extent, already working in agriculture.

Survey data for the comparison communities show that only minor changes can be observed in terms of employment level and shares between sectors. The share of main HH providers working in agriculture remain about the 90% level and the share working in the construction sector was 1% both in 2005 and 2009.

26) The construction sector does not include rural road construction/maintenance, which could be PAST related.

**Table 7: Employment location**

	Before	After	Difference
Treatment communities	82.6%	98.3%	0.157***
	(115)	(115)	(115)
Comparison Communities	96.0%	95.2%	-0.08
	(124)	(124)	(124)
Difference	-0.134***	0.031	0.165***
	(239)	(239)	(239)

Note: Difference-in-difference estimates. Dependent variable: Employment in same municipality. Number of observations in brackets. \*, \*\*, \*\*\* indicate significance at a 10%, 5% and 1% level, respectively. (Data source – Censo question 26: El lugar o centro de trabajo está ubicado en: 1) Este municipio o 2) Otro municipio.).

Survey data (Table 7) also shows that the *share of HH heads working within the same municipality has increased significantly within treatment communities compared to comparison communities. This estimate is highly significant (at the 1% level), meaning that the declining share of HH heads from treatment communities that now work outside the municipality can be attributed to PAST project interventions.* This tendency was confirmed by the qualitative fieldwork where it was also revealed that HH heads within treatment communities now, in general, have a shorter distance to work<sup>27</sup> and, as a consequence, are spending less time<sup>28</sup> on travelling back and forth. Treatment community members also considered this to be an important social impact. From the comparison communities was not reported of changes in employment conditions.

The positive and highly significant effect on employment within the treatment communities, mainly realized through job creation within the agricultural and construction sector in the same municipality, was strongly supported by findings from the qualitative fieldwork. In all seven treatment communities reference was made to the positive impact from PAST interventions on local agricultural production and employment. The improved access has led to changes in relative prices on agricultural inputs and outputs and provided more incentives for increasing agricultural production. This has reportedly led to increases in amount of land used for agricultural production within the treatment communities and in the demand for farmhands. These qualitative findings are further supported by survey data on land holding size for agricultural production and on land value (see Table 8 and 9).

In four out of the seven treatment communities visited by the evaluation, the positive employment effect within construction was highlighted by the community members as one of the most positive impacts from PAST project intervention. The community members emphasized in particular, that in their new job within the construction sector they were applying skills and capacities acquired from the training provided by PAST.

27) It cannot a priori be concluded that working within the same municipality means less travel distance than working within a neighbouring municipality. In fact, this depends on the specific location of the community where the HH head lives and the place of work.

28) The saving in travel time is a combination of improved access conditions, shorter distance to work and improved transport services.

Interviews carried out at the Municipal Offices in Las Segovias provided further explanation to the pattern in the employment data. The demand from Municipal Offices for skilled construction workers has increased over the period 2005-2009. Due to the experience and knowledge gained from the Danida PAST interventions, Municipal Offices have now partly or fully adopted a labour intensive methodology (instead of machinery) for different types of public construction works (repair and new construction of municipal buildings and parks, health centres/posts, schools, urban streets etc.) within the municipality. In these cases the Municipal Offices have often sought labour from the PAST treatment communities, where they knew that community members had been trained in the use of labour-intensive methods and had practical working experience<sup>29</sup>. The improved access from the treatment communities to the municipal urban centre has been an additional employment advantage for the treatment community members.

The qualitative fieldwork also pointed towards some impacts on commerce within the treatment communities compared to comparison communities. In five of the seven treatment communities the number of *pulperias* had increased after PAST project completion. In one community<sup>30</sup>, the number of *pulperias* had however decreased, which was explained by the close and easy access from the community to the municipal centre. The comparison communities did not report notable changes in the level of commerce and the number of *pulperias*.

The survey data provides no specific information on how the PAST project interventions may have affected the work of women<sup>31</sup>. The qualitative fieldwork however, pointed towards interesting findings on the development of women's participation in income generating activities. In four out of seven treatment communities it was explained that the income generated from provision of labour to PAST projects had made it possible for many HHs to improve the condition of their patio<sup>32</sup>. Since the patio is traditionally the responsibility of women, this resulted in more participation of women in economic activities (production and sale of chicken, pigs, some vegetables etc.). This represents an expansion of economic activity related to traditional women's role rather than a shift to new roles.

What does seem to be a new development is that women are now allowed to control income generated from the patio activities. Women participants referred to their participation as road committee members, labour and income earners in PAST projects as a major catalyst and driver towards increasing their participation and responsibility in handling economic activities. On average, 30% of the labourers employed by PAST projects were women<sup>33</sup>, and this more than fulfils the expectations outlined in the gender guidelines prepared for PAST interventions<sup>34</sup>.

29) Due to recent municipal elections and change of Mayors in Nicaragua (2008) it was not possible for the evaluation to get insight into municipal budgets and expenditures from previous years to possibly document these qualitative findings.

30) El Carbon in Jalapa.

31) It is mainly the employment of men that is covered in the survey in the category of the "Main HH provider".

32) The *patio* in the context of rural Nicaragua is usually a home garden with a few smaller animals (pigs, chicken, goats etc.) and some small-scale vegetable and fruit cultivation.

33) According to the "Comparative Study on Employment Creation and Financial and Economic Costs of Labour-based and Machine-based methods in Rural Roads in Nicaragua" (January 2009).

34) "Lineamiento de Género para Componente 2, Fase II, 2005-2009", where expectations are at least 20% women participation for RAAN and RAAS and at least 30% for Las Segovias.

The qualitative fieldwork within the seven comparison communities in Las Segovias indicated no such developments in commerce and women's participation in economic activities.

#### *Change in Agricultural Production Patterns*

The survey data (Table 8) shows that *HHs within both treatment and comparison communities have reduced the diversification (number of crops grown) for market sale of production*. HHs within both treatment and comparison communities have on average gone back from producing three products in 2005 to producing only two products for the market in 2009<sup>35</sup>.

**Table 8: Production diversification for market sale**

	Before	After	Difference
Treatment Communities	2.956	2.067	-0.889***
	(45)	(45)	(45)
Comparison Communities	3.014	1.942	-1.072***
	(69)	(69)	(69)
Difference	-0.059	0.125	0.184
	(114)	(114)	(114)

*Note: Difference-in-difference estimates. Dependent variable: Type of agricultural products produced. Number of observations in parenthesis. \*, \*\*, \*\*\* indicate significance at a 10%, 5% and 1% level, respectively. (Source: EMNV Section 8, Part B: Actividad Agrícola – Producción)*

This tendency to greater specialization<sup>36</sup> of HH agricultural production for market sale was not fully confirmed from the qualitative fieldwork. Treatment communities reported more diversification<sup>37</sup> of agricultural production in general within the communities, however it was not clearly indicated if the individual HHs had actually specialised more of its production for the market. Comparison communities did not report changes in production diversification.

**Table 9: Specific product information for market sale**

	Year	Main Product 1	Main Product 2	Main Product 3
Treatment Communities	2005	51.2%	32.6%	16.2%
		Maize	Beans	Other
	2009	48.9%	35.6%	15.5%
		Maize	Beans	Other
Comparison Communities	2005	62.7%	14.9%	22.4%
		Maize	Beans	Other
	2009	67.7%	22.1%	10.2%
		Maize	Beans	Other

35) It should be noted that there are relatively few observations here.

36) A number of studies have shown that specialization raises productivity.

37) Product diversification reduces the vulnerability of external shocks.

*Note: Summary statistics on primary production – Percentages. Source: EMNV, Section 8, Part B: “Actividad Agrícola – Producción”*

Table 9 illustrates that the two main products produced for the market by the agricultural producers within the communities are the basic grains, maize and beans, in both treatment and comparison communities. However, maize is more dominant in comparison than in treatment communities where beans generate agricultural income for 1/3 of the households.

It is interesting to note however, that the share of HHs in comparison communities that produce a third product for the market has dropped from 22% to 10% during the period from 2009 to 2005, while HHs within the treatment communities have maintained the share of a third market product on 15-16%. This indicates that for HHs within treatment communities it has been economically favourable to continue producing the same ratio of other products for the markets in addition to subsistence grains (maize and beans). On the other hand, in comparison communities, there seem to have been a stronger tendency to move towards production of only subsistence grains for the market. This indicates that relative price changes and/or market access have developed differently in treatment and comparison communities.

In terms of the prices of agricultural inputs and production, it was reported from the qualitative fieldwork within treatment communities that, due to improved infrastructure, the products were now less damaged during transport. The reported impact of this had been an increase in selling prices for the producers. Likewise, it was reported from the treatment communities that more sellers of agricultural inputs started entering the communities after the improvement in access. This in turn has contributed to a lowering of costs on agricultural inputs as well as a better input supply. As referred to above in the employment section, the indication is that these changes in relative input and output prices have led to increases in the agricultural cultivation area, employment and production within the treatment communities compared to a status-quo situation within the comparison communities.

Similarly, all treatment communities visited during the qualitative fieldwork emphasized the benefits for the agricultural producers of now having access to the urban market through an improved road. The impact of this for the producers is realized through lower travel times and higher quantity and quality of the products brought to the market. In terms of livestock production<sup>38</sup>, the qualitative fieldwork also pointed towards large increases within the treatment communities compared to the control communities. Good access conditions are of particular importance to livestock producers in order to be able to transport livestock to and from the communities.

All together, the quantitative and qualitative findings on agricultural production patterns point towards an increasing and more market-focused production for the market within the treatment communities as compared to the situation in the comparison communities.

#### *Land Holding and Value*

The survey data (Table 10) shows that *while average HH land holding size (for agricultural use) has increased nearly 50% within treatment communities in the period from 2005-2009, it has remained nearly unchanged within comparison communities.* This finding is however *not statistically significant, possibly due to very few observations.*

38) Livestock production within the communities is not well-reflected in the EMNV data, since the livestock owners usually do not live within the communities but in larger towns or cities.

**Table 10: Land holding size for agricultural use (number of manzanas)**

	Before	After	Difference
Treatment communities	1.393 (28)	2.071 (28)	0.679 (28)
Control communities	1.714 (49)	1.735 (49)	0.020 (49)
Difference	-0.321 (77)	0.337 (77)	0.658 (77)

*Note: Difference-in-difference estimates. Dependent variable: Land size (for agricultural use). Number of observations in parenthesis. \*, \*\*, \*\*\* indicate significance at a 10%, 5% and 1% level, respectively. (Data source – EMNV, Section 8, Part A, question 4: Cuantas manzanas de estas tierras están destinadas para cultivos temporales o cultivos permanentes?)*

From the qualitative fieldwork within the treatment communities it was explained that incentives for agricultural production had increased after PAST interventions, and that this had led to increases in the size of landholding for agricultural production. The combined findings from the qualitative fieldwork and the survey data therefore provide a reasonable indication that agricultural production has increased within the treatment communities as a consequence of Danida PAST. Comparison communities did not report increases in agricultural production, which support the findings from Table 10 of no increase in landholding size (for agricultural production). These findings are further supported by the findings on employment, which showed that more HH heads in treatment communities are now employed in agriculture compared to a status quo situation within comparison communities.

The data for land holding size follows the same pattern as for housing size: The comparison communities seem to have been better off (wealthier) in 2005 but this picture has been reversed in 2009, in line with changes in relative access conditions.

The survey data on *land value per unit of land used for agricultural production (Table 11) shows significant positive changes for both treatment and comparison communities. The Before-After estimates are positive and statically significant for both treatment and control communities, leading to a positive but not well-determined DD estimate*<sup>39</sup>.

**Table 11: Land value per unit (córdoba per manzana)**

	Before	After	Difference
Treatment communities	6574 (27)	23769 (27)	17195*** (27)
Control communities	5246 (49)	17231 (49)	11985*** (49)
Difference	1328 (76)	6538 (76)	5209 (76)

39) It should be noted that there are very few observations here.

*Note: Difference-in-difference estimates. Dependent variable: Nominal land value per unit (for agricultural use) in Córdoba. Number of observations in parenthesis. \*, \*\*, \*\*\* indicate significance at a 10%, 5% and 1% level, respectively. (Data source – EMNV, Section 8, Part A, question 15: Cuál es el valor de una manzana de tierra en la zona donde tiene la finca?*

The qualitative fieldwork supported the data findings on increases in land values within the communities. Treatment community members reported increases in land values of between 300 and 600% in the period from 2005 to 2009, depending on the actual location of the house, in particular its distance from the road. The comparison communities also reported increases in land values, but in the range of 200 to 300%.

While personal estimates of agricultural land values can be expected to vary widely from person to person and community to community, the difference between the estimates provided by community members in treatment and comparison communities was striking. In addition, the community members in treatment communities were able to explain how the improvement in transport infrastructure seemed to be a strong contributing factor to the rise in the price of agricultural land.

#### *Consumer Price Developments*

The survey data shows that *average commodity prices have gone up in treatment communities as well as in comparison communities and that there is no significant impact from PAST interventions on commodity prices within communities.* Price information was collected on approximately 90 different commodities in different types of stores in the different communities.

This finding was supported from the qualitative fieldwork as well as from the municipal interviews<sup>40</sup>. Although Danida PAST interventions seem to have led to establishments of more *pulperias* (see above) within the treatment communities, there was no sign that this had led also to increased competition and a lowering of commodity prices. Instead, owners of the *pulperias* appear to informally agree not to lower sale prices. On the other hand, community members within treatment communities reported that the supply and variation of products in the *pulperias* had increased due to road improvements, because of easier access to/from urban markets and more frequent visits by commercial traders.

The qualitative fieldwork found that people within treatment communities would only abandon the smaller *pulperias* and do their shopping in the larger urban commercial centres if the community is located very close to the urban centre. One explanation for this seems to be that the cash available within the communities is quite limited and that HHs do their buying on a day-to-day basis and in rather small quantities. This pattern means that it is in general not attractive for community members to travel long distances for doing daily shopping even when travel time has been reduced.

#### **Household Assets**

Asset holding is a commonly used indicator for wealth. In this analysis, we are focusing on two types of assets: Housing conditions and durable assets.

40) Price studies that have been carried out by the Danida PAST programme during program interventions also did not find any tendency that road improvements had led to a lowering of prices in the *pulperias*.

*Housing Conditions*

Survey data (Table 12) shows that *the housing size (number of bedrooms) has increased significantly more within treatment communities than within comparison communities*. HHs within both treatment and comparison communities have increased the average number of bedrooms in their houses. The DD coefficient estimate (significant and positive) shows however that this *change has been more significant for HHs within treatment communities. The DD estimate is significant (at the 5% level)*.

During the qualitative fieldwork it was also noted that more families within treatment communities had built fully new houses or extended existing ones. In addition housing size seems to be a good indicator for wealth and access improvement within the communities in Las Segovias given that the village mapping exercises in treatment and comparison communities showed that extensions and new construction of houses was mostly done with concrete blocks, which require an investment decision by the HHs as well as reasonable access conditions.

**Table 12: Number of bedrooms**

	Before	After	Difference
Treatment communities	1.048	1.709	0.661***
	(165)	(165)	(165)
Control communities	1.260	1.673	0.413***
	(223)	(223)	(223)
Difference	-0.212**	0.036	0.248**
	(388)	(388)	(388)

*Note: Difference-in-difference estimates. Dependent variable: Number of bedrooms. Number of observations in parenthesis. \*, \*\*, \*\*\* indicate significance at a 10%, 5% and 1% level, respectively. (Data source – Censo question 3: De cuantos cuartos dispone este hogar solo para dormir?)*

It is interesting to note from these data, that houses within comparison communities started out with more bedrooms on average than houses within treatment communities, but end up having less bedrooms than the treatment communities in 2009. This is in accordance with the finding that comparison communities had better road access than treatment communities in 2005 but that this had been reversed by 2009.

The survey data also shows that *the share of HHs with latrines has increased more within the treatment communities*, from 81% in 2005 to 94% in 2009, compared to an increase within the comparison communities from 84% in 2005 to 87% in 2009. This estimate is not statistically significant, but provides an indication of a possible impact from PAST interventions. This finding is supported by survey data on “other development projects” within the communities which shows that the number of latrine projects in PAST communities has increased compared to comparison communities. Information provided by the qualitative fieldwork also supported the finding.

In terms of *housing quality (roof, walls, floor)*, the data from the survey (Annex 2A) do not provide any evidence that houses in treatment communities have been improved more than houses within comparison communities. Housing quality has improved for

both groups on average. One explanation for this may be found in the “contamination” created in those communities by interventions unrelated to transport. Based on municipal interviews and survey data, it appears that HHs within comparison communities on average have indeed been more “contaminated” by external housing quality improvement projects than HHs within treatment communities during the period 2005 to 2009<sup>41</sup>.

#### *Durable Goods*

The survey data (Table 13) shows that *HHs within both treatment and comparison communities on average have increased their durable asset<sup>42</sup> holdings significantly* (the “before-after” estimates are highly significant and positive for both groups, Table 13). The index for treatment communities has increased more than for comparison communities (the DD estimate is positive), but the increase is not statistically significant meaning that the increase in this wealth parameter within the treatment communities cannot be attributed statistically to the PAST intervention.

**Table 13: Index of durable goods**

	Before	After	Difference
Treatment communities	1.170 (165)	1.806 (165)	0.636*** (165)
Comparison Communities	1.296 (223)	1.704 (223)	0.408*** (223)
Difference	-0.126 (388)	0.102 (388)	0.228 (388)

*Note: Difference-in-difference estimates. Dependent variable: Count variable of durable assets (0 to 10). Number of observations reported in parenthesis. Number of observations in parenthesis. \*, \*\*, \*\*\* indicate significance at a 10%, 5% and 1% level, respectively. (Data source – Censo question 7: “Este hogar tiene bienes o servicios que sean de su propiedad, tales como (respuesta multiple)”.*

The survey data for durable asset holding thereby follows the same pattern as most of the other indicators examined. The comparison communities seem to have been better off (more wealthy) in 2005 but this picture has been reversed in 2009, where the HHs within treatment communities own more assets (although this finding is not statistically significant)<sup>43</sup>.

- 41) The Government of Nicaragua as well as the Municipal Offices are supporting improvement of housing quality within poor villages through projects like “Proyecto Vivienda” and “Plan Techo”. The selection of HHs for these housing improvement projects is supposed to be “needs based”
- 42) The durable asset index is composed by the following assets: Radio, TV, Internet, Computer, Air Condition, Sewing Machine, Kitchen and Washing Machines, Electric Iron, Telephone.
- 43) The survey data also included information on ownership of transport means (cars, bicycles, beasts, motorbikes etc.). These data only indicate minor increases in asset holdings within treatment communities compared to comparison communities and none of the results were statistically significant. On the other hand the SIMOIN transport data from treatment communities (Table 4) showed significant increases in the traffic intensity going in and out of the treatment communities and from the qualitative fieldwork it was found that the use of different transport means had increased within the treatment communities compared to the comparison communities. Neither the SIMOIN data nor the qualitative fieldwork data however, refer to the ownership of the means of transport.

### Access to Basic Services (Electricity and Water)

In terms of public utility services provided to the communities, the evaluation has focused on *electricity* and *water supply*.

The survey data (Table 14) shows that the percentage of *HHs in treatment communities having access to publicly provided electricity increased substantially in the period from 2005 to 2009 compared to HHs in comparison communities, resulting in a positive and significant DD coefficient estimate (at the 10% level)*.

**Table 14: Percentage of HHs with access to Public Electricity Grid**

	Before	After	Difference
Treatment communities	0.342 (79)	0.494 (79)	0.152* (79)
Control communities	0.243 (111)	0.297 (111)	0.054 (111)
Difference	0.099 (190)	0.196*** (190)	0.098* (190)

*Note: Difference-in-difference estimates. Dependent variable: Indicator variable for access to public grid. Number of observations in parenthesis. \*, \*\*, \*\*\* indicate significance at a 10%, 5% and 1% level, respectively. (Data source – Censo question 6: El alumbrado que tiene esta vivienda es X (8 alternatives provided)).*

The municipal interviews also provided some insight into the survey data on electrification. As municipal officials noted, access conditions constitute one important parameter for the communities to qualify for public electricity projects. Access is however not the only criteria, other factors, some of more political character, are also important. Similarly, it is not necessary for the communities to have good all-year-around road access. Communities that have road access only during summer time, or only in average conditions, would also be able to qualify for public electricity projects. Despite these indications, that other factors than year-round transport access play a large part in determining which communities connect to the public electricity supply, *program treatment communities still gained new connections to the public supply at a greater rate than comparison communities during the 2005 to 2009 period* and this difference is statistically significant.

In relation to water supply, the survey data (Annex 2A), did not show any significant difference in changes between treatment and comparison communities. Water supply projects, of course, depend much more on the availability of water sources than the state of transport access to the communities (although transport could still be a bottleneck to water supply where heavy equipment would be required to establish a supply). The absence of a discernible impact on water supply was confirmed by the qualitative fieldwork, where no systematic relation between access conditions and supply was found.

## Social Impacts

### *Other Projects*

The survey data (Table 15) shows that the *in-flow of development projects*<sup>44</sup> *has increased in treatment communities but decreased in comparison communities over the period 2005 - 2009. The DD estimate is positive and significant (at the 10% level).*

**Table 15: Inflow of development projects**

	Before	After	Difference
Treatment communities	2.288	2.575	0.288
	(80)	(80)	(80)
Comparison Communities	2.223	1.875	-0.348*
	(112)	(112)	(112)
Difference	0.064	0.700**	0.636*
	(192)	(192)	(192)

*Note: Difference-in-difference estimates. Dependent variable: Count variable representing the number of other projects being implemented in the area. Number of observations in parenthesis. \*, \*\*, \*\*\* indicate significance at a 10%, 5% and 1% level, respectively. Data source – EMNV, Section 1, Part C, question 55: Desde el 2005, algún miembro de este hogar ha sido beneficiado con programa de X (23 alternatives provided)?)*

This finding from the survey data is strongly supported by the qualitative fieldwork where an increased in-flow of external projects was documented in five of seven treatment communities by the “Service and Opportunity Map”, drawn by the villagers. In contrast, the comparison communities reported either equal or decreasing levels of in-flow of external projects. Major explanatory factors for increased inflow of development projects to treatment communities are reportedly improved access conditions, improved capability of the communities to apply for projects as well as closer contact to the Municipal Office<sup>45</sup>. While there therefore seem to be some indication that PAST interventions have had a positive impact on the communities’ ability to attract external projects due to improved access and community capacities, the decrease in the in-flow of projects to comparison communities indicate that part of this development may be due to a change in the distribution of projects. It is also possible that government and non-government organizations were carrying out planned shifts of program activities from non-PAST to PAST communities for other reasons than access<sup>46</sup>.

### *Education*

The qualitative fieldwork pointed to four key findings in relation to education:

- The treatment communities report *more frequent supervision visits from the Ministry of Education (MINED)* than the comparison communities to monitor and control the use of the resources assigned to the community schools. The frequency of these visits cannot be attributed only to improvement in access, but is also close-

44) One category of development projects refers to construction/improvement of roads, and may include interventions from PAST.

45) The more recently arrived external projects to the treatment communities include projects on electrification, installation of latrines and health and education activities.

46) It has not been possible for the evaluation to verify this.

ly related to the political agenda in the country. However, the reported increase in the frequency of MINED supervision visits is higher for treatment than for comparison communities, which indicates that improved ease of year round access resulting from PAST projects is facilitating more frequent contacts by MINED.

- There is *reportedly less of a problem with school attendance and less teacher absence in the treatment communities compared to the comparison communities*<sup>47</sup>. This was a strong finding from the qualitative fieldwork. An explanation provided by a number of treatment communities was that, before the Danida PAST interventions, those teachers and children living distant from the schools often had serious difficulties in arriving during winter due to deteriorating road conditions and rising water levels. Within the comparison communities it was reported that the teacher absence/school attendance issue in general had not changed over the past five years.
- From the community fieldwork it was reported that from 2005 to 2009 the *number of children attending secondary school has increased more*<sup>48</sup> *within the treatment communities than within the comparison communities*. Nearly all communities visited by the evaluation (treatment as well as comparison) reported increases in the number of children attending secondary school during the period. Although the actual and relative increases depended on a number of factors (number of children within the community in the age of secondary school, distance to secondary school, transport services etc.), there was a clear tendency to more increase within the treatment communities than within the comparison communities. The secondary schools are often located distant from the communities and it was found that this represented an important barrier for the children within the treatment communities (and still does for children from comparison communities). However, with the improved road, many children can now go by bicycle to the secondary school, and return back the same day. This was highlighted by the treatment communities as a major impact from the road construction.
- Two of the seven treatment communities reported that *school buildings (primary school) within the communities have been improved* after road construction. They indicated that improved access conditions have facilitated transport to the communities of construction materials. None of the comparison communities reported improvements in school infrastructure.

### *Health*

The qualitative fieldwork highlighted the following changes with regards to access and quality of health services:

- The qualitative fieldwork indicates that, in general, *the frequency of visits from MINSA to treatment communities has increased from 1-2 times a year before the PAST interventions to monthly or bi-monthly visits*<sup>49</sup>. For the comparison communities with similar low levels of activity in 2005, and in particular those with relatively worse access conditions, the reported frequency of MINSA's visits had

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47) The evaluation intended to obtain figures on school attendance and teachers' absence through the decentralized MINED offices, but such data has not been collected and reported on a systematic basis.

48) Data from the community fieldwork showed this.

49) The evaluation intended to obtain figures on development in health services to individual communities through the decentralized MINSA offices, but it was not possible to extract such data from the system.

not changed over the last five years. As in the case of the more frequent visits from MINED to the treatment communities, although the more frequent visits cannot be attributed entirely to the improvement in access, there are clear indications that the access level is one parameter which influences their frequency.

- All treatment communities emphasize the importance of the fact *that ambulances can now serve communities year-around in cases of emergencies and pregnancy.*

#### *Other Social Impacts*

The qualitative fieldwork also identified some other social changes when comparing treatment and comparison communities in Las Segovias:

- As already discussed in the “Employment” section, the qualitative fieldwork pointed towards *a clear impact from the PAST projects on women’s social and economic participation* within the treatment communities. The economic income generated by the women through their provision of labour to the project, together with the women’s participation in the road committees, seems to have improved both the social and economic status of the women within the communities. It has now become more acceptable that women are handling their own economic activities and that they manage the income generated from these activities. The women’s group discussions from the fieldwork in the treatment communities also reported that nutrition has improved within the HHs due to women’s improved position as they have improved control over disposition of household resources, including funds.
- This tendency was not seen to the same extent at all within the comparison communities, and points therefore towards a clear impact from PAST interventions.
- The treatment communities seem to have *increased and improved social and economic relations with other communities in the local area* more than comparison communities. This seems to result from a number of factors directly or indirectly related to improvements in access. First, the access improvement itself has made it easier and faster to enter the treatment communities. Second, the increase in economic activities has attracted more people from other communities to do business. Third, the village mapping and transect walks in the treatment communities showed that new social constructions (sport fields, churches, etc.) had been build after 2005 (with the use of labour-intensive methods, using skills from PAST projects, and by transporting construction materials on the new roads). These were now also benefitting people from other communities in the area.
- The qualitative fieldwork in a very small number of treatment communities indicated that crime had increased after road constructions. This was attributed to greater access to the community by “outsiders” using the newly improved roads. This effect was not reported by community members in RAAN and RAAS so it may be linked to the more open secondary and primary transport network of Las Segovias.

#### *Environmental Impacts*

The qualitative fieldwork indicated that the PAST projects had caused some impacts to the environment:

- The improved access to treatment communities has led to problem with increased extraction of fire wood and increased deforestation.

- Some treatment communities reported that due to improved vehicle access, more people from outside are now coming in to load off their garbage.
- In some communities, the increase in production and improved access to production inputs, has led to more use of pesticides which in turn are reported to worsen water contamination problems.

### 4.2 Assessments of Community Impacts in RAAN and RAAS

The evaluation findings in this section are based on the participatory evaluation exercises carried out in by the evaluation team in 25 different communities including 19 communities benefiting from PAST supported infrastructure investments and six chosen for comparison.

The communities chosen covered most municipalities (seven of eight in RAAN and nine of 12 in RAAS) as well as a good cross-section of coastal, river and central geographic zones in both autonomous regions. In addition, there was a good cross-section of communities by ethnic makeup. In terms of different generations of projects the communities chosen cover a good spread of completion dates from 2003 to 2009. Two very early projects completed in 1998 provide an example of investments supported by Danida before the codification of a formal program in the region.

#### **Impact on Access and Transport Services**

The project communities in both RAAN and RAAS have experienced notable changes in their ability to access different means of transport, especially when these changes are viewed in light of the experience of the comparison communities. As one example, in 15 of the 19 project communities, residents pointed to either the introduction or significant improvements in collective transport. The new or improved services include scheduled boat (panga) service for river and coastal communities and scheduled motor transport (by bus or by a scheduled truck or taxi service) in central zone communities. Similarly, communities also often reported that they now made more frequent and year-round use of transport by bicycle or motorcycle as well as by horse and on foot.

This is consistent with the PAST SIMOIN based monitoring report for 2008 in RAAS, which pointed to reductions in travel time for 49 projects in the region and to increases in both cargo and passenger travel for 41 projects.<sup>50</sup> The 2008 report for RAAN did not include data on travel time but did note similar increases in traffic intensity for both cargo and private passenger vehicles.

Comparison communities in RAAN and RAAS were much less likely to report this type of improvement and continued to emphasize their relative isolation. Four of the six comparison communities (two in each region) noted that they still did not have any form of collective transport on a scheduled basis. The other comparison communities (La Fortuna in Rama municipality in RAAS and San Jeronimo in Waspam de Rio Coco in RAAN) both reported access to collective transport with a fixed route and schedule. Interestingly, both are located on major rivers with access to commercial panga traffic. Thus they were relatively less isolated than some of the project communities before those communities invested in upgraded infrastructure. However, their problems in access were still signifi-

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50) *Monitoring and Evaluation of Socioeconomic Impacts of PAST Phase 2*. PAST Danida, MTI, RAAS. 2009.

cant enough to make them eligible for future PAST supported projects and thus were reasonably comparable to the treatment communities before their participation in PAST. The report by project communities that they are able to make better and more frequent use of both personal and communal transport options (including shipping goods and materials into the community by truck or boat) is also consistent with the findings of the econometric analysis of census and survey data in Las Segovias which found a very significant double difference result showing project communities making larger reductions in travel time when compared to non-project communities.

Participants from project communities also pointed to improved safety and security of transport, especially in periods of heavy rains, as an important impact of the infrastructure improvements associated with PAST. This was sometimes noted in terms of the safety of students attending primary or secondary school (e.g. Marshall Point in RAAS) or, more often, in terms of safety of transport to access health services (e.g. Haulover in RAAN and many other communities).

In contrast, the comparison communities in RAAN and RAAS tended to put special emphasis on the risks and dangers inherent in transport. All three comparison communities in RAAN (Floripon, San Jeronimo and Santa Maria Mahalwas) emphasized the high risks associated with transporting injured or very ill community members to health centres. In RAAS comparison communities (La Esperanza, La Fortuna, and Nuevo Horizonte) pointed to similar difficulties.

It is interesting that both project and comparison communities in both RAAN and RAAS tended to emphasize not only that poor transport infrastructure could hinder their access to services and to employment but was, in and of itself, a risk to the community members. In other words, the absence of an adequate wharf, bridge or road not only exposes community members to risks from lack of, for example, medical treatment. It can also represent a heightened risk of injury for community members. This effect tends to increase the sense of isolation for communities with clearly inadequate infrastructure and may be one reason why community members appeared in all project communities to place a high value on the infrastructure investments supported by PAST.

### **Production, Employment and Income**

#### *Production and Income*

Community members tended to separate economic impacts and results into two different parts. The first could be considered an interim group of impacts relating to access to markets and inputs, while the second relates to the results of this improved access and its effects on production, income and wealth.

Seventeen of the 19 project communities reported improved contact with markets because of the infrastructure built or rehabilitated by the program. The improvements in contact with the market can come about in various ways: more frequent contact with buyers (for example La Ceiba, Arenitas, Tumarin), less time required to ship products to markets (Karawala) and access to totally new markets for cattle (Sombrero Negro) and milk (El Bambu). The improvement in market contact can also come about because one form of transport (by truck) may replace another (walking cattle to market) which allows producers to receive higher prices.

A very strong example of medium term economic impact is provided by Sombrero Negro in Muelle de Los Bueyes municipality in RAAS. As a result of two PAST supported in-

vestments (a bridge over the Rio Mico and a road connection with La Batea on the main road to Managua) this community and others along the road can now be reached by trucks supplying a major dairy.

As a result, local producers are able to sell high-value fresh milk directly to the dairies and have increased their production of milk and the size of their dairy herds. Milk which was either consumed in the household or processed into artisanal cheese and consumed locally is now sold directly to the dairies. The resulting increase in production and incomes from farming has contributed to a rise in land prices. Indeed, four of the larger producers and their families attended the workshop in Sombrero Negro in very new four-wheel drive trucks<sup>51</sup>.

There are similar economic gains reported in both RAAN and RAAS project communities as a result of either increased production (and financial gain) of current crops or diversification into other crops and products.

In RAAN for example, Haulover and Krukira reported that community members had diversified into harvesting both shrimp and crab for sale and had increased their production. Haulover benefits from the inter-municipal canal while Krukira is linked to the market by both a wharf and a road project. In both cases, the projects seem to have addressed the specific bottlenecks in the transport system limiting market access.

Arlen Siu and Salto Verde in RAAN also reported increased production from beef and dairy cattle. It is interesting that both are in the central region (Mululuku and Siuna municipalities) and are largely mestizo in ethnicity. This pattern is very similar to the one in RAAS where Sombrero Negro, Santa Fe, and La Ceiba all reported increased dairy and beef cattle production. These latter three communities are all colonias in the central part of RAAS (in Muelle de Los Bueyes, Nueva Guinea and Rama municipalities) with fairly good connections to the secondary road system and access to markets in Managua. They are also predominantly Mestizo in ethnicity.

This may result mainly from the fact that the communities in the central zone can be linked by the projects to existing secondary and primary roads which allow them access to major markets, in particular for dairy products and cattle. Access by larger trucks to these communities allows dairies located on the major road to buy milk at the farm gate. It also means that cattle are heavier and receive a higher price when shipped by truck.

The relatively important economic impacts reported by largely Mestizo communities in the central zones of RAAN and RAAS is not an indication, however, that indigenous communities do not realize economic benefits from PAST supported infrastructure investments. Haulover, Krukira, and Asang (all Miskito communities in RAAN) and Karawala (mixed Miskito and Mestizo in RAAS) all reported positive economic results from the PAST supported transport infrastructure. Karawala community members, for example, pointed to more frequent cargo sailings (four times a month instead of one).

In all, 14 of the 19 project communities went beyond pointing to improvements in market access to identify diversification into different products and/or increases in production and income.

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51) An unforeseen consequence of construction of the bridge across the Rio Mico connecting these communities with La Batea was a relocation of some of the larger producers in Sombrero Negro. They can now live in La Batea with their families and commute to their farms on a daily basis.

In contrast, the comparison communities emphasized the cost and difficulty of connecting to markets and/or reliance on subsistence agriculture (autoconsumo). In RAAN only San Jeronimo (which is directly on the Rio Coco) among comparison communities reported commercial activity based on connections with markets in both Honduras and Nicaragua. In RAAS, all three comparison communities emphasized their poor connections to markets and noted that production was either self-consumed or sold in very small quantities.

Community members in the comparison community of Nuevo Horizonte in Nueva Guinea remarked that theirs is a very productive agricultural zone but that prices are kept low and costs high due to their poor transport link to the rest of the municipality. This community's experience can be placed in direct contrast to Sombrero Negro in the same zone with its road and bridge project providing it direct access to La Batea and Muelle de Los Bueyes and the considerable economic impacts reported by community members there.

Wherever project communities do not report positive economic impacts resulting from the infrastructure supported by PAST, there are usually some explanatory factors. For example:

- In Walpa in RAAS, community members point to little or no economic change as a result of the road project since almost all of their fisheries production is transported by boat across the lagoon.
- In Arenitas in RAAS the suspended pedestrian bridge across the Rio Neri is very new (completed in March 2009) and was not functioning fully at the time of the evaluation team's visit due to a major flood.
- In La Esperanza in RAAN there was little or no economic change reported as a result of the communal wharf project. This is a Miskito community which has largely relied on near subsistence production. It also reports weak community organization, with an inactive project committee which is not able to collect the planned small toll from commercial pangá drivers and has not coordinated with the municipal government.

A few project communities also reported substantial economic impacts on the assets side, mainly through increases in land prices. In particular Salto Verde and Arlen Siu in RAAN and Sombrero Negro in RAAS reported increases in land prices of 300 to 500% which they attributed directly to the PAST supported infrastructure investments. Strikingly, all three communities are in the central zone and all three reported that the new roads gave them access to dairies and led to a relative shift from basic grains production into dairy and beef cattle production.

One reportedly important consideration in assessing the type and level of economic impacts being experienced in project communities relates to changing conditions in the markets for their predominant agricultural or fisheries production. While current general agricultural prices are somewhat depressed this does not seem to have affected dairy and cattle production to the extent it has other crops.

In direct contrast, communities reliant on selling into the commercial fishery (including crab and shrimp) report that they have experienced a collapse in the market in 2008 and

2009. Large corporations (which normally buy shrimp and crab for the export market) are not able to sell their frozen stocks. As a consequence, they have simply stopped buying from small scale producers. At the same time, communities along Laguna de Perla (Marshall Point for example) report that fish landings have declined due to a catastrophic collapse of fish stocks including crab and shrimp.

The poor state of fisheries markets and landings may explain some of the difference in economic impacts reported by coastal and river communities when compared to their counterparts in the central zones, where cattle and dairy production are much more prevalent. Community members reported that they felt there were more economic benefits from the infrastructure during 2006 and 2007 when prices for fish products were much higher.

The point they made is that during times of relatively higher prices the infrastructure allowed them to have more frequent contact with buyers who came to the community or to load and ship their products more quickly, safely and cheaply and thus gain more from the opportunity to sell into a good market. When the market essentially collapsed in 2008 and 2009, they could not take advantage of the improved transport infrastructure since there were no buyers willing to pay a price that would cover their costs. Some community members in comparison communities indicated that they traded a smaller proportion of their fisheries produce and were more reliant on self-consumption. Thus, they were less able to take advantage of better prices in earlier years.

### *Employment*

One area of economic impact which was not generally emphasized during the community consultations was employment outside the community as a result of the new or rehabilitated road, bridge, canal or wharf. This is in direct contrast to the impacts reported in Las Segovias region, where increased wage employment seems to be a major impact of the investments. This may reflect the fact that paid employment levels in rural areas of RAAN and RAAS are reportedly much lower than in Las Segovias, thus providing little opportunity for community members with improved skills resulting from PAST projects to gain paid employment in the municipality. In RAAN and RAAS, municipal centres are also generally much smaller than in Las Segovias and would logically provide fewer opportunities for paid employment.

### **Health Services**

Faster, cheaper and safer access to emergency health services, especially in transporting pregnant women, the very ill or seriously injured community members to health posts or centres outside the community was the single most frequently cited and most emphatically emphasized impact of the infrastructure investments supported by PAST in RAAN and RAAS.

This improvement comes about because an improved road means patients need not travel on horseback or be carried but can travel in an ambulance or car (Arlen Siu and Salto Verde in RAAN for example and Sombrero Negro in RAAS). It also arises because the construction or rehabilitation of a wharf allows patients to be placed directly in a panga rather than being carried out into the water or transferred from land to a dugout canoe and then from the dugout to the panga (Tumarín and Marshall Point in RAAS and Esperanza in RAAN).

Since this type of transfer may take place at night and in difficult weather, it is all the more hazardous. Similarly, the reported increase in a sense of security and safety is that much greater when this hazard can be avoided.

All nine program communities in RAAN and nine of ten in RAAS pointed to some improvement in access to and/or in the quality of health services as a result of the improvement in transport infrastructure. Similarly, 15 of the 19 project communities reported more frequent visits by doctors and by health brigades as a result of the improved transport infrastructure. There also seems to be a link between project communities and improved or newly constructed health posts (Haulover and Suniwas in RAAN and Karawala and Sombrero Negro in RAAS).

Just as project communities emphasized the benefit of improved and more secure transportation for patients in emergencies, comparison communities pointed to difficulties in this area. Five of six comparison communities pointed to the risks to community members safety both directly during transport and as a result of poor access to emergency care as a direct result of poor transport infrastructure<sup>52</sup>.

Finally, it is worth noting that the improvements in safe and timely access to health services (especially emergency care) reported in RAAN and RAAS are very consistent with the findings of the econometric analysis of impacts in Las Segovias. The quantitative analysis of impacts in Las Segovias points to a substantial improvement in the time required to access the nearest health post for households in project communities when compared to households in comparison communities.

#### **Access to Education Services**

Community members in RAAN and RAAS were quite clear in their opinion that the infrastructure investments made under PAST contributed to positive impacts in both access to education services and to the quality of those services. They did not, however, point necessarily to improved outcomes in education (increased primary school completion rates for example).

Sixteen of the 19 project communities (eight in RAAN and eight in RAAS) reported improvement in access to primary and/or secondary education facilities for students and teachers. This improvement generally takes the form of more secure, year-round access by foot, motor transport or by boat for students leaving the community or for teachers coming in.

Comparison communities do not report the same types of improvements in either access or quality of the education experience. In RAAN for example, San Jeronimo (Waspam) and Santa Maria (Bonanza) both reported that their primary schools were totally deteriorated. All three comparison communities in RAAN (including Floripon in Siuna) reported that travel to and from primary schools was time consuming and dangerous for both students and teachers.

It is worth noting that many of the project communities in RAAN and RAAS went beyond the question of access and pointed to different ways that they felt the infrastructure had contributed to improvements in the quality of either the educational infrastructure or the teaching/learning environment. For example:

- 52) Not all of the comparison communities have the same level of difficulty in accessing health services. For example, Esperanza in RAAS reported very little attention from health brigades while La Fortuna and Nuevo Horizonte both reported receiving visits every three months. As for the project communities reporting little or no impact in health, Aranitas in RAAN is not yet experiencing much benefit from a pedestrian foot bridge completed in February 2009 and flooded at the time of the evaluation visit.

- Six of nine project communities in RAAN reported that the support provided to schools in their community by the Ministry of Education (MINED) had improved because of the project. This improvement came in the form of more frequent supervision visits (Haulover, Krukira, Arlen Siu, Salto Verde, Fruta de Pan, Suniwas).
- Five communities in RAAN and three communities in RAAS reported either construction or rehabilitation of primary schools which benefited from easier shipment of materials into the community following construction or rehabilitation of transport infrastructure. Krukira in RAAN pointed to the immediate attention to repair of its primary school in the aftermath of hurricane Felix as one impact of the wharf project.
- Three communities in RAAN (Haulover, Krukira Suniwas), pointed to the arrival in the community of new programs in education run by NGOs or supported by the World Food Program (PMA).
- In RAAS, Santa Fe in Nueva Guinea reported improved attendance in adult education classes in the local primary school on Saturday and Sunday.
- Five of the nine project communities in RAAN (Haulover, Krukira, Arlen Siu, Fruta de Pan, and Suniwas) reported improvements in the availability of didactic materials as a result of greater attention provided by MINED following improvements to the transport infrastructure.

At the same time it is important to point out that the most frequent and most strongly emphasized education related impact of PAST supported infrastructure investments was the direct improvement in the safety, security and time needed for transport of both students and teachers to and from primary and secondary schools. This was emphasized in 14 of the 19 project communities visited.

In direct contrast, comparison communities placed strong emphasis on the higher risks and longer travel times they faced in the absence of improvements to their transport infrastructure. This was particularly emphasized by members of comparison communities Floripon and Sanata Maria in RAAN.

The qualitative evaluation work carried out in Las Segovias provided results under the heading of access to education which are very consistent with the findings in RAAN and RAAS.

### **Reported Environmental Impacts**

Fourteen of the nineteen project communities in RAAN and RAAS reported that there were no substantial environmental impacts resulting from the PAST supported construction or rehabilitation of roads, bridges, wharves and canals.

All the examples of potential or real negative environmental effects were cited by communities in RAAN. Community members in Haulover noted that sedimentation represents a problem for the inter-municipal canal but this can be seen more as a problem in organizing maintenance than a direct negative environmental problem attributable to the projects.

More importantly, Arlen Siu, Salto Verde and Suniwas (all in the central zone of RAAN) reported increased deforestation and logging, especially in Mestizo areas and linked this increase to better access on improved roads and bridges.

It is interesting that experience in the comparison communities is not greatly different from the project communities in the area of environmental change. In RAAS for example, La Esperanza and Nuevo Horizonte report no changes in environmental conditions while La Fortuna reported that the community had seen a significant change in land preparation for crops with much less use of chemical fertilizers. In RAAN, San Jeronimo reported no change while Floripon noted an increase in deforestation by logging companies and Santa Maria reported a continuing threat to land conservation because of increased cattle ranching and more intensive farming.

Other than the reported problem of increased deforestation which can accompany, in particular, the opening of road access to communities, there are very few significant environmental impacts. In a few communities, for example in La Ceiba in RAAS, community members reported that new NGO and government led programs with an environmental focus had become active in the community since the construction of the improved transport infrastructure.

### **Basic Services**

When considering basic services other than transport, education and health, community members in both RAAN and RAAS tended to focus on electricity and water and sanitation systems. In all three cases there was no clear pattern which suggested that the transport infrastructure was contributing to improvements in these systems.

Under the heading of water and sanitation, one community in RAAN (Arlen Siu) and one community in RAAS (Tumarin) reported they had improved their system of potable water to provide good water in all seasons but did not connect this improvement to the new or improved infrastructure in either case. However, three communities (Haulover and Krukira in RAAN and Walpa in RAAS) reported that the projects had facilitated either interconnection with a larger electrical grid (Walpa) or installation of an electrical plant to serve the community.

For almost all the project and comparison communities there were examples of a small number of householders using solar panels or installing a gravity feed water system but this was usually a very small group of households acting on their own and not a wider community initiative.

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## 5 Institutional Impacts

### 5.1 Institutional Framework and Expected Impacts

One of the objectives of the evaluation is to examine the impact of the Program on institutional capacities, with special emphasis at the municipal and regional level.

As the program evolved from a series of direct investments in tertiary infrastructure in the 1980s and mid 1990s, to a five component, formal PAST Phase One program in 1999 and on to PAST Phase Two in 2004, it became more formalized, with common structures, procedures, standards, manuals and guidelines applied in all three regions.

During PAST Phase One, *regional transport support teams* were highly active in RAAN, RAAS and the newly added Las Segovias Region. These teams were responsible for project planning, management, procurement, implementation and supervision.

One of the main strategic shifts between Phase One and Two was an explicit strategy to align the program more closely with a national policy of decentralisation of responsibilities to regional and municipal governments. As noted in the *Final Component Description*<sup>53</sup>:

“Even stronger emphasis will be placed on building capacity at community, municipal and regional levels, with the objective of promoting decentralized planning, implementation and maintenance of the municipal and regional transport infrastructure network. During this phase, the municipalities<sup>54</sup> will take on more responsibility for the planning, administration, and implementation of the projects. The regional support teams will support the municipalities in assuming this function, but the level of assistance to each individual municipality will decrease as capacity is developed. This will release capacity in the regional support teams and allow the teams to extend support to a greater number of municipalities. Weak municipalities will continue to receive full support.”

By the latter part of Phase Two of PAST, this strategy of gradual transfer of responsibilities to municipalities had evolved into a process of full decentralization of responsibility for all aspects of project identification, proposal development, procurement, implementation and maintenance to the municipal level. Indeed, by the mid-2009, the decentralization process had been completed in all participating municipalities. Some PAST staff reported that the process of decentralization to the last few active municipalities active in PAST had been perhaps more accelerated than was warranted, especially in terms of decentralizing authority for procurement.

Nonetheless, the main role of the three *regional PAST support offices* in Phase Two has been to work with the municipalities and communities to identify and design projects, obtain commitments, train staff and supervise works and to support the process of decentralization.

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53) *Final Component Description*. 2004. P8.

54) In this chapter the term municipality refers to the municipal government, (alcaldía) rather than the geographic/administrative entity of the municipality proper which encompasses the municipal centre and all communities located within the boundaries of the municipality.

The regional support offices established during Phase One were from the beginning of Phase Two staffed with a Regional Advisor and an engineering and socio-economic team. A coordinated approach has been adopted in all three regions. Although there have been significant differences given the divergent communities involved, common program strategies and objectives have been introduced in each region.

During the process of decentralization (until the municipality has taken on responsibility for all aspects of the project) the regional PAST engineering teams are responsible for elaboration of project proposals and, if the project is considered viable, the detailed technical design and budgeting. These activities are supported by the relevant Municipal Technical Officers (TMs) who would ultimately take over the responsibility. The regional socio-economic teams have, in the past, been responsible for training and community organization as well as for support to implementation, particularly with respect to maintenance and sustainability. The socio-economic teams have also been coordinating monitoring and baseline studies, and secured the integration of gender, environment and indigenous issues into the project design and development process.

The three CRTs, established late in Phase One, have responsibility for receiving annual project proposals from the municipalities, prioritizing and approving projects, and making the final recommendation to the CED for the distribution of funds. An important activity in Phase Two has been the legislation and institutionalization of the CRTs so they could play a permanent key role in coordination between MTI, FOMAV, donors and the municipalities on transport related matters.

In fact, one of the expected outcomes of Phase Two has been the full institutionalization of the CRTs as the key organizational element in the program. As noted in Section 2.1, all three major planned outcomes in institutional strengthening during this phase were focused on the CRTs.

As described in the Component Description:

“Regional Transport Councils are the principal counterpart organisations for the institutionalization of this component. It is the intention to ensure they have the appropriate legal standing to make decisions about the transport networks in the respective regions on behalf of the municipalities...

As the majority of members of the municipal councils will change every four or so years with municipal elections, it is also the intention that they [CRTs] are provided with a trained secretariat to provide continuity and technical expertise...

Procedures for planning, pre-selection and project prioritisation have been developed and implemented by Danida staff during the first phase. The CRTs will be trained in applying these procedures in order to assume the responsibility and gain full control of the process during the second phase.

The CRTs will also have assumed the responsibility for monitoring the maintenance of completed projects and ensuring compliance with the project agreements that are a pre-condition for project approval.

It has been the expectation that once the CRTs had been institutionalized, they would be responsible for the planning and approval of projects, not only those funded by Danida

but also for projects funded by other donors and state agencies. One hoped for outcome is that the system, or a very similar approach, would eventually spread to other regions in the country.

The CRT is governed by an executive board, consisting of a president, vice president and a secretary, democratically elected by the members of the CRT. Each council consists of one representative from each of the participating municipalities (the mayor or the vice mayor) and a representative from the Regional Autonomous Government and the Regional Autonomous Council (in the case of RAAN and RAAS). Furthermore, representatives from the MTI are participating as a member of each of the Councils. Training has been provided for members of the CRTs and a small Technical Secretariat for the CRT established in each region to provide technical support and advice to the members, maintain the regional transport database, and provide continuity between former and newly elected municipal councils. The cost of the Secretariat is being financed by the members (the municipalities), with initial support from PAST on a decreasing scale.

Transport infrastructure is currently the legal responsibility of MTI. The CRTs has therefore had a role in negotiating annual maintenance agreements with the MTI to facilitate coverage of overlaps or critical gaps in their respective network responsibilities.

As part of the process of working with municipalities to allow them to take on greater responsibilities during Phase Two, PAST has expended considerable effort in supporting the staffing and training (and equipping) of a cadre of technical and administrative staff in each of the municipalities active in the program.

Within each of the *municipalities* a TM, a social promoter (helping to motivate and organize communities) and a financial administrator have been appointed with responsibility for planning, implementing and administration of community projects, including backstopping of maintenance. The municipalities have also been responsible for working with the communities to raise awareness about the projects, securing the necessary community commitments, and capacity training with advice and support from the regional support teams. The responsibility within the municipalities for project identification and administration, and for designing and supervision of construction work, has gradually increased with their capacities. The municipalities have been responsible for all staff payments, unless some special conditions have applied (for instance, isolated location or lack of administrative capacity).

As already noted, the *long-term aim* has been for the municipalities to assume full responsibility for the implementation of the projects and thereby limit the PAST involvement to primarily monitoring and backstopping activities.

### **Framework for Institutional Analysis**

The context in which an institution is operating also influences the conditions and frame for its capacity development. The context therefore provides both the *drivers* and the *constraints to changes*, in the sense that explanations for good or poor performance are to be found not only inside the institution itself but also in relation to the wider context in which the institution is performing.

In the assessment of the institutional impacts and sustainability of the PAST interventions, the evaluation is therefore making use of an approach that take into consideration the *internal dimensions* (observed changes in tasks and working procedures within

the institutions) as well as the *external dimension* (which focus on how external factors, including political aspects, will influence the task and working system dimension). It also attempts to consider how the institutions have changed in their capacities and responsibilities over time.

This chapter examines institutional and organizational and capacity development impacts of PAST at the community, municipal and regional levels.

## 5.2 Community Organization and Capacity

The evaluation evidence of PAST's impact on the capacity of participating communities to organize around key issues of development and to identify, develop, manage, implement and follow-up on development initiatives comes from the quantitative econometric analysis, from key informant interviews with national, regional and municipal officials and from the qualitative evaluation activities carried out in the communities themselves.

### Survey Data

The survey data for Las Segovias indicates that PAST project communities were able to attract an increased number of other (non-PAST) development projects while comparison communities suffered a decline in the same time period. The relative success of project communities in increasing the in-flow of development projects could be attributed to a number of factors:

- The improvement in year round accessibility for the communities with PAST projects (especially in light of the reported decline in accessibility for comparison communities);
- An improvement in the capacity of the community members to identify development issues and to formulate potential projects and attract external government and non-government projects to their community; and,
- An improved relationship between project communities and municipal governments based on their cooperation on PAST supported infrastructure projects.

It is important not to discount the potential effect of improved access on attracting development projects supported by agencies outside the communities. On the other hand, the key informant interviews and the qualitative work at community level also indicate that improved community organizational capacity has played a role. As already noted, it is possible that external organizations shifted their pattern of development project investments due to other factors such as a desire to target more isolated communities or to shift from communities where they had achieved their objectives. On balance, however, it seems that PAST communities are more able than non-PAST communities to attract new project investments either because they are more organized or are now relatively easier to access.

### Key Informant Interviews

Interviews carried out at national and municipal level indicate that communities have increased their organizational capacity through the experience of developing and implementing investments in transport infrastructure with the support of PAST. FOMAV officials, for example, report an ongoing and clear improvement in the quality of project proposals from municipalities taking part in PAST.

In turn, municipal officials point to the increased ability of community members to take part in project planning, implementation and follow-up in an organized way as evidence of increased capacity at community level. They also noted that communities with experience in implementing PAST projects have proved to be a good source of recruits for technical positions at the municipal government level where their experience makes them well suited to the process of project planning, development and implementation.

### **Qualitative Evaluation at Community Level**

The qualitative evaluation work at community addressed the question of community organizational capacity across four different dimensions:

- The continuing role of PAST trained community members in leadership positions in the communities;
- Community member perceptions of the level of community organization and capacity before and after implementing the projects;
- The ongoing operation of program structures, mainly in the form of the maintenance committees; and,
- The apparent relationship with the municipal government as evidence of the communities' ability to identify and organize around its practical interests.

On entry into the communities, the evaluation found immediate evidence of the impact of the program on the capacity of communities to organized and manage the project planning, implementation and maintenance process in the continued presence in each community of one or two very active community organizers trained by PAST in technical and administrative aspects of project management. They were usually serving as current or past chairs of the project and/or maintenance committee and they have considerable stature within the community.

In 18 of the 26 project communities taking part in qualitative evaluation methods, community members indicated that their communities were now more capable of organizing to address development issues with the PAST supported project contributing to this change. On a regional basis six of seven communities in Las Segovias, five of nine in RAAN and seven of ten in RAAS reported a positive change in community organization related to participation in the program.

Most often community members pointed to their ability to identify, plan, and implement community development projects as the most evident change in capacity. Another, less frequently cited positive impact was on the ability of producers in the community to organize cooperatives and similar producer organizations.

Interestingly, two of three comparison communities chosen in RAAS were in the process of preparing proposals for submission to the CRT for approval. Members of both these communities pointed to participation in the proposal development and submission process as a factor in an important gain in the organizational capacity of the community. Similarly, community members in two of the seven comparison communities in Las Segovias reported that they were beginning to develop proposals for submission to PAST and were beginning to experience improvements in community organizational capacity as a result.

Generally, however, comparison communities continue to rely on traditional structures of community organization and did not report that those were becoming more active or stronger during the same time frames. Table 16 summarizes the responses of members of program and comparison communities on a regional basis.

**Table 16: Community reported improvements in organization and capacity**

Region	Project Communities		Comparison Communities	
	Positive Change Reported	No Change Reported	Positive Change Reported	No Change Reported
Las Segovias	6	1	2	5
RAAN	5	4	2	1
RAAS	7	3	2	1
Total	18	8	6	7

It is worth noting that four of the six comparison communities which reported improvements in the level of community organization and the capacity of the community to identify, plan and manage development projects were, at the time of the evaluation, in the process of preparing proposals for support to transport infrastructure projects to be submitted to the PAST program through their municipal government. Members of these communities reported that engagement in the PAST process was contributing to these improvements.

Where community members did not report a gain in community organizational capacity as a result of participation in PAST supported projects, they most often indicated that the community was already well organized prior to the project.

Chapter 6 provides a detailed analysis of the operation of PAST project maintenance committees in the communities as an important factor in the sustainability of the infrastructure created with program support. For the purpose of this analysis, it is most important to note that maintenance committees continue to function in 20 of the 25 project communities where this question was addressed. Similarly, the ongoing operation of the maintenance committee is often cited by community members as one piece of evidence supporting their perception that the program has had a positive impact on community organizational capacity.

Finally, the qualitative evaluation work at community level provides evidence that communities where PAST supported infrastructure investments take place enter into a deeper and more balanced relationship with their own municipal governments. Whether or not community members were satisfied with the level and quality of municipal support provided to their infrastructure investments, they were able to cite examples of ongoing dialogue with technical and administrative officials at municipal level.

Community members were clear and vocal concerning their expectations of service and gave examples of negotiations with municipal authorities. Community members reported that this was an important change from the situation prior to the PAST project. Before the projects, they indicated that they had little direct contact with municipal authorities. Comparison communities which were beginning the process of preparing proposal for support by PAST also noted an improvement in their interaction with municipalities.

Interviews with municipal officials, including mayors, program technical and administrative staff and members of municipal councils, supported the finding that communities undertaking PAST supported infrastructure projects became both more engaged and more demanding of services from the municipality. They saw this development as necessary and linked to their own capacity development experience from participation in the program.

### **Summary: Community Organizational Capacity**

In summary, participation in PAST supported infrastructure projects have had a positive impact on the capacity of communities to organize to address developmental issues through the identification, proposal, implementation and follow up of development projects. It has (along with improved access) also apparently improved their ability to attract development project investments from outside the community and has strengthened their relationship with their municipal government. In fact the PAST project identification, proposal, approval, execution and maintenance process seems to result in a dynamic which can strengthen both the community and municipal level. With communities improving their capacity to engage with and make appropriate demands on municipal structures and with the municipal governments better able to respond with financial, technical and administrative services.

### 5.3 Municipal Impacts

#### **Strengthening of Technical and Administrative Capacities within the Municipalities**

It is important to note that the question of what can reasonably be expected in terms of results in strengthening technical and administrative capacities clearly varies from region to region and from one municipality to the next.

Despite the differences in starting points, in all three regions it was found that a strengthening of municipal capacities had taken place due to PAST interventions. Extensive training of municipal technical staff, promoters and financial administrative staff within all project municipalities has been a corner stone in the PAST strategy on how to ensure that institutional outcomes and impacts would be developed from the interventions. This has included training in MOI; design of public works using auto-cad software; project management; accounting and procurement; community organization, motivation and mobilization; gender and women's participation; and, environmental management.

Interviews in the municipal offices confirm that municipal staff believe that training provided by PAST has been highly relevant and contributed to a strengthening of institutional capacities in terms of project planning, execution and management as well as in relation to financial administration, budgeting and procurement. In general, it was emphasized by the municipal staff that the relatively long and intensive institutional support provided through the PAST program had contributed to changing the working mentality and mindsets within the municipal offices.

One area where the program achievements seem to have been more limited is in relation to the training of the technical staff within the Municipal Offices. It was reported from most of the interviews with the Municipal Offices in all three regions that there is still a need to consult the Regional PAST Offices on a number of technical aspects related to construction and maintenance of the roads.

The general view that technical and administrative capacities of municipal offices have been upgraded through involvement in PAST was strongly supported by interviews with FOMAV officials. According to FOMAV there is a remarkable difference in the quality of those proposals prepared by municipalities within the three PAST regions compared to proposals received from municipalities within other regions. This leads ultimately to more efficient proposal discussions and approval processes in relation to PAST municipalities.

It was also observed by the evaluation that capacities of the municipal offices have been strengthened within other areas than transport infrastructure by having staff trained by PAST making use of their improved skills also on non-PAST activities within the municipal offices. For instance, the financial administrative person is normally using less than 50% of her/his time on PAST projects. The remaining time is absorbed by other working tasks, often of a project nature, and it was reported that the training from PAST had contributed to more efficient performance also on these non-PAST tasks.

Similarly, technical staff often provide support to other, non-PAST, development projects, where they often are able to make use of skills and techniques acquired from participation in PAST training activities.

### **Sustaining Capacities and Skills at Municipal Level**

As with the task of building capacity at municipal level, the problem of sustaining these capacities varies in magnitude from one municipality to the next and from region to region. There are at least four temporal elements which could influence outcomes in this area: the age and general level of development of the municipal government; the duration of the municipality's active participation in the PAST program; its history of accessing PAST technical, material and financial support; and, the general history of political development of the municipality. Some municipalities have more active, engaged administrations now than they did in the past and for some the reverse is true. Municipalities also vary in their commitment to the program over time. Esteli for example, is a large and prosperous municipality with apparently little or no interest in participating in PAST as a program in recent years.

In terms of *sustaining* capacities and skills within the municipal offices, the evaluation found relatively little staff turnover in technical and administrative positions. In most of the municipal offices visited, the technical, promoter and administrative staff trained by PAST, had been in the same position for several years. In RAAS there appears to have been more frequent turnover in these staff positions, but even there, most TMs had two or more years of experience in their current post. The longevity of employment of PAST trained technical and administrative staff in a given municipality is an important indicator both of the level of interest in transport infrastructure on the part of the municipal administration and the degree of professionalization of staff in the municipal office.

In municipal offices where recent changes in staff trained by PAST have taken place, new staff emphasized the importance of the manuals and guidelines prepared by PAST as effective mechanisms for understanding the program context. However, they also emphasized the need for continuous training by the program to bring the skills of new staff up to a similar level to their more experienced counterparts.

The possibility of introducing elements of PAST manuals and guidelines into the curriculum of some technical university programs in Nicaragua is currently under considera-

tion<sup>55</sup>. This would provide another element of sustainability for these techniques. Finally, municipal officers pointed out that the training of a large number of community leaders in planning, design and implementation of construction works has provided a pool of potential candidates to continue administering and promoting the MOI methodology within the municipal offices. In one municipality in Las Segovias, an example was presented where a former community leader for a PAST project had subsequently been employed as a TM.

In terms of *sustaining* the improved capacities at the municipal offices, the approach applied by PAST for training and capacity building of municipal staff therefore seems to have been both relevant and effective. The combination of limited turnover in trained staff positions within the municipal offices, the development of useful and high-quality guidelines and manuals, and the existence of a pool of community leaders with strong technical knowledge on MOI, is providing a sound basis for the sustaining of these capacity building efforts in the future. This is particularly true for many municipalities in Las Segovias.

In contrast, in many municipalities in RAAN and RAAS, the evaluation found that the technical, engineering and logistic support provided by the PAST regional offices to the municipal offices appear still to be of critical importance for the sustaining of those activities that have contributed to generating the identified outcomes and impacts from PAST interventions in these two regions. A critical factor here appears to be the often relatively time consuming and expensive travel from the municipal offices to visit project communities, and as a consequence of this, less frequent visits together with more limited funds available for repair of any transport infrastructure emergency damage.

In terms of programme design it could therefore be questioned whether it was a right decision to apply the same implementation strategy and objectives for the PAST interventions in, respectively, Las Segovias and RAAN/RAAS. The high dependency rate in RAAN/RAAS on continued support from PAST regional offices indicates that the institutional sustainability is fragile here and that much of the institutional structures and procedures that have been supported by PAST may fall apart if/when it is decided to phase out the support activities within a limited timeframe.

### **Transport Infrastructure Planning, Maintenance, Budgeting and Implementation**

In contrast to technical capacity, it was clear from the municipal visits and key informant interviews that municipalities are at very different stages, in terms of their professional and financial capacity to plan and budget infrastructure interventions. The level of capacity in this area tended to be closely related to the elapsed time of a municipalities experience with PAST.

In Las Segovias, those municipalities that have been working with PAST for several years now successfully operate their own systems for planning and budgeting transport infrastructure construction and maintenance. Specific budget lines are allocated for maintenance of the road network, something that was not existing prior to PAST. It has, however, become a more severe financial challenge for these municipalities, as more communities with bad road access are requesting road improvements as priority number one during community consultations. Similarly, the increase in constructed road kilometres within the municipality contributes to year-on-year increases in maintenance costs. These two factors have made it difficult for some municipalities to match increasing road maintenance demands with budget constraints.

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55) According to staff from PAST offices.

One way municipal offices have attempted to limit the budgetary impact of maintenance costs has been by ensuring that the communities carry out routine maintenance as required. In many municipal offices in Las Segovias this logic appears to inform the process of interaction with the communities.

Either the TM or the promoter makes frequent visits to all project communities (one-two times a month) as well as to non-PAST project communities. This relatively high frequency of visits by the MT/promoter was confirmed during the qualitative fieldwork within the treatment communities. The community members emphasized the importance of these visits for the maintaining good and close relations with the municipal office. They also allow the municipality to contribute to resolving any potential conflicts in the community organization which could ultimately affect the routine maintenance of the local transport infrastructure.

This frequent, mostly, positive contact between the municipal offices and the communities was not found to quite the same extent in RAAN and RAAS. Communities there were more likely to complain of lack of municipal support for periodic maintenance work. There are a number of factors which may have contributed to this difference between municipalities in RAAN and RAAS and their counterparts in Las Segovias as well as differences within the region.

In the first instance, municipal offices in the central zones of RAAN and RAAS (as in Las Segovias), where there are better road connections to urban markets and more productive and economically rewarding agricultural production, clearly have more financial resources and more capacity than some of their counterparts in the coastal zone. This does not mean, however, that all coastal municipalities have not made significant efforts to support communities in carrying out routine and periodic maintenance.

One factor limiting municipalities' ability to satisfy the need for maintenance of rural transport infrastructure arises from the fact that municipalities receive most of their fiscal resources through direct transfers from the central government. With a recent cut of 20% in the transfer of funds from the central government to the municipalities, there is a risk that this will even further constrain their fiscal capacity in the future.

The establishing of FOMAV has created an additional funding source for maintenance of transport infrastructure by the municipalities. The amount of funding that the municipalities can apply for at FOMAV is, however, not sufficient to cover the increasing demand for transport infrastructure maintenance. Interviews with FOMAV confirmed that municipal demand for financial support for transport maintenance projects is increasing and exceeding the pool of resources available. If FOMAV were to play a more important role for future sustaining of transport maintenance within the municipalities, this would require a political decision to increase the fuel levy which would automatically lead to an increase FOMAV's funding base.

#### **Application of MOI by Municipalities**

In terms of impact on municipal practices, the evaluation found important differences between Las Segovias on one side and RAAN and RAAS on the other.

In Las Segovias the municipal interviews reported increasing legitimacy and political profile with regards to investments in rural transport infrastructure. Staff in all municipalities reported that yearly community consultations often ranked rural roads as the first prior-

ity within many communities where water and electricity which have traditionally been at the top. This is a change from the period before PAST interventions commenced in these municipalities, when basically all rural roads were in the same bad or non-existent condition. Now that a large number of communities have benefitted from transport infrastructure projects, the positive developments related to these projects have been noted by other communities. This, in turn, has led to a higher demand and prioritizing of rural transport infrastructure projects from these communities.

In Las Segovias, MOI has now been adopted as a strategic, integrated part of planning and execution of construction works within a number of municipalities: three out of six interviewed municipalities indicated they had now adopted the MOI methodology and were often using it for all projects in all types of construction works. Similarly, two of the six municipalities noted that they were often using a mixed approach with both machines and MOI, while one municipality said it was still not comfortable with the methodology and needed to analyze its potential benefit. Those municipalities that were among the first to receive support from PAST were also those that were making most frequent use of the MOI approach for other projects.

An interesting finding is that within these municipalities the MOI is not only being applied for rural road construction/maintenance projects but also for road construction/maintenance projects within the urban centre as well as for other types of municipal construction work (municipal parks and recreation areas, health clinics and schools, etc.).

This tendency observed in Las Segovias of gradual adaptation of MOI by a number of PAST municipalities was supported by the survey results which showed that HH heads within treatment communities had significantly increased their relative and absolute employment rate within the construction sector. It stands to reason that treatment community members trained in the use of MOI methods through participation in PAST projects would have an advantage in accessing employment on construction and maintenance projects using the same techniques in an urban setting.

In RAAN and RAAS the municipal interviews provided very few examples of the use of MOI outside PAST interventions. Here it seems that the use of MOI has still not been as effectively adapted, not even for those municipalities that have been supported by PAST for a longer time.

While most of the municipal staff interviewed in RAAN and RAAS agreed that MOI was useful in PAST projects, a number pointed to difficulties with MOI in the context of the expectations of both funding agencies and community members. Specifically:

- The very long rainy season in RAAN and RAAS contributes to a very short active period for construction. This means that it is often impossible to implement a project in a single year using MOI which creates problems in terms of community member expectations and some funding agencies who wish to disburse funds in a single calendar year. As a result there may be fewer projects in RAAN and RAAS where MOI can be successfully applied.
- As PAST projects using MOI are spread over a number of years it has sometimes been difficult to adjust the labour rate for MOI workers and, given advances in day-labour rates in the private sector, it can be hard to attract the workers required.

- While the cost of rehabilitating and maintaining transport infrastructure using MOI is more or less equivalent to using mechanized methods<sup>56</sup>, some municipalities find their road network growing rapidly and therefore feel they can amortize the cost of mechanized equipment over more kilometres of road which makes mechanized maintenance more cost-effective.

Another possible explanation for these observed differences between the municipalities in Las Segovias and RAAN/RAAS seem to be the different level of capacity and resources. The municipalities in Las Segovias, in general, have a stronger resource base and are in better position to plan and implement infrastructure interventions on their own. In RAAN and RAAS, many municipal projects are donor-funded. And since donors may have their own preferences for mechanized construction and maintenance, it has been more difficult for MOI to become rooted as standard practices in these municipalities.

#### 5.4 Regional Capacity

The establishing of the Regional Transport Councils (CRTs), bringing together mayors in Nicaragua with different political backgrounds to discuss and plan municipal transport infrastructure investments, is considered a significant achievement of Danida PAST interventions. The ability of the CRTs to be operational at the regional levels despite different political interests among the participating mayors stands out as one impressive result of the institutional part of PAST interventions.

In addition, key informant interviews at national, regional and municipal level support the conclusion that PAST Phase Two has accomplished its main desired outcome of bringing the CRTs to a higher operational level and having them assume responsibility for key functions relating to prioritizing, approving and monitoring PAST projects and coordinating municipal investment in rural transport infrastructure (PAST funded) at regional level.

What still has not been fully achieved in relation to the role and responsibilities of the CRTs is the institutionalizing of the CRTs as regional coordinating bodies towards MTI and FOMAV for planning and prioritization of interventions in the regional transport networks, in particular in relation to the linking of secondary and tertiary network interventions.

##### **Avenues of Financial and Technical Support to CRTs**

As already noted, the CRTs are funded by the municipal contributions, and receive some ad-hoc technical support from PAST. Currently, the budget for the CRTs does not allow the Technical Secretaries to do much travel within the respective region. This further limits his/her ability to monitor development in the transport infrastructure network and assess needs for new transport infrastructure constructions or maintenance.

Some threats to the sustainability of the CRT's have been identified:

- Some municipalities, in particular those which have not been much involved with transport infrastructure projects, may drop out when they don't have the potential to benefit from PAST financial support. The intention to attract other funding

56 *Comparative Study on Employment Creation and Financial and Economic Costs of Labour-based methods in Rural Roads in Nicaragua*. I.T. Transport Ltd. 2009. p.15.

sources has not yet succeeded. The CRT mechanism is still viewed by outsiders very much as a “Danida” mechanism, and potential external funders have not been tempted to channel their support through CRTs for coordination.

- Interviews at in municipal offices in Las Segovias reported a recent tendency to a “political fractioning” within CRT, which could lead to a separation of the group.
- The *financial sustainability* of the CRTs is often threatened by the frequent delays in payment of the assessed contribution by a number of municipalities in each region. The CRT has no means to sanction these municipalities (although technically a municipality in arrears should not have projects approved for funding in the new fiscal year). This financial threat to the CRT would be aggravated if some of the municipalities decided to leave the council if it lacks financial resources to allocate to projects.

The benefits for the municipalities of participating in their CRT (without Danida program funding) can be found mainly in the area of information sharing and closer relations to MTI and FOMAV. In the absence of Danida program funding it would be incumbent on MTI and FOMAV to commit to the CRT as a mechanism for prioritizing and approving their support to infrastructure investments if the mechanism was to be sustained.

### **Regional Governments and Councils**

In RAAN and RAAS, the respective Regional Governments have an ongoing role to play in the operation of the program, mainly through the CRT. Regional and municipal interviews indicate that the Regional Government in RAAN has shown a greater interest in the operation of the CRT. On the other hand the Regional Government of RAAS recently created a Commission for Infrastructure with a transport division in order to be able to better interface with the CRT. The current head of the transport division is also the Technical Secretary of the RAAS CRT. The commissioner for infrastructure in RAAS has also indicated that he would like to use a similar mechanism to the CRT to coordinate investments in health and education infrastructure but has not been able to interest MINED or MINSA in such an approach.

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## 6 Design, Maintenance and Sustainability

### 6.1 Analytical Framework

In order to address the question of the sustainability of the infrastructure investments supported by PAST, the evaluation considered different factors which could be expected to contribute to or detract from sustainability including:

- The quality of design of the roads, bridges and wharves as a contribution to both durability and ease of maintenance using MOI methods.
- The physical condition of the infrastructure observed by the evaluation teams at the time of the evaluation field work.
- The existence of community maintenance committees and their functional status at the time of the qualitative evaluation activities at community level.
- The reported ability of the community (usually through the maintenance or project committee) to raise and administer funds to pay for routine maintenance.
- The reported relationship between the communities and the municipal governments regarding routine and periodic maintenance.

In assessing sustainability, it is also important to address the costs of both the initial infrastructure construction/rehabilitation phase of PAST projects and of ongoing maintenance after the infrastructure is commissioned, especially in light of the emphasis on MOI methods at the centre of the Program. A Danida commissioned study of the costs of road construction and maintenance carried out in 2009 attempted to compare these costs when mechanized and labour-based methods are used<sup>57</sup>. The study concluded that the financial costs for both methods were similar but that economic costs (after removing distortions related to taxes, subsidies, exchange rates, employment rates, etc) were considerably lower for labour-based methods such as MOI. Further, labour-based methods provided superior short-term employment benefits when compared to the mechanized option.

The study also pointed out (p. 36) that mixing labour- and mechanized-based methods for road rehabilitation is generally not effective because the arrival of heavy machinery discourages participation by labourers and the cost of mobilizing heavy equipment to a site once incurred, skews the relative cost of the two methods back to favouring the mechanized option.

### 6.2 Quality of Design and Physical Condition of the Infrastructure

In the Las Segovias region, the lead technical specialist on the evaluation undertook a systematic analysis of the current state of infrastructure in six PAST projects documented both photographically and by assigning a score from one to four to different aspects of

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57) IT Transport Ltd. *Comparative Study on Employment Creation and Financial and Economic Costs of Labour-based and Machine-based methods in Rural Roads in Nicaragua*. London. January 2009. P.20.

design and maintenance. The analysis considered the quality of design and execution of the physical work component for roads, vehicle bridges and pedestrian suspension bridges as well as quality of routine and periodic maintenance.

While this was a very small sample of PAST projects and cannot be claimed to be representative, its findings were largely consistent with the observations made by the evaluation field teams conducting qualitative evaluation field work in 26 treatment communities.

One of the main conclusions of the technical review in Las Segovias was that the PAST infrastructure projects visited were very well designed and very suitable to the use of MOI methods for ongoing maintenance. Similarly, the infrastructure reviewed by the technical specialist was generally in good operating condition with evidence of routine maintenance rated between adequate and an example of best practice for all the projects reviewed.

One problem was identified, however, arising from the use of mechanized methods for periodic maintenance which were not suited to the design of infrastructure which was optimized for maximum use of labour-intensive methods. The most obvious of these was road grading with a machine which removed the crown from the roadbed (thus flattening the road and leading to erosion) and deposited important road material in the ditches thus both weakening the road and clogging ditches.

The evaluation did not undertake the same technical review of infrastructure assets rehabilitated by the program in RAAN and RAAS as was completed in Las Segovias. It did, however, ask the field teams to make observations on both the condition of the infrastructure and the apparent evidence of the frequency and quality of both routine and periodic maintenance (this was also done in Las Segovias).

Generally speaking, the observations from RAAN and RAAS are similar to those for Las Segovias in that the basic design and construction quality of the assets created appears very sound and the roads, bridges and wharves have proven quite durable over time.

In RAAN, seven of the nine project communities reported the roads, wharves and bridges were in good condition with only two reporting problems. Haulover reported that the inter-coastal canal was silting up despite being in constant use due to the absence of periodic dredging. Similarly, Suniwas in Bonanza reported the road to Salto Grande was in a high state of deterioration due to the absence of both routine and periodic maintenance (perhaps related to problems of conflict between Mayangna and Mestizo members which community members reported undermined the work of the maintenance committee).

In RAAS, the basic condition of the infrastructure was rated as good for all ten project communities. There were some concerns expressed regarding the wharf at Marshall Point, where the community is attempting some heavier maintenance which, in turn, requires support from the municipal government in Laguna de Perla which was not yet being provided at the time of the evaluation. The community requires loan of a heavy drill and supply of large bolts. They have prepared the heavy lumber but are unable to install it without assistance. In defence of the municipal government, the wharf at Marshall Point predates the existence of a functional municipal government and the overall set-up of the PAST. It is notable that the municipality did undertake a major repair to the Marshall Point wharf approximately five years ago.

Krukira in RAAN reports that the wharf was repaired promptly and effectively with support from Puerto Cabezas municipality after being damaged by Hurricane Felix and that the associated road has been kept in good repair through ongoing routine maintenance.

### 6.3 Functioning Maintenance Committees

A key feature of the programmatic methodology of PAST is the establishment of a community project committee during the early formulation stages of any infrastructure development project. The committee subsequently becomes responsible for project implementation and then serves as the focus for planning and carrying out periodic maintenance with labour provided by community members and inputs financed by the community. After the infrastructure is completed and commissioned this committee is referred to either simply as the roads committee (in the case of a road project) or the maintenance committee. Its functions include collecting tolls and subscriptions in order to pay for inputs and compensate community members providing labour and to plan, organize and carry out routine maintenance.

During the qualitative evaluation work in Las Segovias, RAAN and RAAS, the field evaluation teams gathered information on the maintenance committees in 25 communities with PAST supported infrastructure projects. In all of those communities a maintenance committee had been established during project implementation and the committee was reported by community members as functional in 20 of the 25 communities. On a regional basis, six of six were reported as functional in Las Segovias, along with six of nine in RAAN and eight of ten in RAAS.

Different reasons were given by community members for the non-functional status of five of the maintenance committees, these included:

- The person charged with collecting and transferring maintenance funds into the committee account reportedly had not provided funds for maintenance.
- Delay in legalization of the maintenance fund account and funds transfer process by the relevant municipality.
- While the committee was not functioning for one project community, the persons living nearest to the wharf were cleaning it regularly.
- In one community there had been a functioning maintenance committee but it became “desanimado” due to a reported lack of support from the municipality which did not provide the support it had promised.

Obviously one factor in the full functionality of maintenance committees at community level has been their ability to raise and administer the financial resources necessary to fund routine maintenance. Four of the five committees reported as non-functional cited an inability to raise funds as a key factor. Even where committees are reported as functional, some community members point to problems in finding sufficient funding for maintenance.

In the 20 communities where members indicated that the maintenance committees were functional, two communities reported a lack of capacity to raise sufficient funds. In

Suniwas in RAAN, problems noted included lack of coordination with a neighbouring community (Musawas) and a resulting reluctance to provide funds.

In Karawala in RAAS, community members reported that there was a dispute between the project maintenance committee and the municipal government. The municipal government was reportedly receiving the tolls paid by panga drivers for use of the municipal wharf but not re-investing those funds in maintenance of the wharf.

Sometimes even well functioning and reasonably financed maintenance committees report problems in recruiting labourers from the community to carry out routine maintenance. This was usually related to the formula used to calculate the daily labour rate paid for PAST maintenance work which takes account both municipal labour rates and rates for agriculture day labour. When wage rates rise in the project area but the PAST rate is not adjusted in response, problems in recruiting labour were reported. This could, in turn, affect the ability of the community and the municipality to carry out both routine and periodic maintenance.

In sum, 80% of the communities taking part in the qualitative evaluation activities reported a functioning maintenance committee. Where committees are not functional this is most often due to an inability to raise or to access the necessary funds for routine maintenance.

### 6.4 Support from Municipal Governments

An important element in the longer term sustainability of the infrastructure investments made by communities with support from PAST is the ability and willingness of the municipal governments to provide necessary support, including (but not limited to) meeting its commitments to provide periodic maintenance.

As Chapter 5 has already noted, municipal government staff play a key role in supporting communities during the development and submission of project proposals for consideration by the CRT as well as during project implementation. During the maintenance period of the project life cycle, however, communities rely on municipal governments to provide essential inputs to the process of periodic maintenance.

Not surprisingly, the ability and willingness of the municipal governments to provide the expected support was a key topic raised by community members during the qualitative evaluation work at community level.

In the 25 communities where the qualitative evaluation was able to gather information on the process of maintenance, problems or issues in the relationship with municipal governments providing expected inputs to maintenance were raised by the members of seven communities. In the other 18 communities it seems that support by the municipal government for periodic maintenance was at least meeting the expectations of the municipality.

The perception among some municipalities that more support is required from the municipal government does not necessarily mean that periodic maintenance is not being carried out. Community members were often not very specific about the type of support they expected and sometimes seemed to call for periodic maintenance well before it would normally be scheduled.

In five of the seven communities where community members raised questions about the quality of municipal support to periodic maintenance, projects were completed in 2007 or later, sometimes as late as 2008. Since qualitative evaluation work was carried out in the communities in September 2009, none of these five projects would have been due for periodic maintenance.

It is interesting to note that where communities report disappointments with the level of support provided by municipal governments, including financial support and/or periodic maintenance, in most cases they also point to ongoing negotiations and an expectation that the problem will be addressed in the next year.

*Summary: Sustainability of Infrastructure*

In summary, the overall sustainability situation in Las Segovias, RAAN and RAAS seems to be one of continuing durability and usefulness of the transportation infrastructure built or rehabilitated with support from the program. While most project communities report they are able to maintain the assets supported by the program, there are some concerns over the sustainability of arrangements for both routine and periodic maintenance in a small number of communities, at least at the time of the evaluation.

At the same time, there is a strong sense in the communities taking part in the evaluation that the transport infrastructure created through a common project with support of PAST is very valuable and that it should be maintained. Most often some arrangement is made to allow for at least the minimum level of maintenance necessary to keep these fairly durable assets in operation. This is made easier by the sound design and construction of the assets themselves, which contributes to both their durability and their suitability to routine and periodic maintenance methods promoted by the program.

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## 7 Similarities and Differences in Impacts

### 7.1 Impacts Consistent Across All Regions and Zones

Chapters 4, 5 and 6 delineate a series of impacts/results of the investments in local transport infrastructure which are reported consistently across Las Segovias, RAAN and RAAS and which are also consistent across different zones and types of communities within each of the regions. These include:

- The basic improvement in community access to the wider transportation network and to services, markets and social interaction. An improvement in access which can be measured in reduced travel times, availability of scheduled communal transport options, and year-round access.
- The improved security and safety of transport, especially when viewed in terms of the need for community members to access emergency health services (especially for pregnant women, injured persons and the severely ill).
- Improved access to markets measured in terms of cheaper, faster and/or more frequent contacts with buyers of community produce, easier and cheaper transport of products from the communities to markets, and improved access to (usually cheaper) production inputs.
- Some level of economic gain for community members as a result of better access to markets. However, the extent of these gains varies considerably across regions and across different geographic zones and the predominant type of production in the community.
- Improvements in the frequency of contact with health service providers including health brigades.
- Improvements in access to education services and some improvement in the frequency and supervision of education by MINED staff.
- Improvements in community capacity, as seen through the existence of functional project maintenance committees in the majority of project communities and in an ability to attract more projects, programs and organizations to the communities to engage in development support.
- Improvements in the institutional capacity of municipalities to engage with communities and to provide support to the process of transport infrastructure investment and maintenance.

While these impacts are reported consistently across all three regions and by communities of different types working with infrastructure of all types (roads, bridges, wharves, canals) and in different geographic zones, other program results clearly vary across and within regions.

## 7.2 Variations in Impacts

Economic impacts do appear to vary from region to region and within regions. Variable impacts include increased or shifted production, increased income from production, increases in land values, and gains in employment outside the community. Reported environmental impacts and impacts on community capacity (including the sustainability of maintenance committees and finances) also vary according to similar variables.

Table 17 illustrates the pattern of varying impacts by identifying the impacts which vary, describing how they do so, and by indicating the factors potentially contributing to the variations reported.

**Table 17: Variable impacts and potential explanatory factors**

Variable Impact	Pattern of Variability	Suggested Explanatory Factors
<b>Increase or shift in production and increased land holding/value</b> with consequent gains in income	Most consistently and widely reported in <b>Las Segovias</b>  When reported in RAAN and RAAS most often in <b>Central Zones</b>	<b>Project type:</b> usually a road or road/bridge combination connecting to good secondary road with access to urban markets.  <b>Production type:</b> most often reported as an increase in production for milk and dairy cattle or a switch into cattle or cocoa production. Recent decline in fish prices may explain less impact in fisheries communities.  <b>Cultural factors:</b> While it may be tempting to ascribe the predominance of Mestizo dominated communities in high value agricultural production to cultural factors, this may in fact be more a reflection of the concentration of Mestizo communities in RAAN and RAAS in the central zones with good road connections to urban markets.
Increase in <b>employment</b> inside and outside the community but within the municipality	Reported clearly in the Survey data for <b>Las Segovias</b>  Less frequently reported in qualitative evaluation data in RAAN and RAAS	<b>Project type:</b> Experience gained in road construction and maintenance using MOI techniques may be transferable to other construction projects. Road projects may provide more opportunity for agricultural employment as well as in transport services such as taxis.  <b>Size/vitality of municipal centre:</b> the larger municipal centres in Las Segovias with more active alcaldías undertaking road maintenance and construction provide more opportunities for employment.
Increase in <b>women's participation in economic activity</b>	Reported <b>only in Las Segovias</b> during community consultations	Emphasis in programming in RAAN and RAAS has been on addressing relations between Mestizo and <b>indigenous</b> populations.  In <b>indigenous communities</b> land held in common may make this type of impact more difficult to identify.

Variable Impact	Pattern of Variability	Suggested Explanatory Factors
Reported negative <b>environmental</b> impact through increased <b>logging and deforestation</b>	In selected areas of <b>all three Regions</b> . In RAAS was reported more in central zones	<b>Project type:</b> Roads and road/bridge combinations allow for heavier trucks (even though PAST roads are designed for light trucks). <b>Connection to major roads:</b> As with production impacts access to a major road facilitates the increase in external logging.
Sustainability of <b>maintenance and maintenance committees</b> and adequacy of <b>finances</b>	Varies within <b>all three regions</b> . No clear geographic pattern	<b>Project type:</b> All types of projects financed by combination of subscription and tolls. No clear pattern across types of projects. <b>Age of project:</b> No pattern – some very old projects have enduring and active maintenance committees. <b>Municipal strength:</b> Well organized and engaged municipalities help to sustain organization in the communities and provide periodic maintenance. In RAAS the strongest are in the central zone.

Whether the patterns of variation illustrated above supports a conclusion that PAST should invest only in roads/bridges which connect highly productive agricultural areas directly to good secondary and primary roads with consequent access to urban markets would depend on the priority given by PAST to different outcomes. If the main priority were to be achieving the maximum positive economic impact regardless of the relative wealth or poverty of the communities taking part, concentrating on communities with the best secondary transport linkages would be logical.

On the other hand, if a focus on relatively more disadvantaged communities and a higher impact on poverty was the primary focus, such a concentration would be much less appropriate:

- It would suggest a strong program bias towards Las Segovias which has less widespread severe poverty than RAAN and RAAS<sup>58</sup> and would therefore weaken the poverty reduction focus of the program.
- It would ignore that fact that other types of projects and communities did report some economic benefit although not always of the same magnitude.
- It would discount the very strong social benefits which accompany the wharves, pedestrian suspension bridges and canals (as well as roads and road/bridge combinations), especially in year round safe access to health services (and other emergency services).
- It would discount the positive social effects of the reduction in the sense of isolation experienced by many communities which can benefit from improved transport infrastructure but which may not have easy access to urban markets, even with the improved transport infrastructure.

58) INIDE 2005 Census.

Indeed, more isolated communities with poorer secondary transport linkages often will have the potential for very large gains in economic and social well being but they may take longer to realize these gains as the national network of secondary and primary transport connections is improved over time.

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## 8 Conclusions

### 8.1 Overall Conclusions

The evaluation has identified positive impacts resulting from Danida supported investments in rural transport infrastructure at the community, municipal and regional levels. At the level of participating communities the evaluation found positive economic and social impacts which are supported by both quantitative and qualitative evaluation evidence.

More specifically, the econometric analysis of survey data using a double difference methodology comparing the same variables across participating and comparison communities found notable, statistically significant impacts attributable to program supported infrastructure investments in the areas of:

- Reductions in the time required by community members to access services outside the community;
- Increases in the level of paid employment among heads of households (importantly, the employment gained was predominantly located in the same municipality as the project);
- Gains in household resources reflected in the size of homes;
- Increased access to publicly provided electrical supply; and,
- Greater inflows of development projects to the participating communities.

The qualitative evaluation of community impacts reported specific confirmation of these types of economic impacts in project communities, positive economic changes which were generally not reported by comparison communities.

In combination, quantitative and qualitative evaluation evidence supports the conclusion that PAST interventions have resulted in other positive economic impacts including the direct effects of increased access to markets and inputs to production. For example, quantitative and qualitative findings on agricultural production point to increases in employment within agriculture and increases in the value of land for agriculture as well as changes in what is produced and how it is marketed.

In the area of social impacts, qualitative evaluation methods indicate that communities that have participated in PAST have improved their access to health and education services and have more frequent and reliable contact with both than comparable communities that have not participated in the program. One very important result has been an improved and more secure access to emergency transport services by community members. In terms of women's empowerment, it was found that women's economic and social participation has improved due to PAST interventions, at least in the Las Segovias region.

At the *organizational and institutional level*, the evaluation found that participating communities and municipalities have improved their capacity to organize around issues

of community development and to identify, develop, design, implement and maintain development investment projects and the resulting infrastructure. The program has also contributed to an improvement in the engagement between the municipal and community levels with communities showing an increased ability to interact with municipal government officials, who are, in turn, better able to respond to community needs for technical and administrative support in developing and maintaining rural transport infrastructure.

New regional institutional structures for the coordination and prioritization of transport infrastructure have also been established and strengthened with support from PAST. An important question is whether the observed impacts of the PAST interventions are predominantly a result of improvements in access resulting from the infrastructures themselves (improved roads, bridges, wharves, etc.) or do they result from other aspects of the program such as institutional capacity development, the training of community members, experience gained through project employment, and the short-term economic impacts of project wages and the use of labour-intensive methods. In other words: is it the what (infrastructure investments) or the how (other program characteristics) of PAST program activities which contributes most to economic impacts?

The quantitative and qualitative evaluation data point to a combination of these factors contributing to impacts. It seems most likely that the improvement in *access* which accompanies PAST projects is the single most significant contributor to economic impacts since it is difficult to see how the noted economic gains could be sustained over time without the direct improvements in year-round access. Community members point to the decreases in travel times and costs and the improvements in year-round access as key factors in achieving and sustaining impacts.

At the same time, however, they point to other program characteristics as factors which contribute to their ability to realize and sustain economic benefits. For example, experience gained by community members during construction and maintenance of PAST projects is cited as an element which allows them to have access to paid construction employment in municipal centres. Similarly, the PAST program's strong focus on the maintenance of transport infrastructure can be seen as an element in sustaining improved access and its benefits. The same observation can be made regarding capacity development at the community and municipal levels since both were necessary to strengthening maintenance practices and sustaining the benefits of improved access.

It appears that the improvements in access resulting from PAST supported infrastructure are essential to securing economic impacts but the other characteristics of the program including community participation and the use of labour intensive methods are contributing to those impacts.

In more specific detail the conclusions of the evaluation are as follows:

## 8.2 Conclusions Based on Econometric Impact Analysis

An econometric analysis of quantitative survey data, based on a 2005 baseline and 2009 re-survey using a double difference methodology comparing the same variables across participating and comparison communities, found the following notable, statistically significant impacts attributable to PAST supported infrastructure investments:

*PAST projects have reduced the travel time required for community members to travel to social services, measured in terms of time required to travel to the nearest health post.*

This central finding of reduced travel time as a result of PAST projects was confirmed by the econometric analysis and by all forms of the qualitative evaluation research undertaken. In some ways it is both the least surprising and the most important evaluation finding. Many other results can be expected to flow from improved year round access as measured in reduced travel times for community members. The reduction in travel times found in the survey results is further supported by project monitoring data on the increase in traffic volumes and intensity experienced by program communities.

The significance of this impact is further compounded by the fact that community members often pointed to the increased safety and security of travel which could now be undertaken in all seasons, more rapidly and (in the case of transporting agricultural goods) with less damage.

As confirmed by the qualitative evaluation work at community level, the infrastructure supported by PAST is:

- Increasing the volume of traffic flows into and out of the communities.
- Allowing communities access to communal transport on a regularly scheduled basis.
- Reducing the time and cost taken to access health posts and other essential services.
- Improving the safety and reliability of transport services, especially emergency services.

*PAST projects have contributed to considerable increases in the portion of heads of household in program communities who are in employment in the same municipality.*

Program communities increased the percentage of heads of households in employment a full 17% more than did comparison communities. In the baseline periods, before completion of the transport infrastructure projects, program communities reported levels of employment which were lower than comparison communities but this situation was dramatically reversed by 2009. Most of the new jobs were generated within agriculture and construction<sup>59</sup>.

This observation was further confirmed by qualitative data collection methods which confirmed that community members with experience in the methods of construction used on PAST supported infrastructure projects were finding employment in the local municipal centre.

*PAST projects have contributed to gains in household resources so that program community members have been able to increase the size of their homes.*

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59) Since the re-survey of households in both treatment and comparison communities took place in June 2009, after the completion of the construction phase of the projects themselves, the increase in employment in treatment communities cannot be attributed to the immediate effect of labour employment during the construction phase of projects.

The econometric analysis of survey data confirms that average house size has increased significantly more for program communities than for comparison communities. The evaluation considers housing size to be a very durable asset indicator when compared to others such as the quality of roofing material because it is much less subject to contamination effects resulting from, for example, housing programs targeted to poorer communities.

This impact was also confirmed by qualitative evaluation research at community level with community members pointing to the reduced cost of transporting housing materials resulting from the new and rehabilitated roads, bridges, wharves and canals supported by PAST. Of course, it may also partly be a result of increases in the financial resources among households in treatment communities related to gains in employment and increased production.

There are also proxy indicators of positive improvements in household wealth which, while not statistically significant in double difference terms, are indicative of an overall positive impact by PAST supported projects on the economic well being of households. More specifically:

- The average size of landholdings by households in PAST program communities has increased nearly 50% in the period from 2005 to 2009 while it has remained nearly unchanged within comparison communities. There has also been a greater increase in land values in PAST program communities than in the comparison communities.
- Households in PAST program communities and comparison communities have both increased their holdings of durable goods significantly in the 2005 to 2009 period, with households in program communities showing a somewhat larger increase.

*The inflow of development projects from other programs and organizations has increased for PAST program communities but decreased for the comparison communities over the period 2005 to 2009.*

The improved year-round access which accompanies PAST supported transport infrastructure projects may be associated with higher levels of engagement by both government and non-governmental agencies in provision of basic services such as electricity and in introducing new development investments in project form. It may also be associated with an increase in the capacity of community organizations to organize in support of increased engagement by external agencies.

*The percentage of households in program communities with access to publicly provided access to electricity has increased substantially in the period from 2005 to 2009 compared to households in the comparison communities.*

As with the inward flow of development projects, it is not totally clear whether the improved access associated with PAST infrastructure investments is the predominant factor in inducing changes in community electrification or if it derives from organizational or political factors. Nonetheless, PAST communities have gained new connections to the public supply at a greater rate than comparison communities.

### 8.3 Evaluation Conclusions Based on Qualitative Analysis

It is important to note that the impacts reported here, while derived primarily from the qualitative impact analysis carried out in 39 communities, are also consistent with the conclusions reported for the econometric impact analysis.

#### **Economic Impacts**

In all three regions of the program there are identifiable economic impacts of PAST projects although they are more clearly indicated in Las Segovias and in the central zones of RAAN and RAAS, where there are better links to larger markets in the Pacific area of the country. In particular, members of PAST supported communities pointed to more frequent, more timely and less expensive contacts with markets and buyers for community agricultural products. They also pointed to improved prices for their products resulting from lessened damage and/or the ability to transport higher value products such as fresh milk. The economic gains reported by PAST project communities were not reported by members of comparison communities.

#### **Health Impacts**

Improved access to health services is one of the highest impact areas noted by community members and was often discussed with real enthusiasm during community consultations. In this area, and directly connected to the PAST program infrastructure, the most frequently and vehemently mentioned impact was the improvement in access to emergency care through safer and faster transport for pregnant women with complications in delivery and for the very ill.

After access to emergency care, improved health infrastructure (health centres and health posts) and more frequent attention from health personnel are among the main impacts in health identified by community members.

#### **Education Impacts**

In education impacts noted by community members arise from either an improvement in education services provided by MINED in the form of teachers, materials, improved schools etc. or in the form of easier and safer access to schools outside the community.

Improved supervision by MINED of teachers and improvements in teacher attendance are seen as significant impact in education as without decent transport infrastructure inspection visits are nearly impossible. In the same vein, communities report they have increased access to updated didactic materials.

Improvements in education are seen at primary, secondary and tertiary levels by community members. For many PAST communities with their own primary (but not secondary) schools, the improved transport infrastructure allows some young people to continue their education by commuting more safely to secondary schools.

Community members are especially sensitive to problems of risk in transportation for students and teachers (and for pregnant women and the injured seeking emergency health care) resulting from floods and rising rivers during the rainy seasons. This risk and accident avoidance aspect (improved safety and personal security) was stronger than anticipated by the evaluation.

**Basic Services**

In basic services it is not really clear that there is much effect of the program on water and sanitation but there does seem to be some impact on electrification. In RAAN and RAAS there are examples of communities being connected to a regional grid or to a local plant at least partly because of the PAST supported infrastructure. This is consistent with the finding from Las Segovias of a statistically significant link between treatment communities and electrification.

One clear and important program impact is an increase in the availability of regularly scheduled, year round communal transport which is very important and very frequently cited during consultations with community members. Comparison community members often pointed to the lack of regularly scheduled communal transport services as an important factor in their isolation.

**Environmental Impacts**

For the most part, PAST supported transport infrastructure appears to be neutral in its impact on the local environment. There is some indication in all three regions, however, that rehabilitation of roads has contributed to deforestation and increased logging of community forest resources by those outside the community. This is perhaps a consequence of improving access to a forested area by medium-sized trucks. It is most notable in Las Segovias and in the central zones of RAAN and RAAS.

## 8.4 Conclusions on Institutional Capacity Development Results

PAST has contributed to an important set of institutional capacity development results at the community, municipal and regional level, but there are continuing concerns regarding the financial sustainability of the CRTs and continued support of the CRTs by municipal governments. Further, the evaluation evidence suggests there is a continuing need for some source of programmatic technical and administrative support to both the municipalities and regional structures such as the CRTs. The results and the challenges include the following.

**Community Level Organizational Capacities**

Municipal interviews and qualitative consultations indicate that PAST communities have demonstrated an ability to organize and to continue to support ongoing operation and maintenance of the transport infrastructure built or rehabilitated with program support.

PAST trained project and committee members remain active in many communities and some continue to play a leadership role long after project completion. PAST project and maintenance committee members also play an important role in liaising with municipal officials and others from outside the community who can support development over time.

The experience of developing, implementing and maintaining PAST projects has also deepened the relationship between communities and municipal government offices. Municipal officials are more engaged in dialogue with PAST communities and the communities themselves are more articulate regarding their needs and responsibilities and more demanding of municipal support. Further, the municipal officers now have more technical and administrative capacity to respond to these demands.

### **Strengthening Technical and Administrative Capacities of Municipalities**

Training and material support (including equipment) to MTs, social promoters, administrators and planners at municipal level has been both comprehensive and effective. Municipal officials have upgraded their skills and capacities through involvement with PAST and have used these skills in project preparation and management both inside and outside the area of rural transport infrastructure. The higher quality of project support submissions by municipalities experienced in the PAST program process was noted by FOMAV staff dealing with proposals from municipalities across Nicaragua.

For the most part, technical and administrative staff trained with PAST support remain in their assigned functions, and apply the skills they have learned to PAST and other projects. There has also been relatively little turnover of PAST trained staff at municipal level and most have been functioning in their assigned roles for more than two years.

Training of community leaders in PAST methodologies as an element in community participation in the program has also created a cadre of technically sound individuals who can be recruited into municipal positions as current MTs, promoters and administrators may move to other functions (or other municipalities).

On the other hand, there is a continuing need in many municipalities for technical support, especially in the area of engineering and logistics. TMs also tend to be overloaded in more remote municipalities of RAAN and RAAS as they are challenged by long distances and lengthy travelling times to engage with the communities there.

### **Transport Infrastructure Planning, Maintenance, Budgeting and Implementation**

Depending on the amount of time municipalities have been engaged with the PAST program, they show very different levels of professional and financial capacity to plan and budget infrastructure interventions.

While the initiation of direct financial transfers to municipalities from the central government during Phase Two provided a reasonably strong basis for budgeting for rural transport maintenance, reliance on these transfers has become a problem in recent years, especially for less prosperous municipalities (including many in RAAN and RAAS). The recent 20% cut in direct funds transfers from the central government (along with feared future cuts) will constraint municipal financial capacity to meet their planned responsibilities for maintaining the roads being transferred to their ownership and responsibility.

PAST has had an important impact on municipal practices for managing and financing infrastructure maintenance, especially in Las Segovias where more than half the municipalities visited for the evaluation have adopted MOI as their primary method for maintaining transport infrastructure, including infrastructure not supported by PAST funds. This pattern is much less predominant in RAAN and RAAS where municipal staff indicated that the very short construction (dry) season may mitigate against use of MOI for construction.

### **Regional Capacity and CRTs**

PAST Phase Two has seen the CRTs rise to a higher operational level and take on a leading role in coordinating PAST infrastructure investments among municipalities in each region. They can potentially play a broader role in coordinating rural transport infrastructure for projects funded outside of PAST.

At the same time, there is a need to ensure continuing financial and technical support to the operation of the CRTs if they are to continue to play the roles they have achieved under Phase Two. Specifically:

- Steps will need to be taken to ensure that municipalities remain active in the CRT and continue to provide their annual financial contribution to the operations of the councils.
- A continued supply of funding for rural transport infrastructure will need to be channelled through the CRTs, either from Danida, other donors, or from Nicaraguan Government sources such as FOMAV, in order to ensure continued municipal interest and financial commitment to the CRTs.

### **Design, Maintenance and Sustainability of Project Works**

PAST supported infrastructure is clearly well designed and well suited to the use of MOI methods in both construction and maintenance phases. Further, PAST supported and improved infrastructure has been demonstrated to be quite durable and to remain in reasonably good condition. Further, qualitative evaluation data gathered at the community level indicates that most communities which have implemented PAST projects in the past continue with functioning maintenance committees in place which are able to raise local finances for routine maintenance.

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## 9 Lessons Learned

The evaluation results and the impacts reported in Chapters 4 to 7 give rise to number of lessons learned relating to the design and implementation of a program to support investments in transport infrastructure in Nicaragua, especially tertiary transport infrastructure at the community level. They also give rise to lessons learned regarding how to best monitor and evaluate the impacts of programs of this type.

### 9.1 The Value of Tertiary Transport Infrastructure

#### **Valued by Participating Communities**

One of the most striking impressions left by the qualitative evaluation work carried out in 26 different communities with PAST supported projects and 13 without has been the value placed on the resulting transport infrastructure by community members. This high valuation is grounded in two quite different dimensions; access and isolation. On the access side of the ledger community members place a high value on their ability to reach schools, health posts, markets and other communities on a year-round basis in a safer and more secure way. At the same time they fear the isolation they experienced in the past, especially during winter and periods of high rainfall. For comparison communities this isolation is an ongoing reality and one they are convinced can be lessened with the right investment.

The high value placed on the assets by community members can also be related to the quality of their design and construction in the first place. These are durable, well constructed facilities. While they require ongoing maintenance, they are (with some exceptions such as very long roads in sparsely populated areas) capable of being maintained with the human and financial resources available in the community.

The over-riding lesson is that the type of tertiary transport infrastructure supported by PAST in Las Segovias, RAAN and RAAS meets a strongly felt need in the communities concerned.

#### **Commonality of Impacts**

The program model presented in Chapter 2 points to a wide range of economic, social and capacity impacts arising from the program and the infrastructure investments it supports. The quantitative and qualitative evaluation work carried out during the evaluation illustrates the fact that most communities realized many of the intended results and impacts (at least on some level). Almost all the communities evaluated experienced some level of economic benefit in comparison to similarly isolated communities without the benefit of a project.

As noted in Chapter 7, PAST program communities experienced similar benefits relating to reduced travel times, more frequent and secure access to public forms of transport and better access to education and health services when compared to non-PAST communities. In addition, PAST communities in all regions reported some level of economic benefit although the extent of these benefits varied across and within the three program regions.

## 9.2 Contextual Factors in Variable Results and Impacts

Despite the fact that most communities experienced some level of each of the different positive impacts reported in Chapter 4, there are a number of contextual factors which clearly have a significant influence on the extent of those impacts. These include:

*The quality of the secondary transport infrastructure network which a community gains access to through the project.*

Clearly where the project connects to a well developed secondary or primary road network which, in turn, links the community to larger markets, especially urban ones, the communities experience the largest economic gains.

*The suitability of local agricultural production to take advantage of the improved transport links to markets.*

At least in RAAN and RAAS, communities which were engaged in production of basic grains but were capable (because of land holdings and the agro-climactic zone) of shifting into (or enlarging the share by entering into commercialization) of higher value production reported that they were able to secure considerable economic benefit.

*Economic and price conditions for the main commodities produced for commercial sale by the community.*

The experience of communities on the coastal zone or the main rivers of RAAN and RAAS with high dependency on fisheries to earn income provides an illustration of the fact that changes in the local terms of trade (fish prices) can reduce the economic impact of this type of transport infrastructure at least in some years.

*The size and diversity of the economy of the municipal centre.*

It is clear from the survey data that one of the major beneficial impacts of the infrastructure investments in Las Segovias has been a gain in employment by community members outside their community but within the municipality. This in turn depends on the size and vitality of the community centre and the ability of the municipal government to finance construction and maintenance projects which provide some of these opportunities.

It is important to note that the presence or absence of these factors is not necessarily decisive in indicating whether a given project will have any positive impacts. Rather, they tend to influence the level of economic impact associated with the project. Regardless of the mix of contextual factors, the evaluation found positive impacts relating to transport services, access to health and education services and a reduction in isolation for the PAST communities.

## 9.3 Program Processes, Materials and Institutional Arrangements

The evaluation findings reported in Chapters 4 and 5 point to significant lessons regarding the strength of project identification, selection, approval, implementation and maintenance processes and criteria. These include:

### *The suitability of project prioritization and approval criteria.*

By focusing on an objectively verifiable set of project approval and prioritization criteria, PAST has been able to largely depoliticize the project approval process and (by requiring community financial commitment and municipal support) to ensure a reasonable level of community commitment and ownership.

### *The quality of project designs and supporting material.*

Through a continuous process of engineering and design improvement and training and a comprehensive system of program manuals and guidelines, the program has ensured that the infrastructure investments it supports result in well designed, well constructed and durable roads, bridges, wharves and canals; most of which can be reasonably maintained using MOI.

### *The availability of quality engineering support.*

When problems do occur, it is necessary for community members and municipal technical staff to have access to rapid support from qualified engineers. During PAST Phase Two this has been provided by engineering and technical staff of the PAST regional offices. For municipal officials this is the most important single service they report receiving from PAST offices, and the one which they feel is most essential in the future.

### *The central role of municipalities in project identification, implementation, management, maintenance and monitoring and the need for elapsed time to build municipal capacity.*

The program has invested a great deal of effort in supporting capacity development at the municipal level and has, as a result, been able to rely on a cadre of trained professionals in a significant number of municipalities. By placing municipal governments at the centre of the program process, PAST gains legitimacy and has the opportunity to develop sustainable institutional arrangements at a local level.

Inevitably, however, the program has come to be reliant on the level of professionalism and policy commitment of the municipalities concerned. This means that its results are likely to continue to be variable across a given region and dependent on the engagement and professionalism of the municipal governments involved. At least in the near term, for some municipalities, this remains linked to the quality of technical and administrative support from PAST regional offices.

### *The role and sustainability of regional structures.*

By creating and supporting CRTs, the program has been able to develop a transparent body for coordinating investment decisions relating to tertiary transport infrastructure at a regional level. This in turn has been linked, through the Executive Committee, to decision making at a national level. The primary concern with this structure is the longer term sustainability of the CRTs. There are opportunities for further integrating CRT operations into the regional governments in RAAN and RAAS but no equivalent body exists in Las Segovias. There is also a question of how the CRTs can be placed on a self-sustaining financial basis. At present, participating municipal governments contribute to the operating costs of the CRTs, but it is not clear they would continue to do so without the incentive of access to PAST project funds (which can only be accessed at present by participating in and supporting the relevant CRT).

*The absence of systems and processes for prioritizing other investments in transport infrastructure.*

While the CRT does facilitate the planning and approval of investments in tertiary transport infrastructure in a rational way at a municipal and regional level, there are problems in coordinating with other projects. Major secondary and primary road investments are not coordinated (either on their own or with PAST projects) on a national or regional basis. Sometimes this means that major secondary transport projects are launched without any consideration of how they link to PAST projects in either positive or negative ways. It also means that PAST projects cannot be planned and approved taking into account planned changes in the secondary and primary transport network.

*One of the key design characteristic of the program has been the central role of labour-intensive methods (MOI) during project design, construction and maintenance.*

This has contributed to well designed and durable infrastructure which is suited to the maintenance capacity of the communities and municipalities. However, it represents an ongoing challenge in that a number of factors push both communities and municipalities toward the use of mechanized methods for both routine and periodic maintenance. These include:

- The fact that MOI methods require more time during the construction phase and call on a continuous commitment by the municipality, the community and the external funding organizations. This can place pressure on the funding agency, the municipality and the community to turn to mechanized methods. As already noted, machinery based methods have been found to be economically more expensive than labour-based methods in Nicaragua (IT, 2009) without the attendant employment benefits of the latter.
- Problems in some communities where agriculture is more prosperous and day labour wages are above those paid by the program. This can cause problems in securing required labour for routine maintenance.
- A policy bias in some municipalities toward the use of mechanized methods for both construction and maintenance. In the latter case this can result in the municipality providing mechanized maintenance such as road grading which is damaging to the MOI-based infrastructure and makes it less effective and more difficult to maintain with labour-based methods, in turn leading to higher maintenance costs for municipal governments.
- The fact that MOI to be effective relies on a communal commitment to funding and undertaking long term routine maintenance. In some communities visited by the evaluation, individuals or a small group of individuals have assumed responsibility for contracting the needed maintenance without using MOI methods.

#### 9.4 Evaluating Impacts of Rural Roads Programs

The process of conducting the Impact Evaluation of Danida Support to Rural Transport Infrastructure in Nicaragua has allowed the evaluation team to identify a series of lessons learned relating to how to design and implement a robust, defensible impact evaluation in this sector.

The evaluation benefited from some unique conditions which allowed for successful completion of both quantitative and qualitative methods of impact assessment and for the two different categories of methodologies to work effectively together.

### **Factors Contributing to Effective Quantitative Impact Assessment Methodologies**

In the authors' experience, this evaluation benefited from some unique characteristics which allowed it to determine and demonstrate statistically valid, quantitative impacts which can be attributed to the PAST program and the tertiary transport infrastructure investments it has supported. These characteristics, in turn, suggest some lessons learned which could be built in to future Danida (and other agency) efforts to program and evaluate impacts in the transport sector. These include:

*The critical role of national statistical capacity including survey sample design, questionnaire development, data capture, data analysis and computerized record keeping.*

In the absence of program baseline data for comparison communities, a full quantitative impact evaluation could not have been carried out without INIDE's track record in designing and implementing the national census of 2005 and the national living standards surveys of 2001 and 2005. These three sources provided critical baseline data on households in both treatment and comparison communities. Of equal importance, they allowed the evaluation to identify specific households which had been surveyed and to re-survey them in 2009 using a survey instrument incorporating identical questions to both the census and the EMNV.

*The availability and use of experienced national survey teams to gather quantitative data.*

By contracting an experienced team of Nicaraguan survey enumerators and supervisors and by working with them on questionnaire design, training of enumerators and field testing of instruments and approaches, the evaluation was able to ensure a very high completion rate with accurate and complete data gathered from each sampled household. This was all done within a very condensed time frame for data gathering. One of the main benefits of relying on experienced local enumerators was a relatively smaller investment required in data cleaning.

The Las Segovias survey team was staffed with supervisors and enumerators with experience in carrying out the Census and the EMNV surveys for INIDE. As a result, the re-survey was able to use exactly the same methodology and approach as the baseline data source surveys. The commonality in methods and instruments (and even enumerators) across the Census, the EMNV and the re-survey is a major strength of the evaluation.

*The importance of training and field testing prior to completing the re-survey.*

The evaluation made a considerable investment in intensive training for the enumeration team and supervisors. It also invested in direct observation of the first week of data gathering by international team members (although the process was entirely supervised by the contracted Nicaraguan survey team). This also contributed to a high coverage rate and very complete data collection (in terms of completion of all sections of the questionnaire).

*The importance of using multiple variables to assess the same impacts.*

Because the evaluation could not totally map out all forms of potential contamination a priori, it was important to include questions which captured different indicators of the same impacts. One concrete example of this comes in the area of improvement of the housing stock. A key indicator of the quality of housing concerns the material used for roofing (thatch, wood, corrugated iron, etc.) and the census and our re-survey clearly included questions on material used. However, a series of major programs aimed at housing improvements was under way in the sample area and it prioritized the communities with the poorest housing stock. This had the effect of improving the quality of housing in precisely those communities which (because they had similar conditions five years ago to treatment communities) had been included in the sample for comparison purposes. Corrugated iron sheets are quite portable and can be delivered during the dry season to even the most isolated communities.

On the other hand NGO and other housing programs did not focus to any great extent on enlarging existing houses. Since community members had to make an important investment decision to add rooms to their houses this was more closely linked to their decision processes and to their access to money and materials. Thus, as an indicator, the number of bedrooms in a house proved more resistant to contamination and showed a strong positive and statistically valid difference in favour of treatment communities.

*The importance of including program staff and using consistent criteria in selecting comparison communities.*

Because the criteria for communities to be considered for support by the PAST program are clear and there is a very strong corporate memory at the municipal level regarding conditions across the selection criteria, it was possible for the evaluation team to meet with technical staff in every single sampled municipality and to identify comparison communities with very similar characteristics to the sample of treatment communities available from the census and the EMNV.

This process will be much more difficult in the future as many of the comparison communities chosen for the study can be expected to take part in PAST supported interventions and the pool of potential comparison communities will shrink dramatically.

### **Factors Contributing to Effective Qualitative Impact Assessment Methodologies**

*Phasing qualitative methods and community interaction after preliminary analysis of quantitative data allowed for enriching both methodologies.*

Because the evaluation design allowed for sufficient time between survey data collection in June and qualitative data collection at the community level in September and October the latter was enriched by the former. In other words, the evaluation team was able to ensure that focus groups, transition mapping exercises, and plenary sessions in each community investigated possible explanations for quantitative findings.

As an example, when quantitative data indicated that community members were securing higher levels of employment, the qualitative inquiry identified a link between training in construction for participating in PAST projects and subsequent employment by municipal authorities.

*Qualitative methods allowed for better delineation of the differences among communities and the explanation for differential impacts.*

Because of the somewhat limited sample size, it was not possible to further subdivide treatment and comparison communities into categories such as geographic zone within a region or by main lines of production or of ethnicity. By carefully selecting communities to participate in the qualitative methods, the evaluation was able to examine more closely some of the differences giving rise to different levels of reported impacts. For example, by carefully selecting communities in RAAN from the coastal lagoons, from the isolated communities along rivers, and from the relatively more prosperous central zones, the qualitative methods demonstrated the importance of good secondary transport connections and other factors which contributed to higher levels of economic impact.

*The qualitative methods also allowed for identification of impacts not covered by quantitative survey data and for an assessment of the priority given to different impacts by beneficiaries.*

One negative impact noted by some communities who have improved road connections has been deforestation and increased logging of “their” forest resources by outsiders who can use the improved roads to access the resources. This negative environmental (and economic) impact was not captured by the census or EMNV and thus could not be captured in the re-survey carried out for the double difference analysis.

*The importance of employing local researchers and using both training and field testing of qualitative methods.*

By field testing the qualitative impact assessment methods in two communities in June 2009 (during the quantitative survey), the evaluation was able to adjust the mapping methodologies and add a new intervention in each community (opportunities and services mapping). This was supplemented by a training exercise for each regional field team in mid-September.

*The involvement of field researchers in a three day workshop to analyze preliminary results strengthened the reporting process.*

By including members of each of the three regional field evaluation teams in the team workshop held in Grenada in early October 2009, the evaluation was able to ensure that each regional perspective was fully reflected in the results reported to the program staff, to MTI and to Royal Danish Embassy staff at that time. Along with the individual community level reports available on-line, this ensured a continued regional perspective throughout the reporting process.

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## 10 Recommendations

The recommendations which follow are not specifically directed to Danida or to the Government of Nicaragua. Rather, they focus on the general subject of financial and technical investments in rural transport infrastructure in Nicaragua. They are intended to answer the question: should investments of the type supported by Denmark through PAST and its predecessor programs continue? Further, if these types of investments do continue, how can they be made as effective as possible?

Notwithstanding the above, the findings and conclusions of the evaluation do strongly suggest that there is merit in Danida undertaking initiatives to share its experience in support of PAST (particularly with the community participation elements of PAST such as MOI) as a potential model for supporting investments in rural transport infrastructure. A wider audience within Danida and among other agencies supporting investments in rural transport infrastructure could benefit from exposure to the lessons learned by PAST.

### 10.1 Securing and Extending Program Impacts

Having demonstrated positive impacts at community, municipal and regional level of Danida support to tertiary transport infrastructure in Nicaragua, the evaluation submits the following recommendations aimed at continuing and, perhaps, broadening these impacts.

1. As indicated repeatedly over the course of the evaluation, the positive impacts arise both directly from the improved access which results from the infrastructure investment and from the way in which support has been provided, through a community-focused program administered through municipal and regional structures and relying on labour-based approaches. The primary recommendation of the evaluation is that (regardless of the source of finances) support to rural transport infrastructure should be continued while maintaining the core elements of the PAST program approach. Further, as the basic architecture of the PAST program has proven effective in producing projects with economic and social impacts, the evaluation recommends strong consideration of expanding the program model to other regions. Similarly, the evaluation recommends that PAST type projects continue to be supported in RAAN, RAAS and Las Segovias for the next 2-3 years or until there are very few communities which meet the current criteria for program support. This would allow the program to take full advantage of the capacities which have been developed in communities and at municipal government level in all three regions.
2. There is an apparent need to better coordinate investments in transport infrastructure so that these investments do not conflict with decisions made at municipal and community level and result in waste and duplication. The evaluation recommends that MTI should implement a consultative framework to involve other key decision makers such as FOMAV and the Institute for Rural Development (IDR) (and bilateral donors) in more coordinated decisions to allocate investment resources to transport infrastructure. The CRTs could play an important role in this

process as regional forums for coordinating across tertiary, secondary and primary transport infrastructure.

3. Despite the progress made in capacity development by the participating municipalities, there is an ongoing need (which varies across municipalities depending on their level of experience with the program) for, in particular, technical support by trained engineering and administrative staff to be provided to municipalities in support of rural transport infrastructure development and maintenance. The Department of Municipal Roads of MTI and the infrastructure commissions or departments of Regional Governments, (where they exist) provide potential sources of technical and administrative support to municipalities. The evaluation recommends that the MTI and the Regional Governments collaborate on a plan to provide technical support to municipalities implementing rural transport infrastructure projects using the PAST model and that the PAST national and regional offices provide needed human resource support to this effort during the remaining transitional phase in the program.
4. Given the apparent correlation between more significant economic impacts created by projects and their ability to link the communities to well developed secondary and primary roads and, ultimately, to urban markets, it might seem logical to modify the criteria for prioritizing projects to give this connection even greater emphasis. The evaluation has found that community members place very high value on the improved access to health and education services and improved transport safety. Thus the evaluation recommends retaining the current emphasis on reduced isolation and the change in physical access as key, but not exclusive, factors in project approval.
5. The evaluation recommends that key stakeholders investigate the possibility of further maximizing the impacts of PAST investments by linking them to other interventions relating to economic and social development at community level. For example, targeted support to private sector development (small village shops or *pulperias* for example), technical and management support to agricultural producers and their associations, market development initiatives, and efforts to strengthen social services. Municipal governments may be best positioned to attempt to identify other sources of economic and social development assistance which could magnify the impact of PAST-supported interventions.
6. The evaluation has also demonstrated the high quality and reliability of the main technical components of the PAST program approach. In particular these include detailed and extensive manuals and guidelines on design, construction, rehabilitation and the maintenance of rural transport infrastructure as well as the guidelines and manuals for community capacity development and community and municipal level participation. The evaluation recommends that these features be retained in national or regional programs of support to investments in rural transport infrastructure in Nicaragua.
7. In order to both sustain investments already made and solidify the institutional basis for continued support to rural transport infrastructure, there is a clear need for continued short-term financial, technical and administrative support to different institutional elements of the PAST system. The evaluation recommends that the program should institute a transitioning strategy and action plan so that, in

particular, PAST national and regional offices can transfer responsibilities to municipalities and to CRTs in an orderly way. This would allow for a more measured and sustainable completion of the decentralization strategy which was so crucial to Component Two during Phase Two of PAST.

The evaluation results indicate that a great deal has been achieved in developing and strengthening the institutional framework to plan, implement and sustain successful investments in rural transport infrastructure in Las Segovias, RAAN and RAAS. On the other hand, there is still work to be done to secure the sustainability of the institutional capacity development which has already taken place. Most specifically, there is a requirement to identify and further strengthen the capacity of some municipalities which were not fully ready for decentralization. There is also a need to establish CRTs on a more sustainable basis with longer term support from the municipalities and, where appropriate, regional governments.

## 10.2 Recommendations on Impact Evaluation

8. The evaluation has clearly demonstrated the essential role of national statistical capacity, especially in the national authorities responsible for the census and national living standards surveys. In particular, national capacity in survey sample design, questionnaire development, survey enumeration and computerized record keeping, data analysis and reporting represent key foundations for successful impact evaluations. National governments and development partners should continue to support their development.
9. The success of the evaluation was also dependant on ready access to Nacional de Información de Desarrollo (INIDE) technical and operational staff on the part of the evaluation team. It also relied heavily on the use of census and survey data, proprietary codes and mapping information which is the property of INIDE. The evaluation recommends that INIDE should continue to share this essential information with evaluation researchers who are working to fulfil mandates for Departments and Agencies of the Government of Nicaragua, including MTI. The availability of much of this data in electronic format on-line greatly facilitated the work of the evaluation.
10. The PAST program's internal system of impact monitoring (SIMOIN) does not include baseline data for comparison communities and does not, therefore, allow for a full evaluation of project impacts. On the other hand, SIMOIN does provide important information on, for example, the growth in traffic volume and intensity in program communities. The evaluation recommends continued gathering and reporting of the SIMOIM information as an important element in the system for monitoring program outcomes.
11. The evaluation recommends that future impact evaluations in the transport sector give careful consideration to following a phased approach with sufficient time scheduled between the quantitative survey and data analysis phase and qualitative field data collection phases. This allows community consultations and intensive qualitative field work to be informed by and help explain (or refute) the findings of quantitative impact analysis.

## 10 RECOMMENDATIONS

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12. During the inception phase of impact evaluations it is essential that the evaluation team is able to verify data availability in the field and to carry out consultations with program and project staff in participating municipalities and communities in order to identify appropriate comparison communities. It is only after such a review that appropriate samples can be developed and questionnaires designed. This is also a pre-condition for a fully costed and realistic survey plan which can then be approved by the project authority.
13. The evaluation recommends that field survey teams take part in intensive training (approximately five full days in the case of the PAST evaluation) and that enumeration in the field is supervised by core evaluation team staff.
14. The evaluation recommends field testing of all participatory, qualitative evaluation methods in advance of the main qualitative data collection period. This should be augmented by a significant allocation of time (three days in the case of the PAST evaluation) to a joint workshop to analyze the main evaluation results. The workshop should include members of all regional qualitative data collection teams.

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## Annex 1: Terms of Reference

### **Rationale for the evaluation**

Danida has been involved in the transport sector in Nicaragua since 1993. Initially, the focus was on rehabilitation and construction of transport infrastructure in the two autonomous Atlantic regions (RAAN and RAAS). A second phase was introduced in 1995, adding institutional development to the infrastructural activities. While the first and second phase focused on RAAN and RAAS as well as institutional support to the Ministry of Transport and Infrastructure (MTI), the third phase, initiated in April 1999 and ending in December 2004, extended to Las Segovias/Region I and was relabelled as the Transport Sector Programme Support (PAST from its Spanish acronym: Programa de Apoya al Sector Transporte). The first phase of PAST was replaced by PAST Phase 2, which covers 2005 to 2009. (Phase 2 is expected to be extended by 1½ year within the overall budget frame).

PAST Phase 1 had five components, but it is the second component – generally referred to as Component Two – which took up the bulk of the programme funding, a total of DKK 166.4 million. Component Two provided support for municipalities in RAAN, RAAS and Las Segovias/Region I to deliver tertiary infrastructure investments. The projects covered were primarily rural roads and bridges that could be built by the communities themselves by means of labour-based techniques. Other projects – wharves for small boats, pedestrian tracks and footbridges – were also included where the communities gave these priority.

In 2006, the component completion report for Component Two found that outcomes were achieved, and judged the support very successful in improving the socio-economic conditions of the communities targeted. However, it also noted that it still was needed to capture the impact in a formal way and recommended an impact evaluation of the support.

The new phase is currently running, still including the Component Two support to rural transport infrastructure, and basically following the same approach, but with an enhanced focus on reaching most of the municipalities in the target regions.

A data availability study was carried out between August and October 2007. The study is published as Evaluation Study 2007/3 in October 2007: *Evaluating the Impact of Rural Roads in Nicaragua*. The study is available as part of the background material for the proposed evaluation. In the Evaluation Study, it was concluded that the presently available programme monitoring data would not in themselves be sufficient for a rigorous quantitative impact study. Following this, three different scenarios were presented and subsequently Danida chose Scenario B, a more general study of the impact of rural roads using multivariate regression analysis as the next preparatory step.

The regression analysis used data available from the Encuesta Nacional de Hogares sobre Medición de Nivel de Vida (EMNV) carried out by the Instituto Nacional de Estadísticas y Censos according to the World Bank's Living Standard Measurement Survey (LSMS) methodology. Four data sets are available covering the years 1993, 1998/99, 2001 and 2005. The general study was carried out between February and July 2008, and will also be available as part of the background material. The recommendation of the general

study was that additional variables should be included in the analysis. Further, in order to investigate the possible reasons behind some of the more unexpected results – such as the difficulty in documenting impact on agricultural factors – qualitative analyses should be added.

The combined findings of the two studies indicate that the existing data sources taken separately will not be sufficient for a rigorous impact assessment. However, there is a potential in combining the various existing data with collection of additional information and using mixed methods. Based on these considerations, it has been decided to carry out an evaluation of the impact of Danida-funded rural transport infrastructure support in Nicaragua, making the best possible use of various sources of existing as well as new data, in order to establish a sound knowledge with respect to the impact of the support.

### **Purpose of the evaluation**

The purpose of the impact evaluation is to contribute to the justification, design and implementation of future rural transport infrastructure programmes in Nicaragua and elsewhere.

### **Objective of the evaluation**

The objective is to assess the impact on the beneficiaries socio-economic situation and physical well being, of the rural transport infrastructure interventions supported by Danida under PAST's Component Two (1999-2004 + completed interventions under the current phase. Where relevant, interventions prior to 1999 may be included). This should be addressed at household and at community level. Further, the objective is to assess whether capacity development and institutional change, as well as other prerequisites for sustainability, have been attained as part of the broader impact of the interventions. This should be addressed at community, municipal and regional level, with the main focus on aspects directly related to transport infrastructure (technical capacity, organizational set-up etc.).

More specifically, the evaluation should include, but not necessarily be limited to, the following:

- Assessment of the economic impact of the interventions, with regard to income and consumption, and potentially production patterns and economic conditions.
- Assessment of the social impact of the interventions with regard to access to education, health and other services.
- Assessment of the broader impact of the interventions with regard to capacity development and institutional change, as part of the prerequisites for sustainability and longer-term impact.

The evaluation should analyse attribution wherever possible, and must address plausible contribution, when data does not allow for specific attribution analysis.

The evaluation should also identify the channels through which these impacts have been realized along with the reasons why the interventions may have produced little or unintended impact. This can be done through a theory-based approach that examines the causal chain from inputs-outputs-outcome-impact, as discussed below. Contextual factors must also be considered.

**Scope**

The evaluation should cover interventions carried out from 1999 and onwards. Where relevant, interventions prior to 1999 may be included, but this should depend on close scrutiny of the interventions to ensure sufficient comparability. For interventions under the current phase, the time of completion must be considered when choosing what interventions to include.

Further, the main focus of the analysis of impact is expected to be on rural roads, and transport infrastructure improvements that relate directly to roads (bridges etc). This is due to the fact that, other things being equal, a larger material with more clearly defined parameters (beneficiaries, access change etc) is expected to be found for rural roads. Interventions related to other types of transport infrastructure should be included, but a differentiated analytical approach may be called for. Separate analysis should be carried out for the various regions involved (RAAS, RAAN and Region I/Las Segovias), since the conditions vary on a number of important points. As part of the evaluation process decisions will be made with regard to the potential weight of the regions in the evaluation.

As mentioned above, the potential socio-economic impact of the interventions relate to the household and community level, and correspondingly data collection and analysis must cover these areas sufficiently. However, a potential broader impact of the intervention relate to capacity development and institutional change at communal, municipal and regional level. This should also be covered by the evaluation; with the main emphasis on the first two levels.

**Approach and methodology**

The evaluation should take a theory-based approach to impact evaluation. Theory-based evaluation (TBE) analyses the causal chain between inputs and impact and critically examines each link in the chain. Doing so requires mapping out the channels through which the inputs provided by the interventions are expected to affect the intended intervention outcomes, in a diagnostic manner. This approach ensures that, whilst the focus is on impact, causes of the obtained results are similarly explored. Within the framework of TBE the evaluation should apply a mixed methods approach combining quantitative analysis and qualitative methods.

The quantitative analysis of the intervention should be as rigorous as possible, given data constraints. This should include a quasi-experimental approach to establish the counterfactual – that is what would have happened had the intervention not taken place, based on the analysis of beneficiaries and comparison groups, potentially supplemented with other forms of analysis. To do so the design can, for instance, take form of a ‘double difference’ approach, with the use of (preferably) propensity score matching, or other approaches such as matched pairs or strategic sampling, to ensure valid comparison groups. It should be noted that establishing the counterfactual will not be a simple task, and may call for combining various approaches and data sources. This could include analysis of trends at national and regional level as well as exploring intra-regional differences, as part of the groundwork for assessing attribution/contribution. Further, the definition and selection of groups of beneficiaries and non-beneficiaries for quantitative comparison may be based on in-depth analysis of qualitative and contextual factors, as well as the above mentioned trend analysis.

The consultant should propose in the Inception Report the optimal quantitative methods based on the availability of data (existing or collected specifically for the evalua-

tion). A variety of data exist, including large monitoring datasets, some baseline data, and a number of national surveys. The programme monitoring data as well as data from screening project candidates should also be considered. The availability of data from other sources in the three areas should similarly be examined (municipalities, regional governments and national and international NGOs etc). The possibilities for conducting the analysis based fully or partially on existing data should be explored. However, it is expected that there will be a need for using multiple existing data sources as well as supplementing with new data collection, e.g. surveys on samples of beneficiaries and/or non-beneficiaries, in order to ensure a sound basis for the evaluation.

Qualitative analysis should be undertaken in order to comprehend the intricacies of the causal chain and to inform and supplement the quantitative analysis, both in terms of establishing the best possible basis for the quantitative analyses, and of investigating and assessing types of impact, that best can be captured to use of qualitative tools. Methods could include PRA techniques, key informant interviews, most significant change approaches etc.

The mix of qualitative and quantitative methods should be designed in order to maximise the usefulness of both types of data in the analysis, and to resolve shortcomings in either type of material. It is possible that retrospective analysis will be needed, as may be strategic sampling. Careful triangulation should be ensured.

It is suggested that the evaluation comprises of three phases as follows:

Phase I consisting of a study of relevant documents; an examination of available data; mapping of the causal chain; and detailed development of methodology including, if necessary, design of field surveys. A field visit will probably be necessary at this stage.

Phase II consisting of carefully planned fieldwork, qualitative and quantitative, as stated in the methodology.

Phase III should focus on analysis of data and qualitative findings, as well as writing of the draft report, which will conclude on the findings, draw lessons learned and make recommendations for similar interventions in the future and, if appropriate, for development interventions in general.

Based on the draft report, a workshop for relevant stakeholders will be organised in Nicaragua. The workshop will discuss main conclusions and recommendations with a bearing on development policy and strategy issues. Based on the outcome of this workshop and on written comments on the draft report, the final evaluation report will be prepared.

The evaluation should follow Danida's Evaluation Guidelines, including the DAC Evaluation Quality Standards.

### **Output**

The outputs of the evaluation correspond to the main tasks described above and consist of the following:

At the end of Phase I an Inception Report, not exceeding 30 pages excluding annexes, is produced. The report should include the evaluation matrix, the proposed methodology, proposed sources of information, the work plan for Phase II and the communication

strategy. The report is submitted to the Evaluation Department for approval. The Inception Report is reviewed by the Evaluation Department and, where appropriate, consultations take place with other key partners and stakeholders before the Evaluation Department signs off the Inception Report.

At the termination of the fieldwork, a Debriefing Note, containing preliminary findings should be presented to the relevant stakeholders at the Danish Embassy, and afterwards to the Evaluation Department in Copenhagen.

Three months after the termination of the fieldwork, a draft Evaluation Report, not exceeding 60 pages, excluding annexes, should be produced according to the Evaluation Department's Layout Guidelines.

The draft Evaluation Report should be presented at a stakeholder workshop in Nicaragua three weeks after the circulation of the report. Additional workshops in the three regions in Nicaragua may also be needed.

Based on the discussions at the workshop and on the written comments from the Evaluation Department, the final Evaluation Report, still not exceeding 60 pages, excluding annexes, should be prepared and delivered not later than six weeks after the workshop. The annexes should contain the reports from the fieldwork, as well as compiled statistics, questionnaires etc., as relevant.

An Evaluation Summary of between three and four pages should also be produced aimed at the broader public audience.

The Evaluation Report should be presented at a workshop in Copenhagen. Finally, a brief 'post-mortem' report (four to five pages) of the evaluation process as experienced by the Evaluation Team. All reports shall be presented in British English and Spanish to facilitate consultation with relevant stakeholders.

### **Composition and profile of the Evaluation Team**

An Evaluation Team, selected through international global tendering, will carry out the evaluation. The organisation of the Team's work is the responsibility of the consultant and should be specified and explained clearly in the proposal.

The Core Evaluation Team should consist of international and local key personnel.

"International Key Personnel" means Key Personnel with an international background, i.a. a degree from an internationally recognised university and the major part of his/her professional experience from assignments within several developing as well as developed countries working for recognised international consultants.

"Local Key Personnel" means Key Personnel with a background in the Recipient Country or another developing country in its region.

Besides the core team it may be relevant to include sub-teams for specific parts of the fieldwork. A description of local partners, associates or subcontractors that could be involved should therefore be included as part of the description of the overall Evaluation Team.

With regard to previous involvement in the rural transport infrastructure activities in Nicaragua, the following criteria for eligibility are applied:

- The individual team members in the Evaluation Team neither have been involved (through identification, formulation, appraisal, implementation or review) with PAST Component Two nor being allied with the implementing organisations. However, minor inputs with a total duration of less than three person-months, and which have not been of strategic importance, will be accepted.

The Evaluation Team should possess the following qualifications and experience:

General qualifications for all team members:

- Higher relevant academic degree;
- At least three years of experience with international development assistance;
- Experience with evaluation of development interventions preferred;
- Fluency in English and Spanish (exceptions can be accepted with regards to fluency in Spanish, if it can be demonstrated that this will not be a hindrance for the tasks of the specific team member).

Specific qualifications for the Team Leader:

- Ten years of experience with international development assistance;
- Three references as Team Leader for multidisciplinary teams;
- Three references of experience in evaluation of development assistance and design;

One reference for each of the following:

- Experience with large-scale impact evaluation;
- Experience with both quantitative and qualitative surveys and analysis;
- Knowledge of rural development and livelihoods, and poverty reduction strategies;
- The Team Leader must be permanent staff of the Tenderer;
- The Team Leader must be an international consultant (as defined above).
- Experience from Nicaragua is preferable.

Specific qualifications for the other team members

Specific qualifications to be covered by the team proven by at least two references for each qualification:

- Experience with evaluation of development assistance;
- Experience with impact evaluation of development assistance;
- Experience with quantitative surveys and econometrics for impact evaluation;
- Experience with qualitative investigation/data collection and PRA techniques for impact evaluation;
- Experience with rural development and poverty reduction (including change in production pattern in rural areas (e.g. agriculture, fishery));
- Experience with technical assistance at country, sector and programme levels;
- Knowledge of rural transport infrastructure;
- Experience with environmental impact issues;
- Experience with labour-based approaches to infrastructure construction;

- Knowledge of gender issues, specifically in Latin America;
- Knowledge of indigenous peoples issues, specifically in Latin America;
- Knowledge of issues related to stakeholder participation and capacity building (esp. community/municipal level); specifically in Latin America;
- Knowledge of development policies, strategies and management.

The Team should cover experience from Nicaragua/Central America:

- Long standing experience from Nicaragua for some team members, including the Atlantic Regions.
- Experience from Latin/Central America for all team members.

It should be stated which of the proposed team members cover which of the above qualifications and experiences.

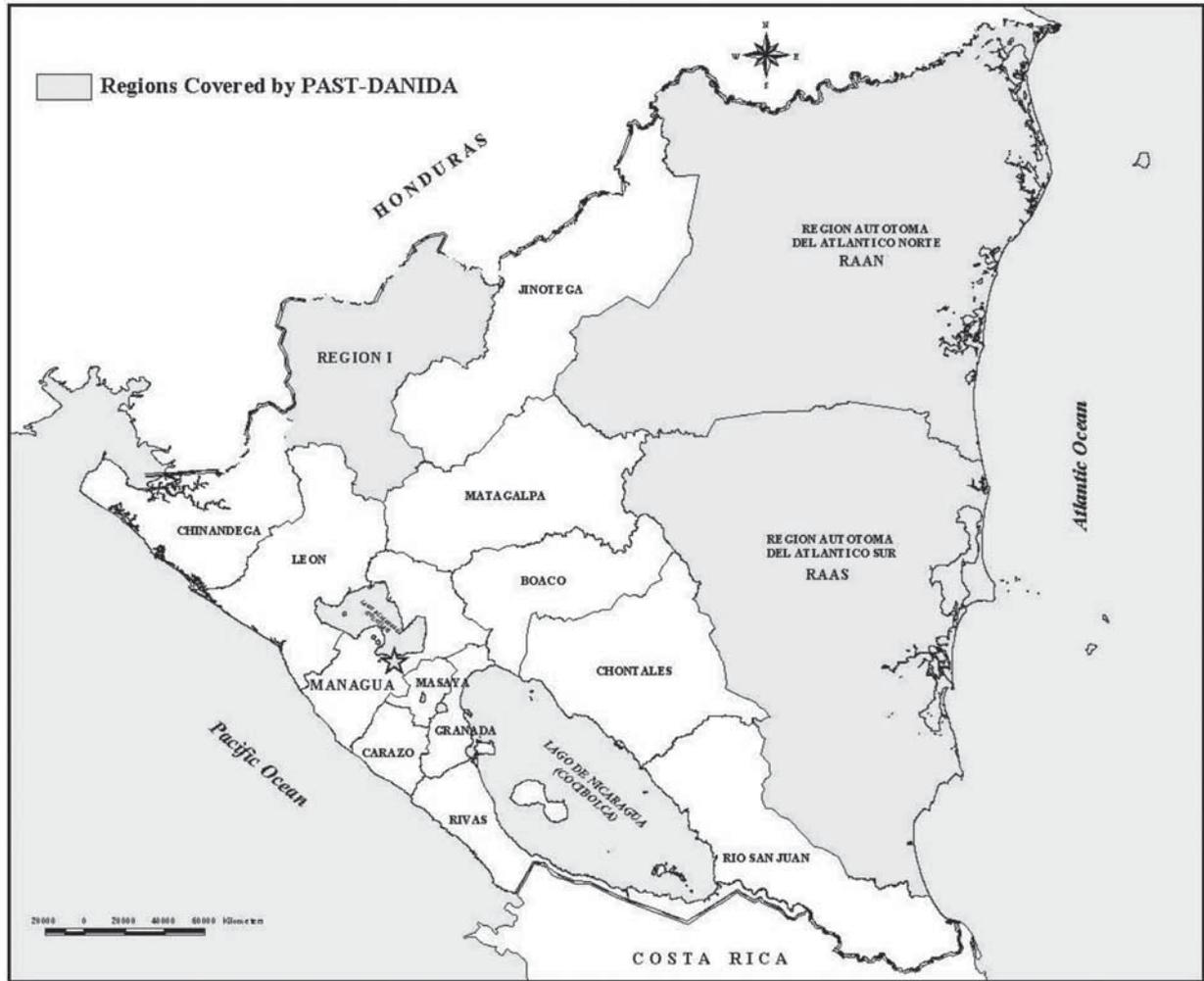
Core team should be composed of both sexes. Smaller teams are preferable. Survey/field teams should consist of men and women from Nicaragua (or with in-depth local knowledge), preferably in equal proportion, and should include people familiar with the Spanish-speaking, rural parts of Nicaragua as well as the ethnically diverse areas of RAAS and RAAN.

#### **Evaluation principles, management and support**

The Evaluation must be carried out in accordance with the Danida “Evaluation Guidelines” (November 2006) as well as the DAC Evaluation Quality Standards 2006. Responsibility for the content and presentation of the findings and recommendations of the evaluation rests with the Evaluation Team. The views and opinions expressed in the report will not necessarily correspond to the views of the Danish Government, the Nicaraguan Government, or the implementing organisations. The Evaluation Report will be available to all relevant stakeholders and will be published online at [www.evaluation.dk](http://www.evaluation.dk). Three sets of roles are contained in the evaluation process: the Evaluation Management, the Peer Review Panel, and the Evaluation Team (Consultant).

Copenhagen 8 August, 2008.





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TO RURAL TRANSPORT INFRASTRUCTURE  
IN NICARAGUA**

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