



VERIFICATION / CERTIFICATION REPORT

JEPIRACHI WIND POWER PROJECT IN COLOMBIA

(Registration Ref No. 0194)

Monitoring period:
31 January 2004 to 31 July 2006.

REPORT No. 2006-2108

REVISION No. 01

DET NORSKE VERITAS



VERIFICATION / CERTIFICATION REPORT

Date of first issue: 2006-11-30	Project No.: 45030051.
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Client: Empresas Públicas de Medellin	Client ref.: Jaime Eduardo Aramburo Penagos

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Summary:
Det Norske Veritas Certification AS (DNV) has performed a verification of the emission reductions reported from the Jepirachi Wind Power Project (Registration Ref No. 0194) for the period 31 January 2004 to 31 July 2006.

In our opinion, the GHG emission reductions reported for the project in the monitoring report of 20 July, 2007 for the period from 31 January 2004 to 31 July 2006 are fairly stated.

The GHG emission reductions were calculated correctly on the basis of the approved monitoring methodology ACM0002 (Version 03) and the monitoring plan and formulas given in the Project Design Document of 15 December 2005.

Det Norske Veritas Certification AS is able to certify that the emission reductions from the “Jepirachi Wind Power Project” in Colombia for the period from 31 January 2004 to 31 July 2006 amount to 48 485 tonnes of CO₂ equivalent.

Report No.:	Subject Group: Environment	Indexing terms	Key words Climate Change Kyoto Protocol Validation Clean Development Mechanism	Service Area Verification
Report title: Jepirachi Wind Power Project in Colombia				Market Sector
Work carried out by: Alfonso Capuchino; Simon Dawes				Process Industry
Work verified by: Einar Telnes				
Date of this revision: 2007-07-31	Rev. No.: 01	Number of pages: 15		

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Abbreviations

ASIC	Administrador del Sistemas de Intercambios Comerciales
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction(s)
CH ₄	Methane
CND	Centro Nacional de Despacho
CO ₂	Carbon dioxide
CO _{2e}	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
EEPPM	Empresas Públicas de Medellín
ERU	Emission Reduction Units(s)
FAR	Forward Action Request
GHG	Greenhouse gas(es)
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
MVP	Monitoring and Verification Plan
N ₂ O	Nitrous oxide
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document
SIN	Sistema Interconectado Nacional
SSP	Superintendencia de Servicios Públicos
UPME	Unidad de Planeación Minero Energética
UNFCCC	United Nations Framework Convention for Climate Change
GWP	Global Warming Potential
XM	Gerencia Operación y Administración del Mercado



1 INTRODUCTION

Empresas Públicas de Medellín has commissioned Det Norske Veritas Certification AS. (DNV) to carry out verification and certification of the emission reductions reported by the “Jepirachi Wind Power Project” (hereafter called the project) for the period 31 January 2004 to 31 July 2006. This report contains the findings from the verification and a certification statement for the certified emission reductions.

1.1 Objective

Verification is the periodic independent review and *ex post* determination by the Designated Operational Entity (DOE) of the monitored reductions in GHG emissions that have occurred as a result of a registered CDM project activity during a defined verification period.

Certification is the written assurance by a DOE that, during a specific period in time, a project activity achieved the emission reductions as verified.

1.2 Scope

The verification scope is:

- to verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan,
- to evaluate the GHG emission reduction data and express a conclusion with a high level of assurance about whether the reported GHG emission reduction data is free from material misstatement,
- to verify that the reported GHG emission data is sufficiently supported by evidence.

The verification shall consider both qualitative and quantitative information on emission reductions. Quantitative data comprises the monitoring reports submitted to the verifier by the project participant. Qualitative data comprises information on internal management controls, calculation procedures, and procedures for transfer, frequency of emission reports, review and internal audit of calculations/data transfers.

The verification shall ensure that reported emission reductions are complete and accurate in order to be certified.

The validation team has, based on the recommendations in the Validation and Verification Manual /14/, applying a risk-based approach, focusing on the identification of significant reporting risks and verifying the mitigation measures for these.

1.3 Description of the Project Activity

Project Parties: Colombia, the Netherlands and Finland

Title of project activity: Jepirachi Wind Power Project



 VERIFICATION / CERTIFICATION REPORT

Registration ref no:	0194
Project participants:	Empresas Públicas de Medellin and International Bank for Reconstruction and Development (IBRD) as the Trustee of the Prototype Carbon Fund (PCF)
Location of the project activity:	Department of Guajira, Area between Cabo de la Vela and Puerto Bolivar, within the region of Uribia.
Project's crediting period:	31 January 2004 to 30 January 2011 (Renewable)
Verification period:	31 January 2004 to 31 July 2006.

The project consists of a wind based generation facility with a nominal power capacity rated at 19.5 MW, located in Wayuu Indigenous Territory in the Northeastern Region of the Atlantic Colombian coast. Since commissioning in January 2004, the wind generators have delivered around 80 GWh to the Colombian National Interconnected System (SIN) under a preferential dispatching scheme.

The project's emission reductions are determined by multiplying the amount of net electricity generated by the project with a validated *ex-post* grid emission coefficient of 0.359 tCO₂e per MWh for the first period of January 31 2004- 31 July 2004; 0.387 tCO₂e per MWh for the second period of August 1 2004 – July 31 2005 and 0.2802 tCO₂e per MWh for the third period of August 1, 2005 – July 31 March 2006. According to the validated project design, there are no project emissions and leakage effects associated with the project.

2 METHODOLOGY

The verification consisted of the following steps:

- A desk review of the Monitoring Report submitted by the project participants as well as additional supporting documents to confirm the calculation of the grid emission coefficient for the three periods: The first period of January 31 2004- 31 July 2004; the second period of August 1 2004 – July 31 2005 and the third period of August 1, 2005 – July 31 March 2006.
- Publishing of the (draft) monitoring report
- On-site visit confirming:
 - o the net electricity supplied by the project to *SIN*
 - o Correct fulfillment of the monitoring plan including checking whether the project meets key sustainable development indicators.
 - o Background investigation and follow-up interviews with personnel of the project developer
 - o Project emission reductions

Verification team

Alfonso Capuchino	DNV Mexico	CDM Verifier / Project Manager
Simon Dawes	DNV Sydney	Sector Expert
Einar Telnes	DNV Norway	Technical Reviewer



Duration of verification

Preparations:	From 11-11-2006 to 13-11-2006
On-site verification:	From 14-11-2006 to 16-11-2006
Reporting:	From 28-11-2006 to 31-07-2007

2.1 Review of Documentation

Project participant deliver all requested documents including the following:

- Project Design Document (PDD) /1/, monitoring report /2/ and project validation report /13/.
- Grid emission factors support data /8/,/10/,/11/ and /12/.
- Project electricity generation logs and Project emission reductions spreadsheets /3/.
- General project management documents /4/, /7/, /9/.
- Sustainable Development Indicators support data /5/ and /6/.

The monitoring report (version 31 October 2006) was made publicly available on the CDM website before the starting of the verification as stated in the Executive Board at its 25th meeting.

2.2 Site Visits

On 14 November 2006, DNV carried out a site visit to the “Jepirachi Wind Power Project” site covering the physical project in the Guajira Region and Empresas Públicas de Medellín offices in Medellín, Colombia.

2.3 Assessment

The assessment performed during the verification enabled the verifier to arrive at a conclusion regarding the realization of the project with regard to the demonstration of accurate and transparent emission reductions. As such, it was indispensable to carry out an on site visit/audit in order to verify that the project is implemented in accordance with the applicable criteria. Furthermore was the on-site visit necessary to check the monitoring data with respect to accuracy of the calculated emission reductions. The following was assessed during the verification:

- Whether all relevant equipment was installed and works as anticipated.
- The operating staff was interviewed and verified their competence in order to ensure correct project operation and emissions reduction report /16/-/29/.
- Existence of and adequate and well implemented management system structure.
- Monitoring parameters.
- The monitoring processes, routines and documentation in order to verify their proper application.
- Information processes and procedures related to generation, collection, transmission, revision and report of project generation and subsequent emission reduction calculation.



- Availability of adequate and accurate external data sources used to determine grid emission factors.

The project operator has provided evidence that all metering equipment was duly calibrated.

2.4 Reporting of Findings

The objective of this phase of the verification is to resolve the requests for clarification and any other outstanding issues which needed to be clarified for DNV's positive conclusion on the GHG emission reduction calculations.

Findings established during the verification may be that:

- i) The verification is not able to obtain sufficient evidence for the reported emission reductions or part of the reported emission reductions. In this case these emission reductions shall not be verified and certified;
- ii) The verification has identified material misstatements in the reported emission reductions. Emission reductions with material misstatements shall be discounted based on the verifiers ex-post determination of the achieved emission reductions.

A forward action request (FAR) should be issued, where:

- i) The actual project monitoring and reporting practices requires attention and /or adjustment for the next consecutive verification period, or
- ii) An adjustment of the MP is recommended.

Corrective action requests (CAR) should be issued, where:

- i) There is a clear deviation concerning the implementation of the project as defined by the PDD;
- ii) Requirements set by the MP or qualifications in a validation opinion have not been met;
or
- iii) There is a risk that the project would not be able to deliver (high quality) CERs.

3 VERIFICATION FINDINGS

3.1 Remaining Issues, CARs, FARs from Previous Validation or Verification

Based on the validation report /13/ the verification team identified no missing steps. The project has been registered as a CDM project on 01 April, 2006 under the reference number 0194.

3.2 Project Implementation

The project is a 19.5 MW nominal power capacity wind farm that consist of 15 1.3 MW rate capacity wind generators manufactured by Nordex (N60/1300). The project has been implemented as described in the PDD /1/ and DNV could verify that the nameplate capacity of the turbines were consistent with the reported capacity.

- Construction phase start on: January 2003.



- Commissioning phase start was done between: 10 October 2003 and 10 April 2004.
- Start of stable generation start initiates between: 18 January 2004 and 16 April 2004.

The total amount of energy is supplied to the National Interconnected System (SIN) through an 8 km 110 Kv line, property of Empresa Carbones del Cerrajon.

3.3 Completeness of Monitoring

The reporting procedures reflect the requirements of the monitoring plan. All relevant data is collected continuously in a transparent and accurate process and stored for a period of at least the whole monitoring period.

During the verification process no lacks of evidence were detected.

The approved monitoring plan defines the sources of data need to be collected in order to calculate emission reductions:

- Net project electricity output for the period chosen from NEON (the official database maintained by XM Company defined as “Manager of the Commercial Interchange System” which is National the official data source.
- All Grid-connected-plants hourly net electricity output for the period chosen.
- All plants hourly bidding prices for the period chosen.
- Dispatch order for every hour, from all the plants taking as a reference the higher bidding price so that the plant with the higher bidding price stay at the top (marginal price)
- All power plants official emission factors in tCO₂/MWh.
- Most recent information available related to plants already built.

The data used was collected by EEPPM from official databases: National Dispatch Centre (CND) via XM Company and from Energy and Mines Planning Unit (UPME).

As defined in the monitoring report /2/ the project is also required to monitor social benefits indicators determined by project operator /6/ and determined for the actual period as follow:

- Desalinization plant: a) Installed plant, b) Energy supply, c) Delivery of operation and maintenance manual, d) Follow up to quality and quantity of water, e) Follow up of quantity of water consumed by family
- Storage of water (jagüeyes): a) No. built and b) No. of appropriate storages
- School enlargement and endowment
- Endowment of the Media Luna local health center
- Arutkajui cemetery closeness.
- Participation and community strengthening program: a) No. of developed program-projects and b) No. of participants.

Social benefits indicators were adequately addressed and completely, but is important to emphasize that desalinization plant operation is a responsibility of the municipality and during the site visit it was identified that maintenance is inappropriate and this could cause deficiencies in water quality and quantity in the near future.



3.4 Accuracy of Emission Reduction Calculations

The CO₂ emission reductions were calculated using the net electricity exported to the Colombian grid. The grid emission coefficient was calculated *ex-post* as a combined margin according to the baseline methodology ACM0002 using official data sources /8/,/10/-/12/ which were evaluated. The emission coefficient was adequately calculated for the first two periods: From 31 January 2004 to 31 July 2004: 0.359 and from 01 August 2004 to 31 July 2005: 0.387. For the third period from 01 August 2005 to 31 July 2006 a mistake was identified in the published monitoring report as the reported value was determined as 0.282, but in the rest of the document it was indicated as 0.2802. This was corrected by project participants delivering a new version of the monitoring report (version of 20 July 2007).

The power generation of the 15 individual power generators was measured by double calibrated meters /4/ meeting the applicable requirements for state of the art operation of such devices. Therefore the accuracy of the generation measurement can be assessed as high. No adjustment to the measured values was necessary in order to ensure for conservative emission reduction calculation.

The system is running stable as could be confirmed during the site visit. 143 994 MWh were submitted to the grid during the monitored period according to reports from Empresas Públicas de Medellin and cross checked with XM company official data base.

3.5 Quality of Evidence to Determine Emission Reductions

The evidences that were submitted to the verification team in order to provide confidence in the provided emission reduction calculation were

- meter readings by the Empresas Públicas de Medellin
- calibration plan and certificates,
- Excel-calculation sheets
- Publicly available data as follows:
 - National Dispatch Centre (CND) Via XM Company: National Energy Demand, Hourly/Daily National Generation by plants, Hourly/Daily Plants Energy Bid prices, Energy generated to cover constraints, National Hydraulic Generation, Dams water levels among others.
 - Energy and Mines Planning Unit (UPME) including Reference Energy and Mines Expansion Plans, Energy and Mines Statistics Bulletins, International Analysis of Electricity Prices, Colombian Electricity Market Magazine, among others. UPME is in charge of the presenting the Indicative Expansion Plan for the energy sector, as well as support the requirement for information from the ministry and from the stakeholders and technical information and chemical analysis of all fuels used within the country.

The presented evidence were found to be consistent, sufficient and appropriate and of high quality. Furthermore all needed information is traceable and appropriately archived.



Empresas Públicas de Medellín has an automated control system where the operation and electricity generated, consumed and exported to the grid is monitored. The readings of the electricity meter are automatically transferred to XM Company as defined in voice and data diagram /9/.

The net amount of electricity generated in the monitoring period is 143 994 MWh. The claimed emission reductions of 48 485 tCO₂e reported for the period 31 January 2004 to 31 July 2006 were verified by reviewing the presented electricity generation monthly reports and crosschecking these with data from the XM Company official database.

3.6 Management System and Quality Assurance

Data was collected according to well defined data collection procedures /7/:

- i) Data of electricity exported is automatically registered on a daily basis;
- ii) The Jepirachi site operations responsible daily analyses operations records including generation and evaluate operation conditions and maintenance requirements.
- iii) Generation information among other operation data are available online to Empresas Públicas de Medellín which monthly process generation data with the MV 90 system with the objective among others to encrypt information and avoid any kind of alteration.
- iv) XM Company (Responsible entity of large range energy contracts, liquidation, billing, collection and payments of the contract values in the energy stock between generators and commercialization organizations).receives and review monthly generation data, with supervision of the Energy and Gas Regulation Commission in order to determine if the generation data is fairly stated.
- v) XM Company send generation observations records for clarification to reconcile this with the generators reports.
- vi) XM Company finally publishes approved values for statistic and billing purposes which are considered as official.

Empresas Públicas de Medellín demonstrate a well structured management system that includes well documented operation procedures; calibration process; records control including back up procedures; competent employees as could be evaluated with CV's and training evidences; well defined employees authorities and responsibilities ensuring that only authorized employees could access to generation records; maintenance process and records and well implemented measuring and data analysis process.

4 PROJECT SCORECARD

Risk Areas		Conclusions			Summary of findings and comments	Error/Discounted Uncertainty Tonnes
		Baseline Emissions	Project Emissions	Calculated Emission Reductions		
Completeness	<ul style="list-style-type: none"> Source coverage/ boundary definition 	OK	OK	OK	All relevant sources are covered by the monitoring plan and the boundaries of the project are defined correctly and transparently.	None
Accuracy	<ul style="list-style-type: none"> Physical Measurement and Analysis 	OK	OK	OK	Equipment calibration has been done as required in the adequate periods. Measurement equipment and process is adequate as required	None
	<ul style="list-style-type: none"> Data calculations 	OK	OK	OK	Calculation was assessed and identified to be correct, accurate and transparent.	None
	<ul style="list-style-type: none"> Data management & reporting 	OK	OK	CAR OK	Third period emission factor was described in the monitoring report as 0.282 but the real value 0.2802 was applied in the emission reduction calculation. Data management is done in a transparent manner and reporting has been done by an adequate and controlled process.	None
Consistency	<ul style="list-style-type: none"> Changes in the project 	OK	OK	OK	There are no changes in the project to date.	None

4.1 Summary of periodic verification findings

Finding No.	Description of the finding	Summary of how findings have been addressed by Project Participant	Assessment of how findings have been addressed
CAR 1	<p>Third Period emission factor calculation was detected with a deviation in the final result. It is reported as 0.282, but after an assessment of the provided documentation it was determined that the correct value is 0.2802. This need to be corrected.</p>	<p>1.- Review the provided version of the calculations in order to identify the difference. 2.- In case is required provide a review version of the updated calculations as well as a review version of the monitoring report which includes this correction.</p>	<p>The project participants provided data applied for the emission factor including a new version of the monitoring report. Evidence was assessed and determined to be correct. As well project participants delivers support information in a easy manner to manage and as determined in the PDD. This CAR is considered close.</p>



5 VERIFICATION STATEMENT

Introduction

Det Norske Veritas Certification AS (DNV) has been engaged by Empresas Públicas de Medellín to examine the greenhouse gas (GHG) emission reductions reported from the Jepirachi Wind Power Project for the period 31 January 2004 to 31 July 2006, equating to 48 485 tonnes of CO₂ equivalents.

Our opinion relates to the project's GHG emissions and resulting GHG emissions reductions reported for the period 31 January 2004 to 31 July 2006 and related to the validated and registered project baseline, and its associated documents. We express no opinion on the baseline of the project. We express no opinion on the data published by the official and recognised sources in Colombia which was used to determine the combined margin emission coefficients.

Responsibilities of the Jepirachi Wind Power Project management of Empresas Públicas de Medellín and DNV

The management of the Jepirachi Wind Power Project is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project Monitoring and Verification Plan dated 15 December 2005. The development and maintenance of records and reporting procedures in accordance with that plan, including the calculation and determination of GHG emission reductions from the project is the responsibility of the management of the Jepirachi Wind Power Project.

It is DNV's responsibility to express an independent GHG verification opinion on the GHG emissions from the project reported for the period 31 January 2004 to 31 July 2006.

Basis of GHG verification opinion

Our verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakech accord, as well as those defined by the CDM Executive board.

Our approach is risk-based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these. Our examination includes assessment, of evidence relevant to the amounts and disclosures in relation to the project's GHG emissions for the period 31 January 2004 to 31 July 2006.

We planned and performed our work to obtain the information and explanations that we considered necessary to provide sufficient evidence for us to give reasonable assurance that the amount of calculated GHG emission reductions for the period 31 January 2004 to 31 July 2006, prepared on the basis of the Monitoring and Verification Plan dated 15 December, 2005, are fairly stated.

We conducted our verification having regard to the Project Design Document including the Jepirachi Wind Power Project's Monitoring and Verification Plan December 15, 2005 and the applied baseline as registered for the project. This assessment included:

- *Collection of evidence supporting the reported data*



- *checking whether the provisions of the monitoring plan and formulas given in the Project Design Document of 15 December 2005 and the Monitoring and Verification Plan dated December 15, 2005 were consistently and appropriately applied*

Opinion

In our opinion, the GHG emission reductions for the Jepirachi Wind Power Project in the period 31 January 2004 to 31 July 2006 as reported in monitoring report version 20 July 2007 are fairly stated.

The GHG emission reductions were calculated correctly on the basis of the approved monitoring methodology ACM0002 (Version 03), the monitoring plan and formulas given in the Project Design Document of 15 December 2005 and the Monitoring and Verification Plan dated 15 December, 2005.

Det Norske Veritas Certification AS is able to certify that the emission reductions from the Jepirachi Wind Power Project for the period 31 January 2004 to 31 July 2006 amount to 48 485 (forty eight thousand four hundred and eighty five) ton CO₂ equivalent.

Oslo, 31 July 2007

Mexico City, 31 July 2007

Michael Lehmann
Technical Director
International Climate Change Service

Alfonso Capuchino
Project Manager



6 REFERENCES

Category 1 Documents:

Documents provided by the Project Participants that relate directly to the GHG components of the project. These have been used as direct sources of evidence for the periodic verification conclusions, and are usually further checked through interviews with key personnel.

- /1/ Empresas Públicas de Medellín: *Project Design Document of the “Jepirachi Wind Power Project”*, version 1.4 of 15 December 2005.
- /2/ Empresas Públicas de Medellín: *Monitoring Report – “Jepirachi Wind Power Project”*: 31 January 2004 to 31 July 2006, of 31 October 2006, and version of 20 July 2007.
- /3/ Empresas Públicas de Medellín: *Jepirachi Wind Power Project Workbook 2004-2006*
- /4/ Empresas Públicas de Medellín: *calibration certificates 2004-2006*
- /5/ Empresas Públicas de Medellín: *desalinization plant water quality monitoring, 2006*
- /6/ Empresas Públicas de Medellín: *Pursuit to the agreements with the Prototype Carbon Fund (PCF) on the Plan of Institutional and Community Invigoration*, August 2006
- /7/ Empresas Públicas de Medellín: *Jepirachi Operacional Procedure*, October 2006
- /8/ Unidad de Planeación de minas y energía: *emisión coefficients from all plants connected to the Colombian grid*
- /9/ Empresas Públicas de Medellín: *Projec’s electrical and voice & data diagrams*, September 2003.
- /10/ Unidad de Planeación de Minas y Energía: *list of most recently built power plants 2004-2006*
- /11/ Centro Nacional de Despacho: *Real Generation Neon database 2004-2006*
- /12/ Centro Nacional de Despacho: *Electricity Bidding Prices Neon data base 2004-2006*
- /13/ SGS United Kingdom Ltd: *Validation Report – “Jepirachi Wind Power Project”*. CDM Val.0004, 15 December 2005.

Category 2 Documents:

Background documents related to the design and/or methodologies employed in the design or other reference documents. Where applicable, Category 2 documents have been used to cross-check project assumptions and confirm the validity of information given in the Category 1 documents and in verification interviews.

- /14/ International Emission Trading Association (IETA) & World Bank’s Prototype Carbon Fund (PCF): *Validation and Verification Manual*. <http://www.vvmanual.info>.
- /15/ CDM EB: *Approved baseline and monitoring methodology ACM0002 - Consolidated methodology for grid-connected electricity generation from renewable sources*. Version 03, 30 September 2005.

**Persons interviewed:**

Persons interviewed during the initial verification, or persons contributed with other information that are not included in the documents listed above.

- /16/ Ana María Sandoval Sastre, Especialista de planeación
- /17/ Camilo Ernesto Garizabal Carmona, Ingeniero
- /18/ Carlos Alberto Osorno Giraldo, Jefe de Área
- /19/ Carlos Mario Méndez Gallo, Subgerente Ambiental
- /20/ Fernando Raúl Colorado Gil, Gestor relaciones con la comunidad
- /21/ German Darío Echavarría Giraldo, Auxiliar servicios y mantenimiento
- /22/ Jaime Eduardo Aramburo Penagos, Especialista de planeación
- /23/ Jaime Raúl Echavarría Beltrán, Auxiliar administrativo
- /24/ Oscar Alonso Fernández Taborda, Especialista de planeación
- /25/ Walter Jose del Río Duque, Ingeniero
- /26/ Alonso Uriana- operador
- /27/ Ana González- Directora de Fundación Anna Wata Kai
- /28/ Nancy Gutiérrez- Líder de la Fundación Anna Wata Kai
- /29/ Leonel Inciarte- Director del Instituto de Estudios Ambientales de la Universidad de la Guajira.

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