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**Environmental management —  
Guidelines for establishing good  
practices for combatting land  
degradation and desertification —**

Part 2:

**Regional case studies**

*Management environnemental — Lignes directrices pour  
l'établissement de bonnes pratiques pour combattre la dégradation et  
la désertification des terres —*

*Partie 2: Études de cas régionales*

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 207, *Environmental management*, Subcommittee SC 5, *Life cycle assessment*.

A list of all parts in the ISO 14055 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

Land degradation and desertification are fundamental and persistent problems that have long been recognized. They are caused by climate variability (e.g. drought and floods), other natural factors and unsustainable human activities, such as over-cultivation, overgrazing, deforestation, over-extraction of water, impacts of construction activities and unsustainable irrigation practices. These activities can lead to loss of vegetation and biodiversity, declining water supply and poor water quality, soil erosion and the loss of soil fertility and structure. The consequences in the medium to long term are loss of agricultural and economic productivity, loss of soil quality and function and loss of ecosystem services, including biodiversity loss and adverse social impacts.

The IPCC Special Report on Climate Change and Land, Summary for Policymakers, noted that “human use directly affects more than 70 % of the global, ice-free land surface” and that “about a quarter of the Earth’s ice-free land area is subject to human-induced degradation”<sup>[3]</sup>. Le et al.<sup>[4]</sup> estimated that at least 3,2 billion people were affected [by land degradation], while Barbier and Hochard<sup>[1][2]</sup> estimated that 1,33 billion people were affected, of which 95 % were living in developing countries<sup>[5]</sup>.

Land degradation is a driver of climate change through loss of carbon stocks in vegetation and soil, albedo changes and reduced capacity to sequester carbon as soil fertility declines. Furthermore, land degradation is exacerbated by climate change; for example, through reduction in ground cover caused by increased incidence of drought, and enhanced erosion caused by increased frequency and intensity of storms.

Recognizing the significance of land degradation leading to desertification in dryland areas, the United Nations Convention to Combat Desertification (UNCCD)<sup>[6]</sup> was developed to combat desertification and mitigate the effects of drought in dryland regions, particularly in sub-Saharan Africa. The UNCCD recognizes desertification as a social and economic issue as much as an environmental concern. Therefore, it has a major focus on fighting poverty and promoting sustainable development in areas at risk of desertification. Parties to the UNCCD agreed to implement national, regional and subregional action programmes, and to seek to address causes of land degradation, such as unsustainable land management. This document is intended to complement and support the activities of the UNCCD by providing guidance to land managers on the establishment of good management practices that, when implemented, will reduce the risk of land degradation and desertification and assist in rehabilitation of lands affected by degradation. Land managers expected to benefit from the document include land users, technical experts, private and public organizations, and policymakers involved in the management of land resources for ecological, productivity, economic or social objectives.

The purpose of this document is to provide case studies, in support of ISO 14055-1, on the management of land degradation from all hemispheres of the globe and across tropical, sub-tropical and temperate climates, and from a variety of topographical areas, including deserts, wetlands and marginal landscapes. Participating communities include those with poor economic profiles and limited resources, and those evidencing some wealth and access to technology and the benefits of research.

This document aims to make ISO 14055-1 more relevant and understood, and to promote its use through an illustration of regional case studies and examples that support the Sustainable Development Agenda 2030<sup>[7]</sup> of SDG 15 (life on land) and SDG 13 (climate action). This document engages a broad range of stakeholders and countries to benefit from their initiatives in combatting environmental degradation and desertification.





# Environmental management — Guidelines for establishing good practices for combatting land degradation and desertification —

## Part 2: Regional case studies

### 1 Scope

This document provides regional case studies of good practices in land management to prevent or minimize land degradation and desertification in support of ISO 14055-1:2017.

The case studies are presented to facilitate the application of ISO 14055-1 across a wide of range of geographical and local conditions.

NOTE The cases studies are presented as different ways of applying good practice and do not preclude alternative ways of applying good practices in accordance with ISO 14055-1.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14055-1:2017, *Environmental management — Guidelines for establishing good practices for combatting land degradation and desertification — Part 1: Good practices framework*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14055-1:2017 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

### 4 Abbreviated terms

AVCF	agricultural value chain finance
BAMB	Botswana Agricultural Marketing Board
C-BP	clearing and brush packing (in brush packing restoration method)
CBO	community-based organization
CEDA	Citizen Entrepreneurial Development Agency, Botswana
CLDS	composite land development sites

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CNFR	Comisión Nacional de Fomento Rural (National Rural Development Commission), Uruguay
CO	clearing only (in brush packing restoration method)
CONICET	Consejo Nacional de Investigaciones Científicas y Técnicas (National Scientific and Technical Research Council), Argentina
CRILAR	Centro Regional de Investigaciones Científicas y Transferencia Tecnológica de La Rioja (Regional Center for Scientific Investigation and Technology Transfer of La Rioja), Argentina
CRS	clearing and re-seeding (in brush packing restoration method)
CRS-BP	clearing, re-seeding and brush packing (in brush packing restoration method)
CSA	climate smart agriculture
CSRS-BP	clearing, soil disturbance, re-seeding and brush packing (in brush packing restoration method)
DPAP	Drought Prone Area Programme, India
DPSIR	drivers/pressure/state/impact/response
EU	European Union
FAO	Food and Agriculture Organization
GIS	geographic information system
HDI	human development index <a href="https://standards.iteh.ai/catalog/standards/sist/586dbd73-90be-46d5-8929-e8ab035f6645/iso-tr-14055-2-2022">ISO/TR 14055-2:2022</a>
ICAR	Indian Council of Agricultural Research <a href="https://standards.iteh.ai/catalog/standards/sist/586dbd73-90be-46d5-8929-e8ab035f6645/iso-tr-14055-2-2022">-2-2022</a>
IFD	intervenciones físicas demostrativas (demonstrative physical interventions), ECONORMAS programme
IICA	Inter-American Institute for Cooperation on Agriculture
IMSD	Integrated Mission for Sustainable Development, India
IPM	integrated pest management
ISPAAD	Integrated Support Programme for Arable Agriculture Development, Botswana
KAZA TFCA	Kavango–Zambezi Transfrontier Conservation Area, Botswana
LADA	Land Degradation Assessment in Drylands, Argentina
LDN	land degradation neutrality
LULC	land use/land cover
NDB	National Development Bank, Botswana
NDVI	normalized difference vegetation index
NGO	non-governmental organization

ONDyD	Observatorio Nacional de Degradación de Tierras y Desertificación (National Observatory of Land Degradation and Desertification), Argentina
PBE	Proyecto Básico y Ejecutivo (basic and executive project), ECONORMAS programme
RS	remote sensing
SDG	Sustainable Development Goal
SEZ	special economic zone
SFR	Sociedad De Fomento Rural (Rural Development Society), Uruguay
SLM	sustainable land management
UC	no clearing (control plot) (in brush packing restoration method)
UNCCD	United Nations Convention to Combat Desertification
UNSD	United Nations Sustainable Development Framework
USD	United States dollar
WAWD	Water Access and Wasteland Development, Pragya project, India
WMP	Watershed Management Programme, India

## 5 Presentation of case study examples

This document provides examples of measures undertaken to reduce the impact of land degradation. Wherever possible, the examples were selected to demonstrate challenges in different climatic zones – temperate, sub-tropical, tropical – as well as different geographical regions (see [Figure 1](#)). The studies have been compiled according to a template so that the logic of each study is properly described, and the relevant good practice emphasized. The relationship between the template and the relevant guidance is shown in [Figure 2](#).

The case studies provide examples of the application of technology, the development of restoration and conservation techniques, stakeholder engagement and innovation, and the alignment of socio-cultural practices. Some projects have been undertaken with international co-operation and support and the participants are described in the study.

The vernacular is used in many case studies and the description of some terms can be found from other sources.

The actions, results, proposals and conclusions described or made within each case study are solely with respect to the particular case study conditions and not intended as a general requirement, recommendation or permission in relation to the use or application of ISO 14055-1:2017.



**Key**

Symbol	Location	Clause	Case study	Focus
1	Costa Riojana	<a href="#">6</a>	A	Community education and sustainable livelihoods
2	Madhya Pradesh	<a href="#">7</a>	B	Use of GIS and RS
3	western Rajasthan	<a href="#">8</a>	C	Sand dune stabilization
4	Ladakh-Kinnaur	<a href="#">9</a>	D	Water supply for irrigation and household use
5	Pandamatenga	<a href="#">10</a>	E	Food security and value chain analysis
6	D’Nyala Nature Reserve	<a href="#">11</a>	F	Restoration after woody clearing
7	Valles Calchaquíes	<a href="#">12</a>	G	Regional cooperation to combat desertification and drought
8	Irauçuba			
9	Chaco Paraguayo			
10	Tala			

NOTE Source: Base map: <http://equal-earth.com>.

**Figure 1 — Location of case study examples**

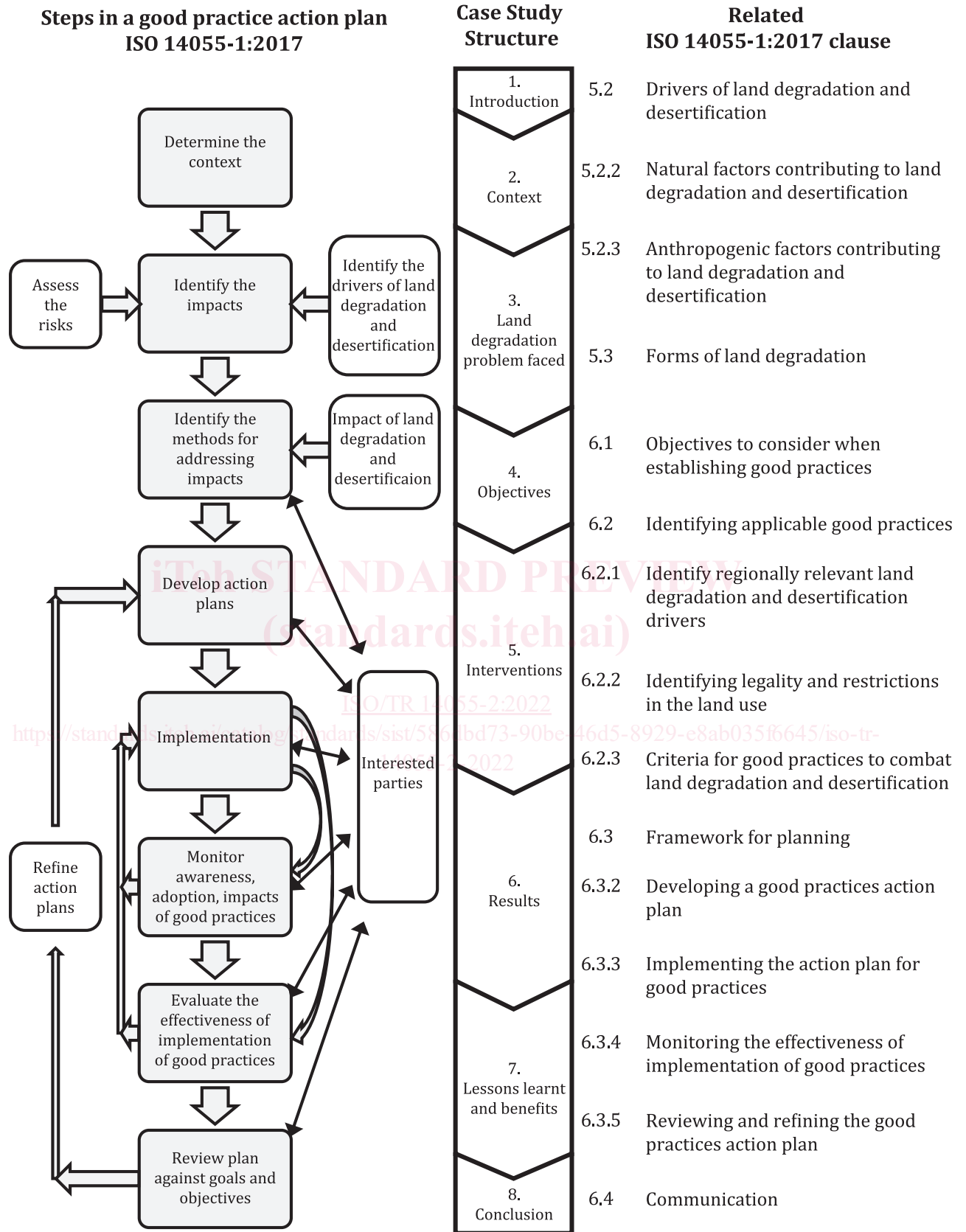


Figure 2 — Case study structure and related ISO 14055-1:2017 clause

## 6 Case study A — Community education and sustainable livelihoods for land degradation management in the sub-montane La Rioja province, Argentina

### 6.1 General

In 2011, Argentina formed the National Observatory of Land Degradation and Desertification (ONDyD) as a network of institutions and researchers. This was an outcome of the report on evaluation of desertification in Argentina, under the Food and Agriculture Organization (FAO) Land Degradation Assessment in Drylands (LADA) project<sup>[9]</sup>. In 2013, the Regional Center for Scientific Investigation and Technology Transfer of La Rioja (CRILAR), under the National Scientific and Technical Research Council (CONICET), located in Anillaco, La Rioja province, became a member of the ONDyD. The province of La Rioja is located in the northwestern sub-montane region of Argentina and is a semi-arid area which faces severe droughts and desertification.

The Costa Riojana, La Rioja, was selected as a pilot site for an ONDyD project to collect information about the state, trends and risks of soil degradation and desertification in the area. The purpose was to develop recommendations for the prevention, control and mitigation of damages to the land, so as to assist the decision-making process in relation to environmental management by both the private and public sectors. The members of the ONDyD project team are from the CRILAR-CONICET.

First, the people of the pilot site, including the representatives of the community, were invited to a workshop that had been organized. After analysing the answers, it was concluded that one of the main causes of desertification during the previous years was the indiscriminate cutting down of mesquite trees (*Prosopis* sp.).

Next, an alternative was proposed: to incorporate the mesquite fruit into the human diet. This would not only promote a healthy diet, but would also promote a sustainable process that would use each and every available resource without damaging or negatively impacting the environment.

One challenge was weather conditions that restrict the use of large portions of the land for agricultural activity. This also resulted in a growing desire to generate work opportunities and productive projects to improve the quality of life for the residents of the area. It was concluded that the most viable solution was the use and care of the mesquite tree. After years of evolution in the area, the native mesquite tree, or “algarrobo” in Spanish, is able to survive the lack of water and climatic variations. The trees survive plagues, their production costs are low and they do not involve much care.

There are different mesquite species, e.g. white mesquite (*Prosopis chilensis*) and black or sweet mesquite (*Prosopis flexuosa*), which are frequent in the Costa Riojana and have multiple applications. Unfortunately, the main demand is for the wood, which is used for firewood due to its high heat capacity, causing deforestation, soil erosion and loss of the vegetation cover.

There are multiple advantages in focusing on the mesquite fruit that would improve the quality of the life of the residents of the area. First, they are excellent sources of protein and good carbohydrates. Second, they can either be consumed fresh or processed. Third, they would help to control nutrition problems in rural areas. Finally, their industrialization would generate new job opportunities.

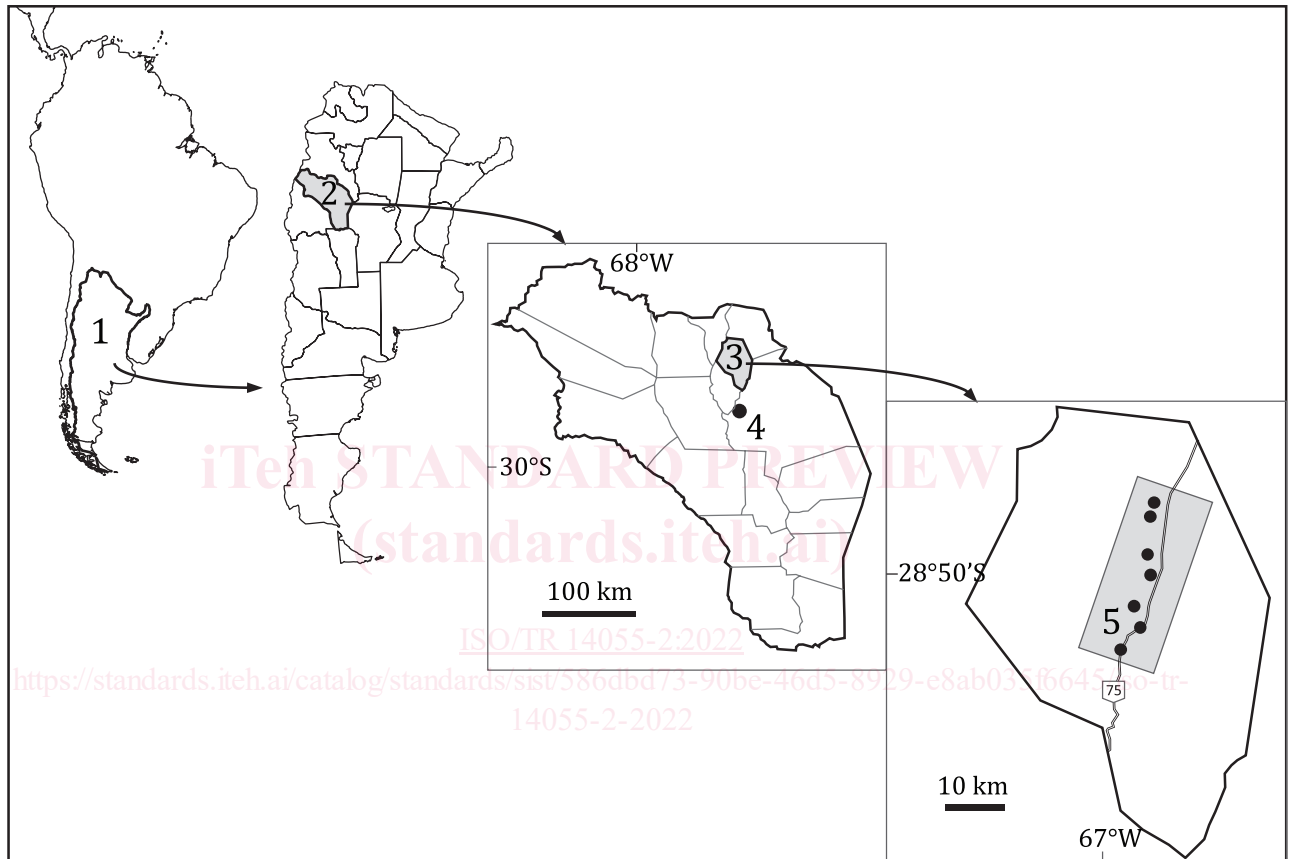
The mesquite fruit is a pod with pulp (smaller in the white mesquite tree and larger in the black one) that contains many seeds that can be used to feed animals. Unfortunately, only a few do so. The pulp corresponds to the mesocarp, it is sugary, very sweet, sticky, visibly developed, with an approximate thickness of 1,5 mm to 2,0 mm. The natives used it in pre-Hispanic times. This was verified in archaeological remains.

The use of the mesquite fruit is the solution for many problems of the pilot site Costa Riojana. It would improve a healthy diet, would help nutrition and would generate jobs opportunities, while avoiding soil degradation and desertification.

## 6.2 Context

### 6.2.1 Location

The ONDTyD pilot site of Costa Riojana, is located in La Rioja province, northwestern Argentina (see [Figure 3](#)). The area under study is bounded by a polygon with the following coordinates: northeast corner at 28° 45' 16,90" S 66° 48' 28,17" W; northwest corner at 28° 42' 10,73" S 66° 57' 10,51" W; southwest corner at 28° 57' 56,41" S 67° 3' 31,91" W; and southeast corner at 29° 0' 44,40" S 66° 56' 46,81" W.



#### Key

- 1 Argentina
- 2 Costa Riojana (La Rioja Province) in Argentina
- 3 Castro Barros Department in the La Rioja Province
- 4 La Rioja city
- 5 study area and sites along Highway 75 in Castros Barros Department

NOTE Source: <http://equal-earth.com>; [https://commons.wikimedia.org/wiki/File:Argentina\\_-\\_mapa\\_de\\_las\\_provincias.svg](https://commons.wikimedia.org/wiki/File:Argentina_-_mapa_de_las_provincias.svg).

**Figure 3 — Location of the ONDTyD pilot site at Costa Riojana**

### 6.2.2 Physical features

#### 6.2.2.1 Climate

The climate is semi-arid, with rainfall that does not exceed 180 mm per year. The minimum winter absolute temperature can reach  $-12\text{ }^{\circ}\text{C}$  and the maximum absolute summer temperature is  $38\text{ }^{\circ}\text{C}$ . The average annual temperature is  $16,8\text{ }^{\circ}\text{C}$  (2000 to 2008 period). Frost occurs between the months of June